Eyre Peninsula Coastal Action Plan
and Conservation Priority Study
VOLUME 2

Australian Government

Government of South Australia

Eyre Peninsula Coastal Action Plan

and Conservation Priority Study

2011

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This plan is a coastal conservation assessment and coastal action plan for the Eyre Peninsula coast between Two Hummocks Point in Spencer Gulf to the eastern boundary of Wahgunyah Conservation Park and builds upon the Conservation Assessment of the Northern and Yorke Coast, the Southern Fleurieu Coastal Action Plan and Conservation Priority Study, the Far West Coastal Action Plan and Conservation Priority Study and Metropolitan Adelaide and Northern Coastal Action Plan.

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Back cover: Eastern Osprey (*Pandion cristatus*), Andrew Brooks; Lake Newland CP, Louise Mortimer.

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Introduction

The purpose of this study is to understand and facilitate the conservation, protection and management principles of the coastal resources of the Eyre Peninsula (EP) Natural Resource Management (NRM) region[1], and to establish conservation priorities for places and areas within the region. The study aims to provide a rational basis for conservation priority actions and places within the defined coastal region; it suggests actions to address threatening processes at specific locations within the region. The study also establishes a coastal database in map and table form, as a tool for ongoing adaptive management.

The report has been divided into two volumes:

Volume 1 of the report includes the rationale for the study, the data on which it is based, the methodology of valuing the data and placing it on digital maps, regional overviews of conservation values and threats and regional management proposals.

Volume 2 presents the results of the GIS study for the region including the GIS results for each coastal sub-region, or 'cell', the results of field and desk based investigation, as well as consultation with key players. Actions to reduce threats are recommended, and prioritised (within the region) from the conservation and threat analyses. Thus description, conservation values, threats and actions are brought together at the local level, but within a regional context. It is hoped this will assist individuals, groups and organisations working on sustainable management of coastal areas at the local scale.

[1] Wahgunyah Conservation Park has not been included in the study area although it falls within the Eyre Peninsula Natural Resources Management Region; Wahgunyah Conservation Park was included within the Far West Coastal Action Plan and Conservation Priority Study

5 Conservation and threat summary

This project has defined 85 coastal cells making up the Eyre Peninsula coast, and has assembled themes of conservation values and threatening processes. The data has been valued and the values placed on geographic information system (GIS) maps in detail, to the raster point level (25 × 25 m). This analysis has contributed to the cell descriptions detailed in section 6.3.

In addition, conservation values and threatening processes have been summed and averaged. Conservation values from all 32 conservation themes were summed and averaged for each cell and defined as 'highest', 'medium' or 'lowest' value according to breaks in the distribution of values (Figure 5.1). A similar process was used for the 19 threatening processes (Figure 5.2).

Note: The terms 'highest', 'medium' or 'lowest' for conservation value and threat total are comparative terms for the region only. They do not imply high or low value within the state or nationally. Thus a cell summarised as lowest value within the Eyre Peninsula coastal zone might, for example, be high value within the Southern Fleurieu region. However, the three categories allocated to cells, based on current available information, inform and prioritise management decisions and actions. Additional information can easily be added as it becomes available, and values and priorities may change in some areas.

5.1 Conservation and threat summary results

Figure 5.1 below shows the distribution of conservation priorities obtained by summarising the mean values of conservation layers for cells. If looked at broadly, the regional distribution of all cell conservation means values gives a clear contrast between the eastern Gulf coast (those cells facing E to SE and are north of Cape Catastrophe) and the western Southern Ocean coast (those cells facing South and South West, i.e. cells EP32 to EP85). The Gulf facing coast has 48% of the cells with mean conservation totals in the 'lowest' category; while the Southern Ocean coast has only 14.8% of cell means in this category. The Gulf coast has more cells with less remnant vegetation (29% of cells are more than half cleared), have many low scoring wetlands, and have slightly higher means for vegetation block degradation. The Ocean facing coast has only 15% of cells more than half cleared, has extensive high scoring dune areas, and has a great variety of habitats.

The distribution of summarised threat values (Figure 5.2) shows a similar distinction between the Gulf coast and the Southern Ocean coast. Sixty-eight percent of Gulf coast cells have a summarised threat value in the 'highest' category, while only 35% of Southern Ocean coast cells are in this category. Amongst the individual threat layers, Gulf Coast cells have 21 out of 31 cells with higher than median values for land use threat; in addition 24 out 31 of these cells have higher than median scores for land ownership. Nineteen out of the 31 Gulf Coast cells have mean ORV totals higher than the median ORV cell mean score for the region. Some other comparisons between the Gulf coast, the Southern Ocean coast and the total study area are shown in Table 5.1.

Fifty- six of the 85 cells defined within the region (or 65.8%) were written up as detailed cell descriptions. Time and space in the final report, did not allow all cells to be detailed. The cells that have been written up in detail consisted of: all cells identified as having high conservation; all cells with medium conservation and high threat, and; all cells with medium conservation, a medium or low threat, which had a conservation value over 100.

TABLE 5.1 Comparison of values, habitats and protection between the Gulf coast, Southern Ocean coast and total study area

	Gulf coast	Southern Ocean coast	Total study area
Number of cells	31	54	85
Ave cell area	1,268.7 ha	2,859.7 ha	2,279.4 ha
Cells with highest conservation value	16%	40%	32%
Cells with medium conservation value	35%	44%	41%
Cells with lowest conservation value	48%	14%	27%
Cells with highest threat value	68%	35%	47%
Cells with medium threat value	19%	33%	28%
Cells with lowest threat value	13%	32%	25%
Area of remnant vegetation	74.7%	71%	71.8%
Area of salt marsh / mangrove	32.8%	7.2%	12.4%
Area of remnant vegetation that is salt marsh / mangrove	43.9%	10.1%	17.3%
Area of coastal sand dune	9.3%	37.5%	31.8%
Area of vegetated sand dune	8.9%	26.8%	23.2%
Area of unvegetated sand dunes	0.4%	10.7%	8.7%
Area protected within NP, CP, CR, WPA, HA or AqR	20.3%	48.5%	42.8%
Area of remnant vegetation that is protected within NP, CP, CR, WPA, HA or AqR	25.9%	52.8%	47.1%

If the mean cell values which make up the list of cells written up are examined as a spread sheet of individual conservation layers some patterns emerge. First, the cell values were ranked for each layer: thus, for example, layer 1B (rarity of plant associations) the highest mean cell value was 7.91, the lowest value was zero, and the middle ranking – median – was 6.00. Those layers with many high scores, as shown by a high median value, were identified as those factors which contributed most to cells accumulating a high score. These layers were: 1B, rarity of plant associations within the state; 2A, endemicity of plant associations to the region (only or mainly found within the region); 6, habitat for significant butterfly species; 8A, viewshed analysis (% of the cell visible from the sea); 9A, vegetation patch size; 9B, vegetation patch connectivity; 9D, vegetation patch shape; 10A, indigenous heritage. At the other end of the scale, some layers had such low scores that they had little impact on the results. These were cells with their highest ranked scores below 2: 2B salt marsh endemicity; 9C, the presence of very small vegetation patches; 10B, non-indigenous heritage; and 10C geological heritage. (It should be noted that these low scoring variables were also used in other regions, sometimes with stronger results, and although they do not contribute significantly to the overall scores, may be quite important locally). These considerations lead to some regional comments from the GIS analysis that underline and develop the comments in the flora chapter (section 3.1). Vegetation rarity and endemicity within the state underline the uniqueness of these habitats, and the difference between the Eyre Peninsula region and the rest of South Australia.

The summarised conservation and threat values shown in Figures 5.1 and 5.2 can assist managers in prioritising areas and management actions at a regional scale. However, it should be noted that a cell with a 'lowest' or 'medium' summarised conservation value may contain areas within the

cell of high value which are significant for the region and under distinctive threat. Localities where this occurs are found within the detailed cell descriptions (for the cells that have been written up, section 6.3). Each of the detailed cell descriptions includes local management actions that were identified and prioritised during the analysis. The management actions for all the cells were then reviewed to develop regional management actions.

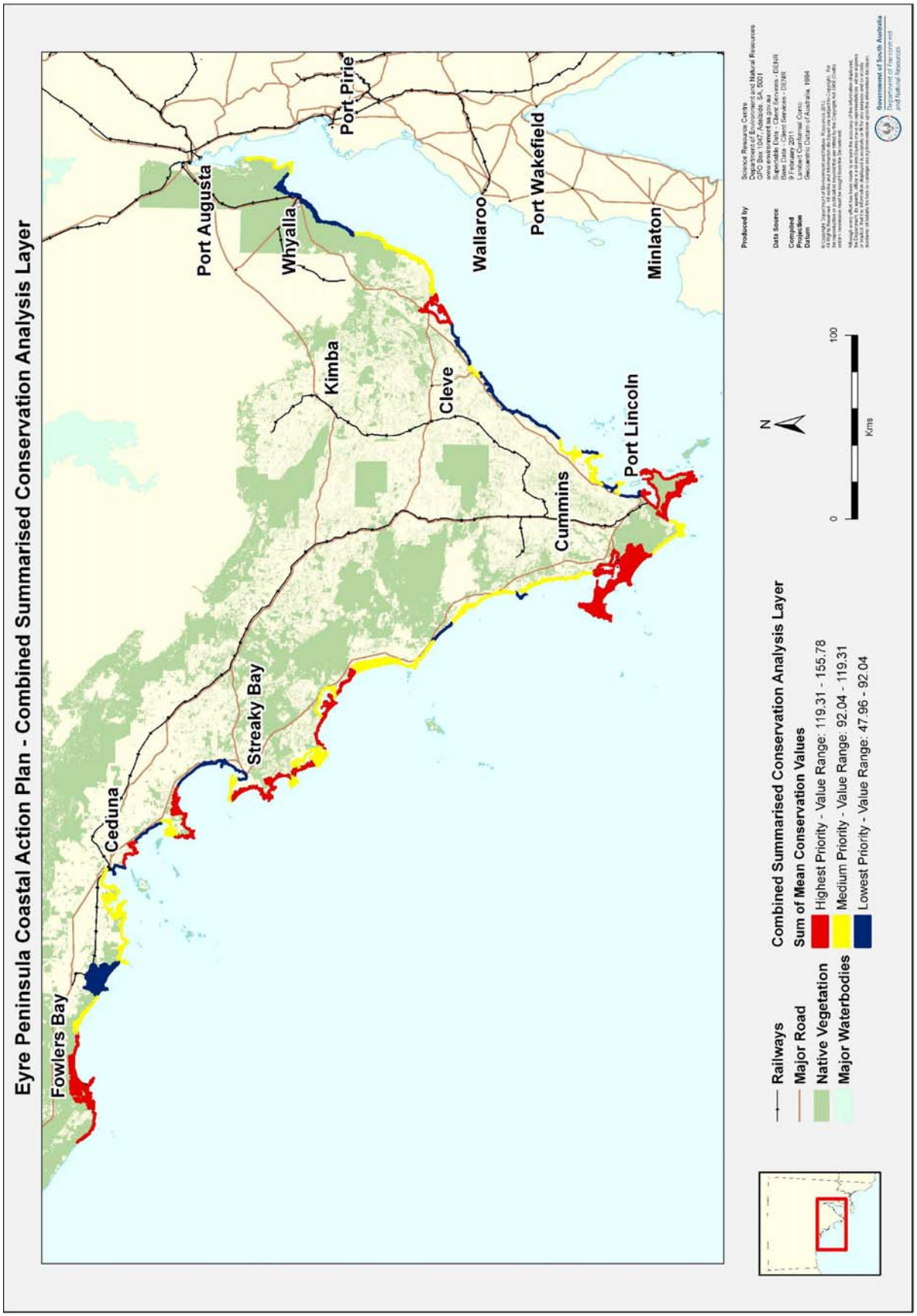


FIGURE 5.1 Combined conservation priority values by cell

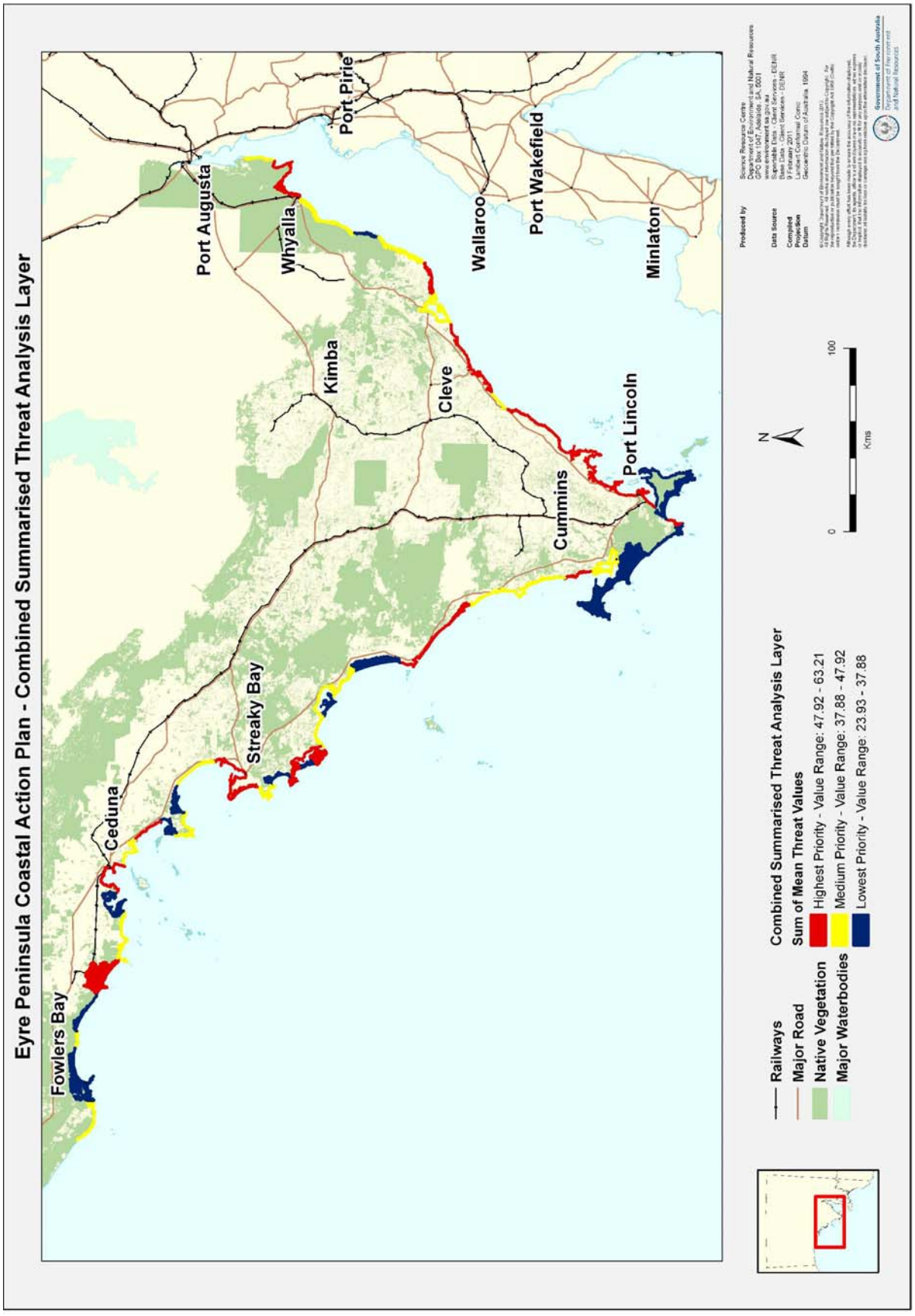


FIGURE 5.2 Combined threatening process values by cell

6 Cell descriptions

6.1 Constructing the cell descriptions

It was not possible to provide a detailed description for all 85 cells within this project. However, 56 of the cells have been written up in detail, these consisted of: all cells identified as having high conservation; all cells with medium conservation and high threat, and; all cells with medium conservation, a medium or low threat, which had a conservation value over 100.

Construction of the detailed cell descriptions in Section 6.3 is shown in Table 6.1., below.

TABLE 6.1 Cell description template

Paragraph in coastal cell description	Source of information
Landforms	The DENR internal GIS system – 'Envmaps'. Reference materials.
Benthic Habitat	Envmaps
Biota	Floristic vegetation maps.
Land use/ land ownership	Envmaps
Uses Threats Opportunities	Field appraisals. Information from, and discussions with community members and government officers working on coastal projects in the area. Analysis of aerial and oblique photography. Current management plans.
Conservation analysis (GIS) Threats analysis (GIS)	Analysis of state and museum databases, with supplementation by experts; ranking of conservation and threat data. Spatial summation and analysis by SRC, Client Services, DENR.
Climate change impacts	Analysis by the consultant of the IPCC (2007) and CSIRO (2008) projections for South Australia. Interpretation at a local scale of possible resulting changes in biophysical systems.
Actions	Derived from information above, including consultation with key players
Priority assigned to actions	Categorisation of priority was decided by the project team and other key players. Priority depended on (i) GIS Analysis; (ii) Key players within the locality; (iii) Potential hazard to life and property. This is further detailed below.
Biota	State and museum databases with supplementation from experts

6.2 Prioritising actions

In the cell descriptions (Section 6.3) a priority is assigned for each proposed action. The project team adopted a scheme of priority assessment based on the data, mapping and on-ground knowledge, having regard to the end users of the report and key players. This assessment is shown in Table 6.2., below.

TABLE 6.2 Criteria for prioritising proposed actions

Priority	Description
High (cons/threat)	a matter or area that has a high conservation priority score in the region and is under very significant immediate threat
High (hazard)	an actual or potential flooding or erosion hazard, water quality or cliff instability issue for human safety
High (soc/econ)	an issue or place that has a high social or economic significance, where this arose from local consultation (this priority was not examined systematically)
Medium (cell)	an area or issue identified as being important in this cell
Medium (region)	an area or issue identified as being important in the region
Medium (threat)	a significant threat, within the GIS threat analysis, i.e. a threat to conservation values
Medium (cons)	an area or matter with high to medium total conservation priority scores in the region
Medium (soc/econ)	an area or matter of moderate social or economic significance
Low (cons)	an issue or place of low to moderate conservation priority and low to moderate threat
Low (hazard)	a flooding, erosion, water quality or cliff hazard of long term potential but low immediate concern

6.3 Description and analysis of coastal cells

Cell EP2 Port Bonython

Cell area is 1,231 ha. Shoreline length 30.24 km.

Landforms

The Point Lowly peninsula is a low plateau, sloping NW - SE, in the Simmens quartzite member, of the Neoprotorozoic Tent Hill formation. The southern shore of the peninsula has 20m bluffs over sloping shore platforms and small beaches. The bluffs and cliffs of the eastern side on the peninsula slope down to pebble beaches with some sand at high tide. Fitzgerald Bay is a sand trap, shown by the storage of Holocene sands in wide nearshore low tide sandflats, and small areas of sand ridges at the head of the bay; here the Holocene sand grit has been mixed with the Pleistocene red sands from the Gulf floor. The beach here is narrow high tide reflective in morpho-dynamic terms. Volcanics are exposed in cliffs and platforms at Backy Point. Small areas of sand dune are found near Point Lowly and at Weeroona Bay. At the Weroona Bay dunes backshore low cobble ridges occur, possibly formerly covered by white Holocene sands that are now immediately inland. No dating is available for these deposits; however, further north in the Gulf similar deposits are Pleistocene in age.

Benthic Habitat

Bare sand is found inshore at Fitzgerald Bay, with some seagrass c.500m offshore. A narrow band of dense seagrass is found inshore from Fitzgerald Bay to Pt Lowly.

Biota

Remnant vegetation is 1,129 ha., 92% of the cell. There are three flora survey sites in beach ridges in Fitzgerald Bay; and four on the cliffs mid-eastern side of the peninsula.
The majority of the area within the coastal boundary is arid low acacia shrubland with tussock grass; small areas of low Casuarina woodland and dune shrubland are also represented.

Land Use/ Land Ownership

The coastal reserve between Backy Point and Point Lowly is unalloted Crown land and varies from approximately 50m to >600m wide, with small areas of privately owned land within the reserve area used for shacks/dwellings. Much of this coastal reserve is backed by the Cultana Training Area used by the Department of Defence. The Point Lowly settlement is surrounded by

unalloted Crown land. However, the tip of Point Lowly that includes the lighthouse complex is owned by the Whyalla City Council. The lighthouse complex, including the cottages is entered in the South Australian Heritage Register as a State Heritage Place, as well as being on the Register of the National Estate. The coastal reserve in front of the Santos hydrocarbon processing plant is owned by the Minister for Transport. The land surrounding Weeroona Bay is Crown land under a Miscellaneous lease and is used as a buffer for the Santos facility. West of the leased area, the coastal reserve (c.130 – 800m wide) is Crown lands Act Reserve under the care, control and management of the Whyalla City Council, backed by privately owned land.

Upper Spencer Gulf Marine Park offshore.

FIGURE 6.1 Stony Point, Point Lowly; Fitzgerald Bay in background. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

Industrial (Santos hydrocarbon processing plant)
Shipping (Port Bonython)
Defence training
Offshore aquaculture
Recreation and tourism – fishing, camping, ORV use, diving
Eco tourism- diving with the cuttlefish
Boat launching, from shore and Pt Lowly boat ramp, for professional and recreational purposes

Values (Field visits and local reports)

Cuttlefish breeding area offshore
Stranded shingle beach ridges – important geological feature

Threats (Field visits and local reports)

Weed infestation from garden escape plants
Dune erosion from vegetation loss
Marine debris
Uncontrolled ORV usage
Uncontrolled camping
Firewood collection
Future industrial expansion, including desalination plant
Development

Opportunities (Field visits and local reports)

Support and expand work currently being undertaken by Cultana Jenkins Shackowners Association and Whyalla City Council to protect shingle beach geological feature.
Support current work by Whyalla City Council to eradicate succulent weeds from Pt Lowly dune area and undertake community education on impact of escaped garden plants that become weeds in coastal environment.
Marine debris surveys currently undertaken by community at Black Point. Use data from surveys to inform actions to address the source of the debris.

Conservation Analysis (GIS)

Total conservation priority values are 107.4, moderate to high for the region, and 44th in ranking. Conservation values are generally low to moderate, with the exception of higher values in the sand dune areas in back of the centre of Fitzgerald Bay, at the back of Weroona Bay and near Point Lowly. (These dunes are the most northerly on the west side of Spencer Gulf and contain locally rare habitat, notably for reptiles).
Small high value areas add to the total value: including, habitat for the Australian Pied Oystercatcher (focal species) on some beaches; the Beach Slider and the Bight Coast Skink (focal species) in the dune areas; and significant geological feature, the Beda Volcanics (Moonabie Formation) at Backy Point.
Widespread moderate to low values for communities and species with threatened status make some contribution to the total, as do endemic plant species and endemic habitat. The low shrubland of almost the entire cell gives high values for vegetation metrics – these are generally low arid acacia shrubland and tussock grassland – but with small areas of low dune shrubland; and widespread sea views assign high viewshed scores.
[Some of the outstanding conservation values of this coastal area are not covered by this analysis, as they lie offshore; however onshore developments within the cell pose clear threats – such as dredging for port facilities and future high saline outflows – to the cuttlefish breeding area.].

Threat Analysis (GIS)

The combined threat total of 50.19 which is high for the region. The largest contributions to this total are from development and land use.
The pattern of medium to high threat totals on the detailed summary is widespread, with the exception of low threat areas of low lying salt marsh and arid shrubland on each flank of Fitzgerald Bay; however the dune areas here have medium to high totals.

The highest concentration of threats is at Point Lowly and < 3km north, in part this is coastal dunes; together with the eastern fringes of Port Bonython.

High individual threat layers include: ORV tracks proliferate throughout the cell, notably through the low arid shrubland and tussock grassland as well as the areas of dune shrubland; development

zoning is categorised high threat notably for the Special Industry zoning near Point Lowly, and the 'no zones' south of Fitzgerald Bay and near Backy Point; land ownership, land use and viewshed have high values through most of the cell.

Adaptation to Climate Change Threats

(see also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	**Impacts and implications (for this cell)**	**Protect and manage habitat threats**	**Address landscape issues: fire, connectivity, refuges, hydrology**
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, dune and lake change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Beach recession and dune instability at Fitzgerald Bay and near Port Bonython	Establish and monitor beach profiles	
2070: +c.80cm	Sandy coast has marked recession. .Foredune blowouts. Low dune ridges overtopped.	Active management of dune blowouts	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides.	Beach for recession.	
Intensity of large storms increases. Storm surge heights are high in the northern half of the Gulf	Frequent damage to foredunes. Surge overtopping (and rapid retreat of) low dune ridges during large storms.	Active management of dune blowouts. Dune weed control.	
Warmer average conditions: 2030:+0.3 to.60C 2070:+1.5 to 20C	(Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere). There will be an increased risk for species that are already vulnerable. Invasive species may become more dominant.		Maintain NE-SW connectivity of vegetation within the coastal boundary

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage	Active dune management, including weed control	
'Flashy' run off: Drier creeks, but larger rare floods	[Short first and second order creeks dissect the plateau edge]. These creeks will transport a full range of sediment to the shoreline and nearshore waters.		
Groundwater lowering; saline incursion:	Local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the plateau and slopes.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains sediment movement towards the north along the Gulf coast. Local movement of large quantities of sand in the nearshore zone may be accelerated as sea levels rise.	Monitor beaches, see above.	

TABLE 6.3 Recommended Actions and Priority for EP2 Port Bonython

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	Medium (cons)	DENR, EP NRM
	Informal camping appears to occur around much of this coast, with potential impact from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, dune instability, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping. Review locations, management and need for camping in this location, with consideration to close and sign areas inappropriate for camping and/or formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping is to be allowed	Medium (cons/ threat)	DENR, Whyalla City Council, EP NRM, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, Whyalla City Council, DENR, land owners, community groups, EP NRM
	A very high level of ORV activity shown in multiple tracks and many formal and informal car parks; with impact from soil compaction, vegetation damage, soil erosion, dune instability and weed introduction.	Develop access/traffic management plan – including review of existing access with a view to rationalise unnecessary tracks and car parks. Block access (eg. fencing/rocks) to tracks and car parks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks or car parks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Maintenance of previous access management works. Community education	High (threat/ cons)	DENR, Whyalla City Council, EP NRM, DTEI, community, Tourism SA
	Possible future industrial &/or residential development with potential impact on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, discharges to sensitive marine environment, etc)	Ensure future development is not located in areas of high conservation value or high sensitivity. Ensure future development minimises impact to surrounding environment (eg. limit track creation, limit development footprint, prohibit/minimise discharges to the marine environment). Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled pets, etc	High (cons/ threat)	Whyalla City Council, DTEI, DENR, DPLG, EP NRM, private land owners, developers, community groups
	Marine debris with potential impact on native fauna species	Support continuation of marine debris surveys. Use information from surveys to develop and implement education program targeting source of debris (eg. professional or recreational fishers, campers, aquaculture operators, etc)	Medium (cons/ threat)	EP NRM, community, Whyalla City Council

Component	Issue	Proposed Action	Priority of Action	Key Players
Dunes at Point Lowly	These dune areas have moderate/ high conservation totals, but are threatened by 'settlement' zoning	Review development plan zoning to include these dunes into the Coastal Conservation Zone	Medium (cons)	Whyalla City Council, DPLG, DENR
	Increasing vulnerability to large storm surges as sea level rises More arid conditions slows recovery from damage	Monitor beach recession and dune instability. Weed control. Blow out restoration	Medium (cons)	DENR, EP NRM
Beaches	Vehicles on beaches and beach boat launching with potential impact on meiofauna, shorebirds and intertidal species and/or habitat.	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	Medium (cons/ threat)	Whyalla City Council, DTEI, EP NRM, DENR, PIRSA, Tourism SA, Birds Australia, community
Backy Point	Significant geological feature present – GSA reference W1.5 (see section 3.4.1)	Interpretive signage	Low (threat)	GSA SA branch, Whyalla City Council, EP NRM, DENR
Stranded shingle beach ridge Backy Point to Stony Point	Important geological feature with damage from ORV and with potential damage from development, collection, removal, etc.	Nominate as a significant geological feature with the GSA. Investigate and implement options and/or actions to protect these features, including track rationalisation, revegetation, interpretive signage, legislative protection, community education.	High (cons)	GSA SA branch, Whyalla City Council, EP NRM, community groups, DENR

Component	Issue	Proposed Action	Priority of Action	Key Players
Dunes at Fitzgerald Bay	These dune areas have moderate/ high conservation totals and are a locally rare habitat, but are threatened by ORV activity.	Review existing tracks with a view to rationalise unnecessary tracks. Implement actions to control or exclude off-road vehicle activity.	High (cons/ threat)	DENR, EP NRM
	Increasing vulnerability to large storm surges as sea level rises More arid conditions slows recovery from damage	Monitor beach recession and dune instability. Weed control. Blow out restoration	Medium (cons)	DENR, EP NRM
Salt marsh and low lying areas	Salt marsh and low lying areas show the potential for acid sulfate soil following disturbance; in turn this would potentially threaten life forms offshore.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Medium (hazard)	Whyalla City Council, DENR, developers, private land owners
Fitzgerald Bay and Point Lowly	Existing development, many shacks along the foreshore with surrounding impacts including increased tracks, vegetation damage, soil compaction, feral animals (pets) impact on native fauna and weed escapes	Work with private land owners to minimise impact from existing development, including education, restoration where appropriate and/or negotiation/enforcement to ensure the developments do not encroach on the coastal Crown reserve. Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs and cats, etc	Medium (cons/ threat)	DENR, Whyalla City Council, EP NRM, private land owners, community groups
	Weed species identified throughout area, associated with existing development	Support current and future weed control programs. Develop and implement weed control strategy if required. Undertake community education on impacts of garden plants becoming weeds in coastal environments.	Medium (cons/ threat)	Whyalla City Council, EP NRM, DENR, private land owners, community groups
	An area of low current rabbit activity identified approximately 2km north of Pt Lowly; potential impact on vegetation degradation, competition for food and habitat.	Monitor and record existence and impacts of introduced pest animals eg. rabbits foxes, cats. Undertake a control program if required.	Low (threat)	EP NRM, private land owners, DENR, Whyalla City Council

Component	Issue	Proposed Action	Priority of Action	Key Players
	Registered non-indigenous heritage site (Point Lowly lighthouse complex) with potential impact from recreational activities	Ensure sites managed to protect from damage. Install interpretive educational signage.	Medium (cons/ threat)	Whyalla City Council, DENR, community

BIOTA

Flora

Remnant vegetation area (ha)	1,128 ha, 91.67% of cell area
# flora surveys / records	7 surveys, 1 opportune sites, 3 herbarium record sites
# flora in cell	87 (note: includes some marine species)
# conservation rated flora in cell	1
# non-indigenous flora in cell	16
Significant CDCS floristic community	*Atriplex vesicaria* ssp. shrubland – 71% of SA records in EP *Nitraria billardierei* shrubland – 54% of SA records in EP
Protected area	No remnant vegetation protected

Weeds

Species	Common Name	Status	Study rating
Carrichtera annua	Ward's Weed	RA	4
Marrubium vulgare	Horehound	D, RA	5
Aeonium arboreum	Tree Aeonium		1
Anagallis arvensis	Pimpernel		2
Brassica tournefortii	Wild Turnip		3
Cakile maritima ssp. maritima	Two-horned Sea Rocket		1
Carthamus lanatus	Saffron Thistle		0
Erodium cicutarium	Cut-leaf Heron's-bill		0
Holcus lanatus	Yorkshire Fog		0
Hornungia procumbens	Oval Purse		0
Medicago minima var. minima	Little Medic		1
Nicotiana glauca	Tree Tobacco		0
Silene sp.	Catchfly		0
Sisymbrium erysimoides	Smooth Mustard		0
Sonchus oleraceus (NC)	Common Sow-thistle		0
Stellaria media	Chickweed		0

D: Declared weed, RA: Red alert weed

Native flora*

Species	Common Name	Aus status	SA status
Santalum spicatum	Sandalwood		V
Acacia ligulata	Umbrella Bush		
Acacia oswaldii	Umbrella Wattle		
Acacia papyrocarpa	Western Myall		
Alectryon oleifolius ssp. canescens	Bullock Bush		

Species	Common Name	Aus status	SA status
Amyema miraculosa ssp. boormanii	Fleshy Mistletoe		
Asparagopsis taxiformis			
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Atriplex paludosa ssp. paludosa	Marsh Saltbush		
Atriplex vesicaria ssp.	Bladder Saltbush		
Austrostipa elegantissima	Feather Spear-grass		
Austrostipa sp.	Spear-grass		
Beyeria lechenaultii	Pale Turpentine Bush		
Bulbine semibarbata	Small Leek-lily		
Calandrinia sp.	Purslane/Parakeelya		
Casuarina pauper	Black Oak		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Cystophora expansa			
Danthonia sp. (NC)	Wallaby-grass		
Dianella brevicaulis	Short-stem Flax-lily		
Dictyota dichotoma			
Dissocarpus biflorus var. biflorus	Two-horn Saltbush		
Dodonaea lobulata	Lobed-leaf Hop-bush		
Dodonaea viscosa ssp. angustissima	Narrow-leaf Hop-bush		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eremophila deserti	Turkey-bush		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos syrticola	Coast Cherry		
Frankenia pauciflora var. gunnii	Southern Sea-heath		
Geijera linearifolia	Sheep Bush		
Geranium retrorsum	Grassland Geranium		
Geranium sp.	Geranium		
Laurencia majuscula			
Lichen sp.			
Lobophora variegata			
Lycium australe	Australian Boxthorn		
Lysiana exocarpi ssp. exocarpi	Harlequin Mistletoe		
Maireana erioclada	Rosy Bluebush		
Maireana oppositifolia	Salt Bluebush		
Maireana pyramidata	Black Bluebush		
Maireana sedifolia	Bluebush		
Minuria cunninghamii	Bush Minuria		
Moss sp.			
Myoporum insulare	Common Boobialla		
Myoporum montanum	Native Myrtle		
Myoporum platycarpum ssp.	False Sandalwood		
Myosotis australis	Austral Forget-me-not		
Nicotiana goodspeedii	Small-flower Tobacco		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Parietaria debilis (NC)	Smooth-nettle		
Pittosporum angustifolium	Native Apricot		
Podotheca angustifolia	Sticky Long-heads		
Ptilotus obovatus var. obovatus	Silver Mulla Mulla		
Rhagodia parabolica	Mealy Saltbush		
Rhagodia spinescens	Spiny Saltbush		
Rhodanthe pygmaea	Pigmy Daisy		
Sargassum paradoxum			

Species	Common Name	Aus status	SA status
Scaberia agardhii			
Scaevola spinescens	Spiny Fanflower		
Sclerolaena obliquicuspis	Oblique-spined Bindyi		
Sclerolaena uniflora	Small-spine Bindyi		
Senecio glossanthus (NC)	Annual Groundsel		
Solanum ellipticum	Velvet Potato-bush		
Stenopetalum lineare (NC)	Narrow Thread-petal		
Tetragonia eremaea	Desert Spinach		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Wurmbea dioica ssp. dioica (NC)	Early Star-lily		
Zygophyllum apiculatum	Pointed Twinleaf		
Zygophyllum confluens	Forked Twinleaf		

R: Rare, V: Vulnerable, E: Endangered
* note: includes some marine species

Fauna

# of fauna in cell	43 recorded – 31 birds, 0 butterflies, 6 mammals, 6 reptiles, 0 amphibians (an additional 16 reptiles and 19 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	10 opportune sites
# of threatened fauna in cell	4
# of non-indigenous fauna	3 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Passer domesticus	House Sparrow	Aves	x
Sturnus vulgaris	Common Starling	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p
Mus musculus	House Mouse	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Arenaria interpres	Ruddy Turnstone	M	R
Egretta sacra	Eastern Reef Egret		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Artamus cinereus	Black-faced Woodswallow		
Artamus superciliosus	White-browed Woodswallow		
Charadrius ruficapillus	Red-capped Plover		
Chroicocephalus novaehollandiae	Silver Gull		
Cincloramphus cruralis	Brown Songlark		
Corvus coronoides	Australian Raven		
Corvus mellori	Little Raven		
Coturnix pectoralis	Stubble Quail		

Species	Common Name	Aus status	SA status
Cracticus tibicen	Australian Magpie		
Cracticus torquatus	Grey Butcherbird		
Eolophus roseicapillus	Galah		
Hirundo neoxena	Welcome Swallow		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Manorina flavigula	Yellow-throated Miner		
Microcarbo melanoleucos	Little Pied Cormorant		
Ocyphaps lophotes	Crested Pigeon		
Phalacrocorax carbo	Great Cormorant		
Phalacrocorax fuscescens	Black-faced Cormorant		
Phalacrocorax varius	Pied Cormorant		
Pomatostomus superciliosus	White-browed Babbler		
Rhipidura albiscapa	Grey Fantail		
Thalasseus bergii	Crested Tern		
Todiramphus pyrrhopygius	Red-backed Kingfisher		
Tringa nebularia	Common Greenshank	M	

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Macropus fuliginosus	Western Grey Kangaroo		
Macropus robustus	Euro		
Nyctophilus geoffroyi	Lesser Long-eared Bat		

Species	Common Name	Aus status	SA status
Pseudomys bolami	Bolam's Mouse		
Sminthopsis dolichura	Little Long-tailed Dunnart		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Morelia spilota	Carpet Python		R	x
Acanthophis antarcticus	Common Death Adder			e
Amphibolurus norrisi	Mallee Tree-dragon			e
Aprasia inaurita	Red-tailed Worm-lizard			c
Cryptoblepharus pulcher	Striped Wall Skink			e
Ctenophorus pictus	Painted Dragon			c
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Egernia stokesii	Gidgee Skink			x
Gehyra variegata	Tree Dtella			c
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			c
Lerista terdigitata	Southern Three-toed Slider			c
Menetia greyii	Dwarf Skink			x
Morethia adelaidensis	Adelaide Snake-eye			x
Morethia obscura	Mallee Snake-eye			e
Parasuta spectabilis	Mallee Black-headed Snake			x
Pogona vitticeps	Central Bearded Dragon			c
Pseudonaja affinis	Dugite			c
Pygopus lepidopodus	Common Scaly-foot			e
Tiliqua occipitalis	Western Bluetongue			x
Tiliqua rugosa	Sleepy Lizard			e

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP9 Shoalwater Point

Cell area 1,789 ha. Shoreline length 25.24 km.

Landforms

This cell runs from Lucky Bay to Shoalwater Point. This is a low energy coast, with coarse sand and shellgrit reflective beaches, that appear to be accreting. The coastal study area is a mix of wide low tide sand flats, backed by extensive Holocene beach ridges then red Pleistocene dunes. The Holocene dunes narrow considerably in the eastern half of the cell. Occasional patches of salt marsh extend onto the flats. At Lucky Bay there are a series of re-curve sand spits backed by salt marsh; two tidal creeks enter the beach either side of the township. In addition to the salt marsh areas, there appears to be a series of small sabkhas (described on the EP Wetland Inventory as 'intermittent saline water bodies'), behind and within the dunes; both the sabkhas and salt marsh are subject to storm surge flooding. At the landward edge of the coastal boundary the coastal plain is lined with Pleistocene red linear parallel dunes, (see photograph below). The serrated inner coastal zone boundary reflects the intersection of Pleistocene (linear NW - SE) red quartz dunes (Sprigg, 1979), with coastal storm surge floodable land in the inter-dunal corridors. Re-working of these Pleistocene quartz dunes that formerly extended across the Gulf floor, to beach ridges at the end of the Holocene transgression, has resulted in a mixed shell/ mineral sand composition for the ridges.

Benthic Habitat

Inshore patchy dense seagrass. With areas of inter-tidal bare sand.

Biota

1,658 ha of remnant vegetation, 93% of the cell. There is one flora survey site, two herbarium record sites and one opportune fauna site within this cell.
Approximately half of this cell is dune shrubland, and in places mallee shrubland with tussock grasses; there is salt marsh and chenopod shrubland on the lower ground.

Land Use/ Land Ownership

Predominantly privately owned with only a very narrow (approx 30m) coastal reserve of unalloted Crown land. The Lucky Bay shack settlement and an allotment behind the settlement are located on a miscellaneous Crown lease. Most of the shacks are fronted by Crown land Act reserve under the care, control and management of the District Council of Franklin Harbor, which also extends approximately 1.5km east of the settlement behind the narrow coastal reserve.

A large allotment under a perpetual Crown lease is located behind the shack settlement. None of the cell is protected by Heritage Agreement or reservation.

HWM to c. 4km offshore is Franklin Harbor Marine Park.

FIGURE 6.2 Lucky Bay: inshore seagrass, narrow low energy beach, shacks, re-curve sand spits, salt marsh corridors. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

Agriculture
Recreation and tourism – fishing, ORV use, boating, walking, camping
Residential – Lucky Bay
Boat launching from boat ramp and beach

Threats (Field visits and local reports)

Eco-tourism / tourism ventures
Uncontrolled camping
Uncontrolled ORV usage
Development – including a proposed major development that is likely to impact on coastal landforms, habitats and vegetation, as well as increase the visitation, threats and pressure on the coastal areas within the cell if it goes ahead.
Weed infestation from garden escape plants
Boat launching (public safety, hydrocarbon spills)
PCASS
Grazing

Conservation Analysis (GIS)

Total of conservation means is 103.67, an average score for the region. The distribution of detailed scores shows medium to medium-high values for the sand dune areas within 7 kilometres of Lucky Bay, with low totals for the rest of the cell.
High total values were found throughout the cell for the following layers: distribution of endemic plant communities, butterfly habitat, viewshed, vegetation metrics, and indigenous heritage. For the dune areas in the east and centre of the cell there were high values for: endemic plant habitat, all reptiles, butterfly habitat, and habitat for the Beach Slider and the Bight Coast Skink (focal species). Only one bird, one mammal and six reptile species have been recorded within this cell, which reflects the absence of survey sites, and of opportunistic recording.

Threat Analysis (GIS)

Total of threat summary numbers is 51.88, high for the region. All parts of this cell have above average total threat levels; areas with high threat totals include the dunes in the western end of the cell, and flood prone lands at the inner edge of the cell.
Off road vehicle tracks are present throughout, with some concentration near Lucky Bay Boulevard, and flood prone areas near the inner edge of the cell. Land ownership and land use add high threat totals, as does viewscape. Petroleum exploration licenses cover the inner parts of the cell and applications for exploration much of the rest of the cell. Medium to high values for the distribution of invasive weeds is widespread through this cell; dune instability is recorded in the central and western parts of the cell.

Adaptation to Climate Change Threats

(see also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	**Impacts and implications (for this cell)**	**Protect and manage habitat threats**	**Address landscape issues: fire, connectivity, refuges, hydrology**
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, dune and lake change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Rise in frequency of tidal flooding of salt marsh, threatening intertidal salt marsh species.	Monitor salt marsh flooding. Ensure that road improvements and maintenance near shacks allow tidal circulation to salt marshes	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Foredune erosion and over topping during storms	Beach recession and dune instability	Continue monitoring beach profiles at Lucky Bay	
2070: +c.80cm.	Intertidal salt marsh flooded leading to mangrove and samphire retreat.	Ensure salt marsh retreat where possible Monitor	
	Sandy coast has marked recession. Foredune blowouts. Low dune ridges overtopped.	Active management of dune blowouts	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides. Flooding frequency critical for many Tecticornia species.	Monitor salt marsh flooding. Beach for recession. Plan for salt marsh retreat buffer zones.	
Intensity of large storms increases. In the past storm surge heights have been high in the northern half of the Gulf	2070: Flooding will affect all salt marsh and adjacent low lying areas. Surge conditions will re-distribute sediments within the harbour	Ensure salt marsh retreat where possible	
	Frequent damage to foredunes. Surge overtopping (and rapid retreat of) low dune ridges.	Active management of dune blowouts	
Warmer average conditions: 2030:+0.3 to.60C 2070:+1.5 to 20C	(Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere). There will be an increased risk for species that are already vulnerable. Invasive species may become more dominant.		Maintain NE-SW connectivity of vegetation within the coastal boundary
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune and salt marsh habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage	Active dune management, including weed control	
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the Pleistocene ridges.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.30C to + 0.60C 2070: +1.00C to + 1.50C	Persistent swell wave climate maintains sediment movement towards the north along the Gulf coast. Local movement of large quantities of sand in the nearshore zone may be accelerated as sea levels rise.	Monitor beaches, see above.	

TABLE 6.4 Recommended Actions and Priority for EP9 Shoalwater Point

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Very inadequate data on biodiversity and habitat values.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Areas within cell identified as being important for endemic plant communities and as habitat for native species, with potential disturbance from agricultural activities, recreational activities, land management practices, uncontrolled access, weeds and pest animals	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches, dogs on leashes, track management, pest animal and plant control, restrict access to sensitive locations. Install interpretive/ educational signage. Community education programs.	High (cons/ threat)	DENR, private land owners, EP NRM, DC of Franklin Harbour, community groups
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	Medium (cons/ threat)	DENR, EP NRM, private land owners, DC of Franklin Harbour, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, private land owners, community groups, EP NRM, DC of Franklin Harbour
	Unrestricted access and multiple vehicle tracks around the coast impacting on the coastal dune and cliff top vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	Medium (cons/ threat)	Private land owners, DC of Franklin Harbour, DTEI, DENR, EP NRM
	Medium current rabbit activity identified near the Lucky Bay settlement and approximately in the centre of the cell; potential impact on vegetation degradation, competition for food and habitat with native species.	Monitor and record existence and impacts of introduced pest animals eg. rabbits foxes, cats. Undertake control program as required.	Medium (threat)	EP NRM, private land owners, DC of Franklin Harbour, DENR
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	Medium (cons/ threat)	EP NRM, private land owners, DENR, DC of Franklin Harbour, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Mineral exploration licences, licence applications and petroleum exploration licence applications cover much of the cell area, with potential impact on sensitive areas and conservation values	Ensure any mining activities avoid areas of high conservation significance	Medium (cons)	PIRSA, DENR, EP NRM, DC of Franklin Harbour
Dunes in western half of the cell	These dunes contain the main conservation values of the cell: endemic plant communities, reptile and butterfly habitat. There is some impact by ORV and rabbits, but little information on weeds.	Undertake flora and fauna surveys in this area. Prepare and implement a local management plan for these dunes, including access, feral animal and weed control.	High (cons)	Private landholders, EP NRM, DENR
	Dunes are threatened with foredune erosion and overtopping during storm surge	Monitor for erosion and weed invasion	Medium (cons/ threat)	EP NRM, private land owners, DC of Franklin Harbour, DENR
Salt marsh inland from shacks	The valuable habitats of the salt marsh have not been properly documented locally	Establish baseline flora and fauna survey sites, and profile salt marsh.	High (cons)	DENR, EP NRM
	Circulation of tidal waters important for samphire survival: this is threatened by road construction and upgrading	Maintain or install culverts to allow the circulation of tidal water. Monitor salt marsh habitats for change with sea level rise.	Medium (cons/ threat)	DENR, EP NRM
	Unregistered off-road vehicle use (eg. trail bikes): illegal, vegetation damage and potential dune destabilisation	Install educational signs on dune vegetation, stability and policy on unregistered vehicles e.g. quad bikes. Undertake compliance program	Medium (cons/ threat)	DENR, EP NRM, SAPOL, DC of Franklin Harbour, DTEI, community
All salt marsh and low lying areas	Salt marsh and low lying areas have the potential for acid sulfate soil following disturbance; in turn this would potentially threaten all life forms offshore.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Medium (hazard)	DC of Franklin Harbour, DENR, developers, private land owners
Beaches	Low energy beaches with low foredune ridges can change rapidly during storm surge	Maintain surveyed profiles (Profiles 3000 – 3004) near Lucky Bay to monitor the effects of sea level rise.	Medium	DENR – Coast Protection Board.

Component	Issue	Proposed Action	Priority of Action	Key Players
	Vehicles and dogs on beaches and beach boat launching with potential impact on meiofauna, shorebirds and intertidal species and/or habitat.	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Review beach boat launching locations with a view to rationalise. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Community education and interpretive signage.	Medium (cons/ threat)	DC of Franklin Harbour, EP NRM, DTEI, EP LGA, DENR, Tourism SA, Birds Australia, community
Lucky Bay shack settlement and surrounds	Existing development impacting on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Work with private land owners to minimise impact from existing development, including education, restoration where appropriate and/or negotiation/enforcement to ensure the developments do not encroach on the coastal Crown reserve Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs and cats, etc	Medium (threat)	EP NRM, DC of Franklin Harbour, DENR, private land owners, community groups
	Possible future residential development with potential impact on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, discharges to marine environment, etc)	Ensure future development is not located in areas of high conservation value or high sensitivity. Ensure future development minimises impact to surrounding environment (eg. limit track creation, limit development footprint, prohibit/minimise discharges to the marine environment).	Medium (cons/ threat)	DC of Franklin Harbour, DPLG, DENR, EP NRM, private land owners, developers, community groups

BIOTA

Flora

Remnant vegetation area (ha)	1,658 ha, 92.69% of cell area
# flora surveys / records	1 surveys, 2 herbarium record sites
# flora in cell	35
# conservation rated flora in cell	0
# non-indigenous flora in cell	7
Significant CDCS floristic community	*Melaleuca lanceolata* / *Tetragonia implexicoma* shrubland – 72% of SA records in EP
Protected area	No remnant vegetation protected

Weeds

Species	Common Name	Status	Study rating
Euphorbia paralias	Sea Spurge	RA	5
Lycium ferocissimum	African Boxthorn	D, RA	8
Brassica tournefortii	Wild Turnip		3
Cenchrus incertus	Spiny Burr-grass		0
Medicago minima var. minima	Little Medic		1
Sonchus oleraceus (NC)	Common Sow-thistle		0
Stellaria media	Chickweed		0

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Acacia ligulata	Umbrella Bush		
Actinobole uliginosum	Flannel Cudweed		
Brachyscome lineariloba	Hard-head Daisy		
Calandrinia granulifera	Pigmy Purslane		
Calandrinia sp.	Purslane/Parakeelya		
Callitris gracilis	Southern Cypress Pine		
Carpobrotus sp.	Pigface		
Codonocarpus cotinifolius	Desert Poplar		
Crassula closiana	Stalked Crassula		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Danthonia sp. (NC)	Wallaby-grass		
Daucus glochidiatus	Native Carrot		
Dodonaea viscosa ssp. angustissima	Narrow-leaf Hop-bush		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Exocarpos aphyllus	Leafless Cherry		
Gramineae sp.	Grass Family		
Leptospermum coriaceum	Dune Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Olearia axillaris	Coast Daisy-bush		
Parietaria cardiostegia	Mallee Smooth-nettle		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia preissii ssp. preissii	Mallee Saltbush		
Senecio glossanthus (NC)	Annual Groundsel		
Senecio pinnatifolius (NC)	Variable Groundsel		
Tetragonia implexicoma	Bower Spinach		

Species	Common Name	Aus status	SA status
Threlkeldia diffusa	Coast Bonefruit		
Triglochin calcitrapum (NC)	Spurred Arrowgrass		
Zygophyllum simile	White Twinleaf		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	8 recorded – 1 birds, 0 butterflies, 1 mammals, 6 reptiles, 0 amphibians (an additional 16 reptiles and 25 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	1 opportune site
# of threatened fauna in cell	0
# of non-indigenous fauna	0 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Pieris rapae rapae	Cabbage White	Invertebrate	p

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Calidris ferruginea	Curlew Sandpiper	M	

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p

Species	Common Name	Status*	Record
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Sminthopsis crassicaudata	Fat-tailed Dunnart		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Acanthophis antarcticus	Common Death Adder			e
Amphibolurus norrisi	Mallee Tree-dragon			e
Aprasia inaurita	Red-tailed Worm-lizard			c
Cryptoblepharus pulcher	Striped Wall Skink			e
Ctenophorus pictus	Painted Dragon			c
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Hemiergis initialis	Western Earless Skink			c
Hemiergis peronii	Four-toed Earless Skink			x
Heteronotia binoei	Bynoe's Gecko			c
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			x
Lialis burtonis	Burton's Legless Lizard			c
Menetia greyii	Dwarf Skink			e
Morethia obscura	Mallee Snake-eye			x
Pogona vitticeps	Central Bearded Dragon			c
Pseudechis australis	Mulga Snake			c
Pseudonaja affinis	Dugite			c
Pygopus lepidopodus	Common Scaly-foot			e
Strophurus intermedius	Southern Spiny-tailed Gecko			x
Tiliqua occipitalis	Western Bluetongue			x
Tiliqua rugosa	Sleepy Lizard			x

R: Rare, V: Vulnerable, E: Endangered

x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP10 Franklin Harbor

Cell area 5,012 ha. Shoreline length 117.97km.

Landforms

Franklin Harbor is a large embayment enclosed by a spit re-curve barrier that extends from Windmill Beach to Point Gibbon, and two calcarenite ridges at Entrance Island and Redcliff. The embayment includes dense seagrass beds, bare low tide sandflats, mangroves, as well as inter-tidal and supra-tidal samphire with largely intact vegetation, (with the exception of the valley site at the head of the bay that is considerably degraded). Inter-tidal and low tide stands of mangroves are seen; also ridges of Pleistocene calcarenite. Chenier/ beach ridges with intact vegetation are recorded extensively on the NE side of the embayment. There is a large flood tide sand mass in the mouth of the harbour, which appears to be moving along the coast from SW to NE. The NE side of the cell includes Pleistocene parallel red sand arid dune ridges; the inter ridge corridors are subject to both storm surge and land based inundation.

Benthic Habitat

The harbour and neighbouring gulf waters are mainly in seagrass; there are two macro-algae areas recorded within the harbour.

Biota

92% of the cell, or 4,619 ha is native vegetation. 77% of the cell is salt marsh/ mangrove. The long, narrow, sandy peninsula with inner islands and seagrass on the seaward side provides optimal feeding grounds for shorebirds in addition to safe roosting and breeding site for many bird species.
Dune areas are vegetated by coastal shrubland: *Olearia axillaris, Leucopogon parviflorus* tall open shrubland, and *Melaleuca lanceolata, +/-Olearia axillaris, +/-Leucopogon parviflorus* tall open shrubland. Pleistocene dunes on the inner NE perimeter of the study area are in *Eucalyptus gracilis, +/-Eucalyptus dumosa, +/-Eucalyptus brachycalyx, +/-Eucalyptus oleosa ssp. ampliata* mid open mallee forest. Salt marsh areas are extensive all around the harbour: including a variety of intertidal and supratidal samphire species. Mangroves include *Avicennia marina ssp. marina* low open forest over *+/-Tecticornia sp., +/-Sarcocornia quinqueflora* shrubs.
There are 15 flora survey sites, one opportune flora site and 23 herbarium record sites; one fauna survey site and 41 opportune sites within this cell.

FIGURE 6.3 Dune ridges and spit re-curve features near Germein Point, looking towards Observation Point and Franklin Harbor; mangrove and chenier ridges bordering the harbour. Photo: Coast Protection Board, 2007

Land Use/ Land Ownership

26% of the cell is within Franklin Harbor CP: the sand spit from the Knob to Germein Point and Entrance Island. From Lucky Bay to Cowell a narrow coastal reserve runs around the coast with private property behind, except an area of perpetual leasehold land adjacent Lucky Bay. Between Cowell and the Conservation Park is a narrow coastal reserve, backed by Crown leasehold land that extends to the road and private property landward of the road.

The whole of Franklin Harbor and nearshore is within the Franklin Harbor Marine Park.

Uses (Field visits and local reports)

Oyster farms within Franklin Harbor
Fin fish aquaculture licences within Franklin Harbor
Ferry terminal at Lucky Bay.
Recreation and tourism – fishing, camping, ORV use, boating, walking
Boat launching from beach and Cowell boat ramp for recreation, charters and aquaculture access
Residential – Cowell township
Agriculture

Threats (Field visits and local reports)

Short et al, p.59, suggest that this low lying coast is stable, but prone to storm surge damage: the 1981 surge was recorded at 4.14m AHD at Whyalla: all the beach ridge plains and salt marshes along this section of the coast were inundated.
Low lying land is subject to PCASS.
Eco-tourism / tourism ventures

Uncontrolled ORV usage, track creation -disturbance of resident and migratory shorebirds, dune vegetation destruction and erosion, samphire destruction
Weed infestation
Stormwater impacts – coastal erosion, weed proliferation and source of marine pollution
Rubbish dumping, including garden waste
Uncontrolled camping
Marine debris
Development – including a proposed major development at Lucky Bay that is likely to impact on coastal landforms, habitats and vegetation, as well as increase the visitation, threats and pressure on the coastal areas within the cell if it goes ahead.
Proximity to aquaculture – changes to sediment deposition

Opportunities (Field visits and local reports)

Develop and implement management plan for Franklin Harbor CP
Implement stormwater discharge improvements identified in "Cowell: Reducing stormwater impacts on coast and marine environments." Prepared for the EP NRM Board by DesignFlow 2010.
Expand and support work already undertaken by the Community Development Group to protect the samphire and mangrove area along the Esplanade north of Main Street and, track rationalisation and maintenance of lookout at Victoria Pt.

Conservation Analysis (GIS)

The total of conservation means is the 9th highest in the region, 136.20. Although some small cleared areas on the inner perimeter of the study area have low values, the majority of the cell is medium-high to high for total detailed values; notably, areas of salt marsh and chenier ridges are high, as are the sand dunes from Windmill Beach to Germein Point. This embayment and surrounding tidal wetlands and dunes is valuable for both plant and animal habitats, and especially valuable for birds, including shorebirds and raptors. 104 bird species have been recorded within this cell, including the state endangered White-bellied Sea-Eagle and Fairy Tern, also the state vulnerable Hooded Plover, Eastern Curlew and Banded Stilt. 10 butterflies, 8 mammals and 7 reptiles have also been recorded.

Rarity of plant communities is high in salt marsh, and medium high in the dunes. Vegetated areas all have high numbers of threatened species. Moderate/ high values for endemic plant communities are found throughout the cell. Some dune areas have high values for endemic habitat. Most samphire areas have high scores for species richness. All salt marsh and dune areas have high scores as habitat for threatened bird species and high numbers of bird species are found throughout the cell. The sedge component of the NE half of the cell provides valuable butterfly habitat. Franklin Harbor is a wetland of national importance.

Threat Analysis (GIS)

The total of threat means is 40.76, a medium total for the region.
The distribution of detailed threat totals shows medium to high totals in all parts of the cell, with the exception of the large and isolated Germein Point spit. The highest threat totals are near to Cowell, and on the north and east of the bay. No threat layers suggest outstanding threat issues: all parts of the cell show some evidence of ORV activity, notably near the Knob, at the western end of the cell; moderate to high totals for zoning, land ownership, visual amenity, and land use are evident; also vegetation block degradation and the presence of invasive weeds (notably in the Germein Point spit dunes and an area north and east of Cowell). Medium threat values for instability in the coastal dunes; potential for the development of acid sulfate soils is widespread throughout the salt marsh, and notably high in the CP.

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, dune and lake change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Rise in frequency of tidal flooding of salt marsh, threatening intertidal salt marsh species.	Monitor salt marsh flooding, beach recession and foredune damage. Ensure that road improvements and maintenance near Cowell allow tidal circulation to salt marshes	
2070: +c.80cm.	Sandy coast has marked recession, foredune blowouts. And dune transgression. Inter-tidal salt marsh flooded leading to mangrove and samphire retreat.	Active management of dune blowouts Ensure salt marsh retreat to buffer zones where possible	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides. Flooding frequency critical for many Tecticornia species.	Monitor salt marsh flooding and beach recession. Plan for salt marsh retreat buffer zones.	
Intensity of large storms increases. In the past storm surge heights have been high in the northern half of the Gulf	2070: Flooding will affect all salt marsh and adjacent low lying areas. Surge conditions will re-distribute sediments within the harbour	Ensure salt marsh retreat where possible	
	Frequent damage to foredunes.	Active management of dune blowouts	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere). There will be an increased risk for species that are already vulnerable. Invasive species may become more dominant.		Maintain N-S connectivity of vegetation within the peninsula
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune and salt marsh habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage	Active weed control	
'Flashy' run off: Drier creeks, but larger rare floods	Poodra and Ullabidinie Creeks are intermittent watercourses leading to a high value salt marsh. Road culverts to allow sediments to reach the marsh in flood conditions may allow build up of the marsh surface.		
Groundwater lowering; saline incursion:	Local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the Pleistocene ridges.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains sediment movement towards the north along the Gulf coast. Local movement of large quantities of sand in the nearshore zone may be accelerated as sea levels rise.	Monitor beaches, see above.	

TABLE 6.5 Recommended Actions and Priority for EP10 Franklin Harbor

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Important area for a number of threatened and sensitive flora and fauna species including shorebirds and raptors, with potential disturbance from agricultural activities, development zoning, recreational activities, land management practices, uncontrolled access, weeds and pest animals	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches, dogs on leashes, track management, pest animal and plant control, restrict access to sensitive locations. Review development plan zoning to these areas to increase protection. Install interpretive/ educational signage. Community education programs.	High (cons/ threat)	DENR, EP NRM, DC of Franklin Harbour, DPLG, private land owners, community groups
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	High (cons/ threat)	DENR, EP NRM, DC of Franklin Harbour, private land owners, community groups
	Unrestricted access and multiple vehicle tracks around the coast impacting on the coastal dune and samphire vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Maintenance of previous access management works. Install directional /educational signage. Community education	High (cons/ threat)	Private land owners, DC of Franklin Harbour, DENR, EP NRM, community groups

Component	Issue	Proposed Action	Priority of Action	Key Players
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DC Franklin Harbour, DENR, land owners, community groups, EP NRM
	Existing and future development with potential impact on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Work with private land owners to minimise impact from existing development, including education and restoration where appropriate. Ensure future development is not located in areas of high conservation value or high sensitivity. Ensure future development minimises impact to surrounding environment (eg. limit track creation, limit development footprint, prohibit/minimise discharges to the marine environment). Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs and cats, rubbish dumping including garden waste etc	High (cons/ threat)	EP NRM, DC of Franklin Harbor, DENR, DPLG, private land owners, community groups
	Weed species identified throughout cell, particularly around Cowell township	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	Medium (cons)	EP NRM, private land owners, DENR, DC of Franklin Harbour, community
	Marine debris with potential impact on native fauna species	Investigate opportunities for, and/or support, ongoing marine debris cleanup programs. Undertake education program targeting fishers, campers, aquaculture operators, etc	High (cons/ threat)	PIRSA, EP NRM, DENR, aquaculture operators, community, DC Franklin Harbour

Component	Issue	Proposed Action	Priority of Action	Key Players
Beaches	Vehicles and dogs on beaches and beach boat launching with potential impact on meiofauna, shorebirds and intertidal species and/or habitat.	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Review beach boat launching locations with a view to rationalise. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	High (cons)	DC of Franklin Harbour, EP NRM, DTEI, EP LGA, DENR, PIRSA, Tourism SA, Birds Australia, community,
Franklin Harbor CP	The CP has high (dunes) to medium high (salt marsh and mangroves) conservation values throughout. The presence of invasive weeds has been detected in the Germein Point dunes. Potential impact from pest animals and recreational activities	Review the management of this valuable area. Prepare a management plan for the conservation park.	High (cons/ threat)	DENR
All salt marsh and low lying areas	All salt marsh and low lying areas show the potential for acid sulfate soil following disturbance; in turn this would potentially threaten all life forms within the harbour.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	High (cons/ threat)	DC Franklin Harbour, DENR, developers, private landowners

Component	Issue	Proposed Action	Priority of Action	Key Players
Salt marsh between Old Whyalla Road and Rodeo Ground Road	High conservation and high threat totals. Bird habitat, including threatened species, endemic plant associations, butterfly habitat are threatened by ownership and use category and the potential for mining activity.	Further investigation of the values of this area. Review management of this valuable area to increase protection with consideration to prepare a local management plan, including possible heritage agreement, improved management, joint management or purchase for conservation.	High (cons)	EP NRM, DENR, Nature Foundation, DC of Franklin Harbour, private land owner
	Adaptation to sea level rise may reduce or stop tidal movement to the marsh; also delivery of sediment by land based floods: maintain and if necessary enlarge culverts.	Ensure that road maintenance/ construction allows tidal circulation to salt marsh. Also that road culverts allow sediment movement from creeks to reach the salt marsh.	High (cons)	DTEI, DC of Franklin Harbour, EP NRM, DENR
Sand beaches and connected dunes	Rising sea level and increasing aridity will destabilise dunes	Establish a beach profile survey line on Windmill Beach, for long term monitoring. Ensure the existing profile within Franklin Harbour is maintained.	Medium	DENR
		Active dune management, including recovery of blowouts	High (cons) and ongoing	DENR, EP NRM
	Nearshore sand transport	Maintain beach profile monitoring downdrift (at Lucky Bay)	Medium	DENR
Cowell township and surrounds	Stormwater impacts on coast and marine environment (eg. spread of weeds, erosion, pollution)	Implement actions from DesignFlow 2010 report	Medium (cons)	DC of Franklin Harbour, EP NRM, Stormwater Management Authority, community groups
	Non-indigenous coastal heritage site identified (Cowell jetty) but not included on any statutory heritage register, with potential impact from recreational activities	Consider including onto heritage register eg. local heritage lists. Ensure sites managed to protect from damage. Install interpretive educational signage.	Medium (cons)	DC of Franklin Harbour, DENR, SA Heritage Council

Component	Issue	Proposed Action	Priority of Action	Key Players
	Potential impact on sensitive coastal features (eg. vegetation damage, fauna disturbance, water runoff erosion) by unrestricted pedestrian access in high visitation areas	Expand and support work already undertaken by the Community Development Group to protect the samphire and mangrove area along the Esplanade north of Main street and, track rationalisation and maintenance of lookout at Victoria Pt.	High (soc/ con)	Community Development Group, DC of Franklin Harbour, EP NRM, DENR

BIOTA

Flora

Remnant vegetation area (ha)	4,618.60 ha, 92.15% of cell area
# flora surveys / records	15 surveys, 1 opportune sites, 23 herbarium record sites
# flora in cell	192 (note: includes some marine species)
# conservation rated flora in cell	4
# non-indigenous flora in cell	35
Significant CDCS floristic community	*Atriplex cinerea* shrublands – 20 sites recorded within SA, 60% of these in EP *Atriplex vesicaria* ssp. shrubland – 71% of SA records in EP *Melaleuca lanceolata / Tetragonia implexicoma* shrubland – 72% of SA records in EP
Protected area	27% of remnant vegetation is protected, most of this is within Franklin Harbor CP, a small amount is within a Heritage Agreement

Weeds

Species	Common Name	Status	Study rating
Carrichtera annua	Ward's Weed	RA	4
Euphorbia paralias	Sea Spurge	RA	5
Limonium companyonis	Sea-lavender	RA	7
Mesembryanthemum crystallinum	Common Iceplant	RA	4
Lycium ferocissimum	African Boxthorn	D, RA	8
Asphodelus fistulosus	Onion Weed	D	3
Solanum elaeagnifolium	Silver-leaf Nightshade	D	2
Arctotheca calendula	Cape Weed		1
Astragalus hamosus	Milk-vetch		0
Brassica tournefortii	Wild Turnip		3
Bupleurum semicompositum	Hare's Ear		0
Cakile maritima ssp. maritima	Two-horned Sea Rocket		1
Erodium cicutarium	Cut-leaf Heron's-bill		0
Fumaria densiflora	Dense Fumitory		0
Hornungia procumbens	Oval Purse		0
Hypochaeris sp.	Cat's Ear		1
Isolepis marginata	Little Club-rush		0
Limonium binervosum	Dwarf Sea-lavender		3

Species	Common Name	Status	Study rating
Medicago minima var. minima	Little Medic		1
Medicago polymorpha var. polymorpha	Burr-medic		1
Medicago sp.	Medic		1
Mesembryanthemum nodiflorum	Slender Iceplant		2
Mesembryanthemum sp.	Iceplant		3
Oxalis incarnata	Pale Wood-sorrel		0
Parapholis incurva	Curly Ryegrass		1
Schismus barbatus	Arabian Grass		0
Sisymbrium orientale	Indian Hedge Mustard		0
Solanum nigrum	Black Nightshade		2
Sonchus oleraceus	Common Sow-thistle		0
Sonchus oleraceus (NC)	Common Sow-thistle		0
Spergularia diandra (NC)	Lesser Sand-spurrey		0
Stellaria media	Chickweed		0
Striaria attenuata			0
Tribulus terrestris	Caltrop		0
Urtica urens	Small Nettle		0

D: Declared weed, RA: Red alert weed

Native flora*

Species	Common Name	Aus status	SA status
Acacia iteaphylla	Flinders Ranges Wattle		R
Eremophila gibbifolia	Coccid Emubush		R
Haegiela tatei	Small Nut-heads		R
Spyridium spathulatum	Spoon-leaf Spyridium		R
Abutilon otocarpum	Desert Lantern-bush		
Acacia ligulata	Umbrella Bush		
Acacia notabilis	Notable Wattle		
Acacia oswaldii	Umbrella Wattle		
Acacia wilhelmiana	Dwarf Nealie		
Actinobole uliginosum	Flannel Cudweed		
Allocasuarina muelleriana ssp. muelleriana	Common Oak-bush		
Alyogyne huegelii	Native Hibiscus		
Alyxia buxifolia	Sea Box		
Amyema melaleucae	Tea-tree Mistletoe		
Arabidella trisecta	Shrubby Cress		
Astroloma humifusum	Cranberry Heath		
Atriplex cinerea	Coast Saltbush		
Atriplex eardleyae	Eardley's Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Atriplex vesicaria ssp.	Bladder Saltbush		
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrostipa acrociliata	Graceful Spear-grass		
Austrostipa drummondii	Cottony Spear-grass		
Austrostipa elegantissima	Feather Spear-grass		
Austrostipa nitida	Balcarra Spear-grass		
Austrostipa nodosa	Tall Spear-grass		
Austrostipa sp.	Spear-grass		
Austrostipa trichophylla			
Avicennia marina ssp. marina	Grey Mangrove		
Beyeria lechenaultii	Pale Turpentine Bush		

Species	Common Name	Aus status	SA status
Billardiera cymosa ssp. pseudocymosa	Sweet Apple-berry		
Billardiera versicolor	Yellow-flower Apple-berry		
Brachyscome lineariloba	Hard-head Daisy		
Calandrinia corrigioloides	Strap Purslane		
Calandrinia sp.	Purslane/Parakeelya		
Callitris gracilis	Southern Cypress Pine		
Calotis hispidula	Hairy Burr-daisy		
Carpobrotus sp.	Pigface		
Cassytha melantha	Coarse Dodder-laurel		
Chamaesyce drummondii			
Chrysocephalum semipapposum	Clustered Everlasting		
Codonocarpus cotinifolius	Desert Poplar		
Crassula colorata var. colorata	Dense Crassula		
Crassula decumbens var. decumbens	Spreading Crassula		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Danthonia sp. (NC)	Wallaby-grass		
Daucus glochidiatus	Native Carrot		
Dianella brevicaulis	Short-stem Flax-lily		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Dissocarpus biflorus var. biflorus	Two-horn Saltbush		
Dodonaea stenozyga	Desert Hop-bush		
Dodonaea viscosa ssp. spatulata	Sticky Hop-bush		
Enchylaena tomentosa var.	Ruby Saltbush		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eragrostis dielsii var. dielsii	Mulka		
Eragrostis pergracilis	Small Love-grass		
Eremophila crassifolia	Thick-leaf Emubush		
Eremophila longifolia	Weeping Emubush		
Eremophila scoparia	Broom Emubush		
Eriochiton sclerolaenoides	Woolly-fruit Bluebush		
Eucalyptus brachycalyx	Gilja		
Eucalyptus incrassata	Ridge-fruited Mallee		
Eucalyptus odorata	Peppermint Box		
Eucalyptus peninsularis	Merrit		
Eucalyptus petiolaris	Eyre Peninsula Blue Gum		
Eucalyptus porosa	Mallee Box		
Eucalyptus socialis ssp. socialis	Beaked Red Mallee		
Exocarpos aphyllus	Leafless Cherry		
Ficinia nodosa	Knobby Club-rush		
Frankenia pauciflora var.	Southern Sea-heath		
Frankenia pauciflora var. gunnii	Southern Sea-heath		
Frankenia sessilis	Small-leaf Sea-heath		
Geijera linearifolia	Sheep Bush		
Geranium sp.	Geranium		
Goodenia varia	Sticky Goodenia		
Gracilaria chilensis			
Gramineae sp.	Grass Family		
Grammosolen dixonii			
Grevillea pterosperma	Dune Grevillea		
Gyrostemon ramulosus	Bushy Wheel-fruit		
Hakea francisiana	Bottlebrush Hakea		
Halgania andromedifolia	Scented Blue-flower		
Homoranthus wilhelmii	Wilhelm's Homoranthus		

Species	Common Name	Aus status	SA status
Isotoma petraea	Rock Isotome		
Lawrencia squamata	Thorny Lawrencia		
Lichen sp.			
Lobelia gibbosa	Tall Lobelia		
Lomandra effusa	Scented Mat-rush		
Lomandra leucocephala ssp. robusta	Woolly Mat-rush		
Lycium australe	Australian Boxthorn		
Maireana appressa	Pale-fruit Bluebush		
Maireana brevifolia	Short-leaf Bluebush		
Maireana oppositifolia	Salt Bluebush		
Melaleuca halmaturorum	Swamp Paper-bark		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Moss sp.			
Muehlenbeckia adpressa	Climbing Lignum		
Myoporum brevipes	Warty Boobialla		
Myoporum insulare	Common Boobialla		
Myoporum platycarpum ssp. platycarpum	False Sandalwood		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Olearia pimeleoides ssp. pimeleoides	Pimelea Daisy-bush		
Ophioglossum lusitanicum	Austral Adder's-tongue		
Ozothamnus decurrens	Ridged Bush-everlasting		
Parietaria cardiostegia	Mallee Smooth-nettle		
Parietaria debilis (NC)	Smooth-nettle		
Pelargonium littorale	Native Pelargonium		
Persicaria prostrata	Creeping Knotweed		
Phebalium bullatum	Silvery Phebalium		
Phyllanthus saxosus	Rock Spurge		
Pimelea microcephala ssp. microcephala	Shrubby Riceflower		
Pittosporum angustifolium	Native Apricot		
Prostanthera aspalathoides	Scarlet Mintbush		
Pterostylis sp.	Greenhood		
Ptilotus exaltatus var. exaltatus	Pink Mulla Mulla		
Ptilotus obovatus var. obovatus	Silver Mulla Mulla		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia preissii ssp. preissii	Mallee Saltbush		
Rhodanthe haigii	Haig's Everlasting		
Sagina maritima	Sea Pearlwort		
Salsola tragus	Buckbush		
Samolus repens	Creeping Brookweed		
Santalum acuminatum	Quandong		
Sarcocornia quinqueflora	Beaded Samphire		
Sarcostemma viminale ssp. australe	Caustic Bush		
Sargassum decurrens			
Scaevola crassifolia	Cushion Fanflower		
Scaevola spinescens	Spiny Fanflower		
Sclerolaena obliquicuspis	Oblique-spined Bindyi		
Senecio glossanthus (NC)	Annual Groundsel		
Senecio pinnatifolius (NC)	Variable Groundsel		
Senecio spanomerus			
Senna artemisioides ssp. X coriacea	Broad-leaf Desert Senna		
Solanum coactiliferum	Tomato-bush		
Solanum hystrix	Afghan Thistle		

Species	Common Name	Aus status	SA status
Spinifex hirsutus (NC)	Rolling Spinifex		
Spyridium bifidum var. bifidum	Forked Spyridium		
Stenopetalum lineare (NC)	Narrow Thread-petal		
Suaeda australis	Austral Seablite		
Tecticornia arbuscula	Shrubby Samphire		
Tecticornia halocnemoides ssp. halocnemoides	Grey Samphire		
Tecticornia halocnemoides ssp. longispicata	Grey Samphire		
Tecticornia indica ssp.	Brown-head Samphire		
Tecticornia pergranulata ssp. pergranulata	Black-seed Samphire		
Tecticornia pruinosa	Bluish Samphire		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Trachymene ornata	Cotton-ball Trachymene		
Triglochin calcitrapum (NC)	Spurred Arrowgrass		
Triglochin longicarpa	Dwarf Arrowgrass		
Vittadinia gracilis	Woolly New Holland Daisy		
Wahlenbergia gracilenta	Annual Bluebell		
Westringia rigida	Stiff Westringia		
Zygophyllum angustifolium	Scrambling Twinleaf		
Zygophyllum aurantiacum ssp. aurantiacum	Shrubby Twinleaf		
Zygophyllum simile	White Twinleaf		

R: Rare, V: Vulnerable, E: Endangered
* note: includes some marine species

Fauna

# of fauna in cell	129 recorded – 104 birds, 10 butterflies, 8 mammals, 7 reptiles, 0 amphibians (an additional 18 reptiles and 16 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	1 survey, 41 opportune sites
# of threatened fauna in cell	16
# of non-indigenous fauna	10 recorded

Non-indigenous fauna

Species	Common Name	Class	Record
Columba livia	Rock Dove	Aves	x
Passer domesticus	House Sparrow	Aves	x
Streptopelia chinensis	Spotted Dove	Aves	x
Sturnus vulgaris	Common Starling	Aves	x
Turdus merula	Common Blackbird	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	x
Camelus dromedarius	One-humped Camel (Dromedary, Arabian Camel)	Mammalia	x
Oryctolagus cuniculus	Rabbit (European Rabbit)	Mammalia	x
Rattus rattus	Black Rat (Ship Rat, Roof Rat)	Mammalia	x
Vulpes vulpes	Fox (Red Fox)	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Sternula nereis	Fairy Tern		E
Cladorhynchus leucocephalus	Banded Stilt		V
Numenius madagascariensis	Eastern Curlew	M	V
Thinornis rubricollis	Hooded Plover		V
Actitis hypoleucos	Common Sandpiper	M	R
Arenaria interpres	Ruddy Turnstone	M	R
Biziura lobata	Musk Duck		R
Calidris melanotos	Pectoral Sandpiper	M	R
Charadrius leschenaultii	Greater Sand Plover	M	R
Egretta garzetta	Little Egret		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Hylacola cauta	Shy Heathwren (Shy Hylacola)		R
Limosa lapponica	Bar-tailed Godwit	M	R
Tringa brevipes	Grey-tailed Tattler	M	R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Acanthiza apicalis	Inland Thornbill		
Acanthiza chrysorrhoa	Yellow-rumped Thornbill		
Accipiter cirrocephalus	Collared Sparrowhawk		
Anas castanea	Chestnut Teal		
Anas gracilis	Grey Teal		
Anthochaera carunculata	Red Wattlebird		
Anthus novaeseelandiae	Australasian Pipit		
Apus pacificus	Fork-tailed Swift	M	
Ardea modesta	Eastern Great Egret		
Ardea pacifica	White-necked Heron		
Artamus cinereus	Black-faced Woodswallow		
Artamus cyanopterus	Dusky Woodswallow		
Artamus personatus	Masked Woodswallow		
Artamus superciliosus	White-browed Woodswallow		
Aythya australis	Hardhead (White-eyed Duck)		
Barnardius zonarius	Australian Ringneck, (Ring-necked Parrot)		
Calidris acuminata	Sharp-tailed Sandpiper	M	
Calidris canutus	Red Knot	M	
Calidris ferruginea	Curlew Sandpiper	M	
Calidris ruficollis	Red-necked Stint	M	
Charadrius ruficapillus	Red-capped Plover		
Chlidonias hybrida	Whiskered Tern		
Chroicocephalus novaehollandiae	Silver Gull		
Cincloramphus cruralis	Brown Songlark		
Circus approximans	Swamp Harrier		
Circus assimilis	Spotted Harrier		
Colluricincla harmonica	Grey Shrike-thrush		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Corvus coronoides	Australian Raven		
Corvus mellori	Little Raven		
Cracticus tibicen	Australian Magpie		
Cracticus torquatus	Grey Butcherbird		
Cygnus atratus	Black Swan		
Egretta novaehollandiae	White-faced Heron		

Species	Common Name	Aus status	SA status
Eolophus roseicapillus	Galah		
Epthianura albifrons	White-fronted Chat		
Epthianura aurifrons	Orange Chat		
Falco berigora	Brown Falcon		
Falco cenchroides	Nankeen Kestrel		
Falco longipennis	Australian Hobby		
Grallina cyanoleuca	Magpie-lark		
Himantopus himantopus	Black-winged Stilt		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Larus pacificus	Pacific Gull		
Lichenostomus ornatus	Yellow-plumed Honeyeater		
Lichenostomus virescens	Singing Honeyeater		
Malurus leucopterus	White-winged Fairy-wren		
Malurus pulcherrimus	Blue-breasted Fairy-wren		
Malurus splendens	Splendid Fairy-wren		
Manorina flavigula	Yellow-throated Miner		
Microcarbo melanoleucos	Little Pied Cormorant		
Nycticorax caledonicus	Nankeen Night Heron		
Ocyphaps lophotes	Crested Pigeon		
Pardalotus striatus	Striated Pardalote		
Pelecanus conspicillatus	Australian Pelican		
Petrochelidon ariel	Fairy Martin		
Petrochelidon nigricans	Tree Martin		
Phalacrocorax carbo	Great Cormorant		
Phalacrocorax fuscescens	Black-faced Cormorant		
Phalacrocorax sulcirostris	Little Black Cormorant		
Phalacrocorax varius	Pied Cormorant		
Phalaropus fulicarius	Grey Phalarope		
Phaps chalcoptera	Common Bronzewing		
Phaps elegans	Brush Bronzewing		
Phylidonyris novaehollandiae	New Holland Honeyeater		
Pluvialis squatarola	Grey Plover	M	
Poliocephalus poliocephalus	Hoary-headed Grebe		
Pomatostomus superciliosus	White-browed Babbler		
Psephotus haematonotus	Red-rumped Parrot		
Psephotus varius	Mulga Parrot		
Rhipidura albiscapa	Grey Fantail		
Rhipidura leucophrys	Willie Wagtail		
Sericornis frontalis	White-browed Scrubwren		
Smicrornis brevirostris	Weebill		
Strepera versicolor	Grey Currawong		ssp
Thalasseus bergii	Crested Tern		
Todiramphus sanctus	Sacred Kingfisher		
Tringa nebularia	Common Greenshank	M	
Tringa stagnatilis	Marsh Sandpiper	M	
Vanellus miles	Masked Lapwing		
Vanellus tricolor	Banded Lapwing		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	x
Jamenus icilus	Icilius Hairstreak	R	x
Trapezites sciron eremicola	Sciron Rush-skipper	R	x
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		x
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		x
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	x
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	x
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	x
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		x
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Chalinolobus gouldii	Gould's Wattled Bat		
Macropus fuliginosus	Western Grey Kangaroo		
Macropus robustus	Euro		
Sminthopsis crassicaudata	Fat-tailed Dunnart		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Amphibolurus norrisi	Mallee Tree-dragon			e
Ctenophorus fionni	Peninsula Dragon			c
Ctenophorus pictus	Painted Dragon			x
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Demansia reticulata	Desert Whipsnake			x
Egernia stokesii	Gidgee Skink			e
Gehyra lazelli	Southern Rock Dtella			c

Species	Common Name	Aus status	SA status	Record
Gehyra variegata	Tree Dtella			e
Hemiergis initialis	Western Earless Skink			c
Hemiergis peronii	Four-toed Earless Skink			c
Heteronotia binoei	Bynoe's Gecko			c
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			x
Lialis burtonis	Burton's Legless Lizard			c
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			x
Morethia obscura	Mallee Snake-eye			c
Parasuta spectabilis	Mallee Black-headed Snake			c
Pseudechis australis	Mulga Snake			c
Pseudonaja affinis	Dugite			x
Strophurus intermedius	Southern Spiny-tailed Gecko			x
Tiliqua occipitalis	Western Bluetongue			c
Tiliqua rugosa	Sleepy Lizard			x

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP14 Arno Bay

Cell area 888 ha. Shoreline length 8.18 km.

Landforms

This is a low coastal plain, with low lying land subject to storm inundation, and with a shoreline of narrow low to absent Holocene dunes. Granitic basement rocks appear in platforms and reefs principally at Cape Driver and at Red Rock, but also intermittently along the shore NW of Arno Bay boat ramp. The Arno Bay shoreline comprises low energy Holocene coarse sand beaches, except at Red Rock, immediately NE of Arno Bay township, where Pleistocene red sands form low cliffs over the basement platform.
48% of this cell is salt marsh (samphire interspersed with chenier ridges): where the estuary flats of the Salt Creek at Arno Bay township shows accumulation of sediments during the Holocene; this is both inter-tidal and supra-tidal samphire, with a good marine connection, through Salt Creek and its branches. In the north of the cell there are large flood prone areas behind the low dunes; however, no surface connection with the sea has been found in the north of the cell: the low Holocene dune at the back of the beach appears to preclude marine inundation. Marked Pleistocene parallel arid dune ridges are seen at the landward coastal boundary, in places intruding into the coastal boundary.

Benthic Habitat

Bare sand and reef in Arno Bay; then inshore reef and bare sand from west of boat harbour for rest of cell. Offshore dense seagrass beds.

Biota

The area of remnant vegetation is 735 ha, 83% of the cell. Moderately intact mangrove, intertidal and supra-tidal samphire were recorded in 48% of this cell. 84% of the intact vegetation is not protected.
The cell contains 6 BDBSA flora survey sites, 8 opportune flora sites, 6 herbarium record sites and 6 opportune fauna sites. Salt marsh sites are mapped as *Tecticornia pergranulata ssp. pergranulata, Parapholis incurva, +/-Medicago truncatula* low open shrubland and *Tecticornia sp.* low sparse shrubland over *Disphyma crassifolium ssp. clavellatum*. Dune areas as shrubland: *Nitraria billardierei, +/-Olearia axillaris* mid open shrubland and *Olearia axillaris, Leucopogon parviflorus* tall open shrubland and *Acacia cupularis, +/-Dodonaea viscosa ssp. spatulata, Beyeria lechenaultii, Olearia axillaris* tall sparse shrubland. Pleistocene dunes retain eucalypt mallee woodland. Areas of mangrove are found along the tidal Salt Creek.

FIGURE 6.4 Arno Bay and adjacent salt marsh. Photo: Coast Protection Board, 2007

Land Use/ Land Ownership

A small Crown lands Act reserve under the care, control and management of the District Council of Cleve occurs on the western boundary of the cell and includes the Redbanks car park. West of the car park a coastal reserve of unalloted Crown land, approximately 50-120m wide, occurs along the coast until the Arno Bay boat harbour, backed by privately owned land including a relatively large area under Heritage Agreement adjacent the western cell boundary. The coastal reserve from the boat harbour to the Arno Bay caravan park is a Crown land Act reserve under the care, control and management of the DC of Cleve, and extends behind the Arno Bay shack settlement including a large allotment on the northern side of the causeway road (Tel El Kebir Terrace).

South of the caravan park the narrow (c.30-60m) coastal reserve is unalloted Crown land apart from a small section at the creek mouth that is under the care, control and management of DC of Cleve. Much of the coastal reserve immediately south of the caravan park is backed by privately owned land under Heritage Agreement, while on the south western cell boundary of the coastal reserve is backed by privately owned land, part of which is used for land based aquaculture.

Uses (Field visits and local reports)

Recreation and tourism – fishing, camping, ORV use, sight seeing, boating, walking
Recreational and charter boat fishing
Land based aquaculture in south of cell
Offshore aquaculture access
Boat launching- aquaculture, charter and recreational
Scattered dwellings/shacks in eastern half of cell
Residential – Arno Bay
Agricultural
Caravan park

Threats (Field visits and local reports)

There is acid sulfate soil potential under much of the salt marsh.
Salt marsh areas around the town used by ORVs
ORV activity in north-east half of cell
Development – including proposed marina and residential development proposed within salt marsh habitat
Weed infestation from garden escape plants, particularly Gazania.
Dune erosion from stormwater discharge and loss of native vegetation
Marine debris
Informal camping
Boat launching (public safety, hydrocarbon spills)

Opportunities (Field visits and local reports)

Very active community group action in the salt marsh has created a positive momentum to further conserve this area.
A range of stormwater management initiatives, including capture and reuse and the direction of stormwater into vegetated swales, have been implemented in the town area. Further work could be undertaken to manage stormwater discharge in the dune areas to prevent erosion and minimise sedimentation of marine area identified in "Arno Bay: Reducing stormwater impacts on coast and marine environments". Prepared for the EP NRM Board by DesignFlow 2010

FIGURE 6.5 Arno Bay from the south (Cape Driver); dunes, salt marsh, Salt Creek, Arno Bay township. Photo: Coast Protection Board, 2002

Conservation Analysis (GIS)

The sum of conservation means is 112.58, average for the region, and 35th in ranking. The values of this cell are concentrated in the salt marsh, mangroves and dunes south of the township which

total medium to medium-high values; the rest of the cell is low to low-medium in total, other than the narrow coastal dunes that have a medium high total.

The pattern of values arises from numbers of threatened plant species. However, the distribution of threatened fauna status shows the inverse of this pattern, with high values in both the dunes and the lowlands of the northwest of the cell. The Holocene dunes show high values for endemic floristic vegetation. Total number of species is moderate to high in the salt marsh, low elsewhere; the salt marsh is also valuable habitat for all bird species, threatened bird species (including the Australian Pied Oystercatcher – focal species), butterflies (high in salt marsh, moderate elsewhere); the salt marsh also attracts value for its wetland significance. The whole cell scores well on vegetation block metrics. The state vulnerable Hooded Plover has been recorded in this cell.

Threat Analysis (GIS)

The total of threat values is high, 55.99. Medium to high threat totals are found throughout the cell, highest near the township of Arno Bay, and in parts of the salt marsh; however, the pattern within the salt marsh is complex.
There are ORV tracks throughout the cell, on the wetlands and some dune areas.
Land ownership and sea views are major widespread contributors to threat totals. Mining exploration licenses in parts of the cell over 800m from the shore. There are some areas of rabbit incursion in the dunes and part of the salt marsh.
Weed distribution is high throughout the cell.
The threat of development of acid sulfate soils is high within the salt marsh.

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, dune and salt marsh change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Beach recession and dune instability (in the short term the rate may depend on the circulation of sediment stored in the embayment).	Continue to monitor existing DENR beach profiles (310001 – 4). Active management of dunes	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
2070: +c.80cm.	Frequency and duration of marine flooding of salt marsh increases, resulting in species and habitat change and landward migration. Mangrove recession across former salt marsh. Possible sediment accumulation from marine ingress and terrestrial flooding.	Monitor salt marsh species and elevation changes using baseline of existing DENR profile 310005. Consider land use and development plan changes to create buffer for salt marsh retreat.	
	Threats to tidal circulation within the salt marsh, threaten endangered Tecticornia species found here.	Increase Causeway culvert size to allow tidal circulation in northern Arno Bay salt marsh.	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides.	Continue to monitor beach profiles. Active management of dunes	
Intensity of large storms increases. Storm surge heights are high in the northern half of the Gulf	Low dunes over hard rock, backed by low ground are extremely vulnerable to storm damage, overtopping, and rapid recession.	Dune habitats can only be retained by allowing rapid overwash recession of low dune ridges. (Salt marsh recession buffer important).	
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere). There will be an increased risk for species that are already vulnerable. Invasive species may become more dominant.		Maintain NE-SW connectivity of vegetation within the coastal boundary
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage	Active dune management, including weed control	
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the plateau and slopes.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains sediment movement towards the north along the Gulf coast. Local movement of large quantities of sand in the nearshore zone may be accelerated as sea levels rise.	Monitor beaches, see above.	

TABLE 6.6 Recommended Actions and Priority for EP14 Arno Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly fauna species.	Undertake coastal flora and fauna surveys to inform future management directions.	Medium (cons)	DENR, EP NRM
	Existing and future development with impact on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, weed escapes etc)	Work with private land owners to minimise impact from existing development, including education and restoration where appropriate. Ensure existing developments do not encroach on the coastal Crown reserve. Ensure future development is not located in areas of high conservation value or high sensitivity. Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs and cats, etc	Medium (cons/ threat)	EP NRM, DC of Cleve, DENR, DPLG, private land owners, developers, community groups
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	High (threat/ cons)	EP NRM, private land owners, DENR, DC of Cleve, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg. rabbits foxes, cats. Undertake control program as required.	Medium (threat)	EP NRM, DENR, DC of Cleve, private land owners
	Unrestricted access and multiple vehicle tracks around the coast impacting on the coastal dune and cliff top vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	High (threat/ KP)	Private land owners, DC of Cleve, DENR, EP NRM, DTEI, community
Holocene dune areas	These are high in value for plant communities and reptile habitat, but threatened by weeds and ORV activity.	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. rationalise vehicle access, pest animal and plant control, restrict access to sensitive locations. Install interpretive/ educational signage. Community education programs.	Medium (cons/ threat)	DC of Cleve, DENR, EP NRM, private landowners, community groups
	The dune response to sea level rise is to recede across the salt marsh	Monitor, using existing profiles as baseline. Active management to recover from storm damage.	High (cons)	DENR, EP NRM, private land owners
Salt marsh immediately south of township	This area is valuable for numbers of plant species, bird habitat, butterfly habitat and wetland significance, but threatened by ownership and land use category, as well as some ORV activity. Also existing development exerts a pressure.	Review management of this valuable area to increase protection with consideration to prepare a local management plan, including possible heritage agreement, improved management, joint management or purchase for conservation.	High (cons/ threat)	EP NRM, DENR, private land owners, local community (Arno Bay Progress Assoc.), Nature Foundation, DC of Cleve

Component	Issue	Proposed Action	Priority of Action	Key Players
North eastern half of cell	Informal camping and car parks occur, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	Low (cons/ threat)	DC of Cleve, DENR, EP NRM, DTEI, private land owners, community
	Vehicles and dogs on beaches a threat to meiofauna and shorebirds	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	Medium (cons/ threat)	DC of Cleve, EP NRM, DTEI, EP LGA, DENR, Tourism SA, Birds Australia, community,
Area > 800m from the coast	Mining exploration licence cover the area >800m from the coast, with potential impact on sensitive areas and conservation values	Ensure any mining activities avoid areas of high conservation significance	Low	PIRSA, DENR, EP NRM, DC of Cleve, private land owners
All salt marsh areas	All salt marsh areas show the potential for acid sulfate soil following disturbance; in turn this would potentially threaten life forms offshore.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	High (threat)	DC of Cleve, DENR, developers, private land owners

Component	Issue	Proposed Action	Priority of Action	Key Players
	Adaptation to sea level rise and/or development may reduce or stop tidal movement to the marsh; also delivery of sediment by land based floods: maintain and if necessary enlarge culverts.	Ensure that road maintenance/ construction or other development allows tidal circulation to salt marsh. Also ensure that road culverts allow sediment movement from creeks to reach the salt marsh.	Medium (cons/ threat)	DC of Cleve, DTEI, DPLG, DENR, EP NRM, private land owners / developers
	All salt marsh areas are threatened by increased frequency and depth of tidal inundation. Commonwealth listed samphire species threatened in this area	Monitor using existing profile as a baseline. Modify land use and development plans to allow salt marsh recession with tidal rise.	High (cons/ threat)	DC Cleve, DENR, EP NRM, private landowners
Arno Bay township/ shack settlement	Stormwater impacts on coast and marine environment (eg. spread of weeds, erosion, pollution)	Implement actions from DesignFlow 2010 report	Medium (threat)	DC of Cleve, EP NRM, Stormwater Management Authority
	Maintenance of coastal access infrastructure eg. mangrove walk boardwalk	Use the EP Coastal infrastructure audit to setup a maintenance program	Medium (cons/ threat/ soc)	DENR, DC of Cleve, EP NRM, community groups

BIOTA

Flora

Remnant vegetation area (ha)	734.81 ha, 82.73% of cell area
# flora surveys / records	6 surveys, 8 opportune sites, 6 herbarium record sites, 2 threatened plant population record site.
# flora in cell	196
# conservation rated flora in cell	3
# non-indigenous flora in cell	22
Significant CDCS floristic community	*Melaleuca lanceolata* / *Tetragonia implexicoma* shrubland – 72% of SA records in EP
Protected area	15.5% of remnant vegetation protected by Heritage Agreement

Weeds

Species	Common Name	Status	Study rating
Euphorbia paralias	Sea Spurge	RA	5
Gazania rigens	Gazania	RA	6
Euphorbia terracina	False Caper	D, RA	5
Lycium ferocissimum	African Boxthorn	D, RA	8
Oxalis pes-caprae	Soursob	D, RA	5
Asphodelus fistulosus	Onion Weed	D	3
Anagallis arvensis	Pimpernel		2

Species	Common Name	Status	Study rating
Brassica tournefortii	Wild Turnip		3
Bupleurum semicompositum	Hare's Ear		0
Conyza bonariensis	Flax-leaf Fleabane		0
Erodium cicutarium	Cut-leaf Heron's-bill		0
Holcus lanatus	Yorkshire Fog		0
Hornungia procumbens	Oval Purse		0
Hypochaeris sp.	Cat's Ear		1
Medicago minima var. minima	Little Medic		1
Mesembryanthemum sp.	Iceplant		3
Parapholis incurva	Curly Ryegrass		1
Reichardia tingitana	False Sowthistle		3
Rostraria cristata	Annual Cat's-tail		2
Sonchus oleraceus (NC)	Common Sow-thistle		0
Spergularia marina (NC)	Salt Sand-spurrey		0
Spergularia sp.	Sand-spurrey		0

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Acacia rhetinocarpa	Resin Wattle	V	V
Tecticornia flabelliformis	Bead Samphire	V	V
Crassula exserta	Large-fruit Crassula		R
Acacia ancistrophylla var. lissophylla	Hook-leaf Wattle		
Acacia cupularis	Cup Wattle		
Acacia euthycarpa	Wallowa		
Acacia farinosa	Mealy Wattle		
Acacia hakeoides	Hakea Wattle		
Acacia halliana	Hall's Wattle		
Acacia ligulata	Umbrella Bush		
Acacia microcarpa	Manna Wattle		
Acacia notabilis	Notable Wattle		
Acacia rigens	Nealie		
Acacia sclerophylla var. sclerophylla	Hard-leaf Wattle		
Acacia spinescens	Spiny Wattle		
Acacia wilhelmiana	Dwarf Nealie		
Acrotriche patula	Prickly Ground-berry		
Actinobole uliginosum	Flannel Cudweed		
Aotus subspinescens	Mallee Aotus		
Astroloma humifusum	Cranberry Heath		
Atriplex acutibractea ssp. karoniensis	Pointed Saltbush		
Atriplex cinerea	Coast Saltbush		
Atriplex paludosa ssp.	Marsh Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Atriplex vesicaria ssp.	Bladder Saltbush		
Austrostipa elegantissima	Feather Spear-grass		
Austrostipa sp.	Spear-grass		
Billardiera cymosa (NC)	Sweet Apple-berry		
Billardiera sericophora	Silky Apple-berry		
Billardiera versicolor	Yellow-flower Apple-berry		
Boronia coerulescens ssp. coerulescens	Blue Boronia		
Boronia inornata ssp. leptophylla	Dryland Boronia		

Species	Common Name	Aus status	SA status
Brachyscome ciliaris var. ciliaris	Variable Daisy		
Brachyscome lineariloba	Hard-head Daisy		
Calandrinia sp.	Purslane/Parakeelya		
Callitris gracilis	Southern Cypress Pine		
Calotis erinacea	Tangled Burr-daisy		
Calytrix involucrata	Cup Fringe-myrtle		
Carpobrotus modestus/rossii	Native Pigface		
Carpobrotus sp.	Pigface		
Cassytha melantha	Coarse Dodder-laurel		
Cassytha peninsularis	Peninsula Dodder-laurel		
Cassytha sp.	Dodder-laurel		
Chenopodium desertorum ssp.	Desert Goosefoot		
Chenopodium desertorum ssp. desertorum	Frosted Goosefoot		
Correa backhouseana var. coriacea	Thick-leaf Correa		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Cryptandra sp. Floriferous (W.R.Barker 4131)	Pretty Cryptandra		
Cyphanthera myosotidea	Small-leaf Ray-flower		
Danthonia sp. (NC)	Wallaby-grass		
Daucus glochidiatus	Native Carrot		
Daviesia arenaria	Sand Bitter-pea		
Dianella brevicaulis	Short-stem Flax-lily		
Dianella brevicaulis/revoluta var.	Black-anther Flax-lily		
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Dicrastylis verticillata	Whorled Sand-sage		
Dillwynia uncinata	Silky Parrot-pea		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Dodonaea bursariifolia	Small Hop-bush		
Dodonaea stenozyga	Desert Hop-bush		
Dodonaea viscosa ssp. spatulata	Sticky Hop-bush		
Einadia polygonoides	Dock Saltbush		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eremophila crassifolia	Thick-leaf Emubush		
Eremophila glabra ssp. glabra	Tar Bush		
Eremophila weldii	Purple Emubush		
Eucalyptus dumosa	White Mallee		
Eucalyptus gracilis	Yorrell		
Eucalyptus incrassata	Ridge-fruited Mallee		
Eucalyptus leptophylla	Narrow-leaf Red Mallee		
Eucalyptus oleosa ssp. ampliata	Red Mallee		
Eucalyptus peninsularis	Merrit		
Eucalyptus socialis (NC)	Beaked Red Mallee		
Eucalyptus socialis ssp. viridans	Beaked Red Mallee		
Eutaxia microphylla	Common Eutaxia		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos sparteus	Slender Cherry		
Exocarpos syrticola	Coast Cherry		
Ficinia nodosa	Knobby Club-rush		
Frankenia pauciflora var.	Southern Sea-heath		
Frankenia sessilis	Small-leaf Sea-heath		
Gahnia deusta	Limestone Saw-sedge		
Gahnia lanigera	Black Grass Saw-sedge		
Geijera linearifolia	Sheep Bush		
Goodenia varia	Sticky Goodenia		

Species	Common Name	Aus status	SA status
Goodenia willisiana	Silver Goodenia		
Gramineae sp.	Grass Family		
Grevillea huegelii	Comb Grevillea		
Hakea cycloptera	Elm-seed Hakea		
Halgania andromedifolia	Scented Blue-flower		
Helichrysum leucopsideum	Satin Everlasting		
Hemichroa diandra	Mallee Hemichroa		
Hemichroa pentandra	Trailing Hemichroa		
Hibbertia riparia (NC)	Guinea-flower		
Hibbertia virgata	Twiggy Guinea-flower		
Homoranthus wilhelmii	Wilhelm's Homoranthus		
Hybanthus floribundus ssp. floribundus	Shrub Violet		
Lasiopetalum behrii	Pink Velvet-bush		
Lawrencia squamata	Thorny Lawrencia		
Lepidosperma viscidum	Sticky Sword-sedge		
Leptospermum coriaceum	Dune Tea-tree		
Lichen sp.			
Linum marginale	Native Flax		
Logania ovata	Oval-leaf Logania		
Lomandra collina	Sand Mat-rush		
Lomandra leucocephala ssp. robusta	Woolly Mat-rush		
Maireana brevifolia	Short-leaf Bluebush		
Maireana erioclada	Rosy Bluebush		
Maireana oppositifolia	Salt Bluebush		
Maireana radiata	Radiate Bluebush		
Maireana trichoptera	Hairy-fruit Bluebush		
Melaleuca acuminata ssp. acuminata	Mallee Honey-myrtle		
Melaleuca halmaturorum	Swamp Paper-bark		
Melaleuca lanceolata	Dryland Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Melaleuca pauperiflora ssp. mutica	Boree		
Melaleuca uncinata (NC)	Broombush		
Microcybe multiflora ssp.	Small-leaf Microcybe		
Millotia tenuifolia var. tenuifolia	Soft Millotia		
Muehlenbeckia adpressa	Climbing Lignum		
Myoporum insulare	Common Boobialla		
Nicotiana velutina	Velvet Tobacco		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Olearia ciliata var. ciliata	Fringed Daisy-bush		
Olearia sp.	Daisy-bush		
Opercularia turpis	Twiggy Stinkweed		
Ozothamnus decurrens	Ridged Bush-everlasting		
Ozothamnus retusus	Notched Bush-everlasting		
Parietaria debilis (NC)	Smooth-nettle		
Pelargonium australe	Austral Stork's-bill		
Pelargonium littorale	Native Pelargonium		
Phebalium bullatum	Silvery Phebalium		
Pimelea micrantha	Silky Riceflower		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pimelea stricta	Erect Riceflower		
Pittosporum angustifolium	Native Apricot		
Podolepis capillaris	Wiry Podolepis		

Species	Common Name	Aus status	SA status
Pogonolepis muelleriana	Stiff Cup-flower		
Prostanthera aspalathoides	Scarlet Mintbush		
Prostanthera serpyllifolia ssp. microphylla	Small-leaf Mintbush		
Ptilotus seminudus	Rabbit-tails		
Puccinellia stricta var. stricta	Australian Saltmarsh-grass		
Pultenaea tenuifolia	Narrow-leaf Bush-pea		
Radyera farragei	Desert Rose Mallow		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia crassifolia	Fleshy Saltbush		
Rhagodia preissii ssp. preissii	Mallee Saltbush		
Rhodanthe pygmaea	Pigmy Daisy		
Santalum acuminatum	Quandong		
Sclerolaena diacantha	Grey Bindyi		
Senecio glossanthus (NC)	Annual Groundsel		
Senecio pinnatifolius (NC)	Variable Groundsel		
Solanum capsiciforme	Capsicum Kangaroo-apple		
Solanum petrophilum	Rock Nightshade		
Spinifex hirsutus (NC)	Rolling Spinifex		
Sporobolus virginicus	Salt Couch		
Spyridium bifidum var. bifidum	Forked Spyridium		
Tecticornia arbuscula	Shrubby Samphire		
Tecticornia indica ssp.	Brown-head Samphire		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Thryptomene micrantha	Ribbed Thryptomene		
Trachymene cyanopetala	Purple Trachymene		
Trachymene pilosa	Dwarf Trachymene		
Triglochin calcitrapum (NC)	Spurred Arrowgrass		
Triodia irritans	Spinifex		
Triodia sp. (NC)	Spinifex		
Vittadinia dissecta var. hirta	Dissected New Holland Daisy		
Wahlenbergia sp.	Native Bluebell		
Westringia eremicola	Slender Westringia		
Westringia rigida	Stiff Westringia		
Wilsonia humilis	Silky Wilsonia		
Zygophyllum aurantiacum ssp. aurantiacum	Shrubby Twinleaf		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	46 recorded – 43 birds, 0 butterflies, 0 mammals, 3 reptiles, 0 amphibians (an additional 16 reptiles and 26 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	6 opportune sites
# of threatened fauna in cell	6
# of non-indigenous fauna	2 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Passer domesticus	House Sparrow	Aves	x
Sturnus vulgaris	Common Starling	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Thinornis rubricollis	Hooded Plover		V
Actitis hypoleucos	Common Sandpiper	M	R
Charadrius leschenaultii	Greater Sand Plover	M	R
Haematopus longirostris	Australian Pied Oystercatcher		R
Tringa brevipes	Grey-tailed Tattler	M	R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Acanthiza chrysorrhoa	Yellow-rumped Thornbill		
Anthochaera carunculata	Red Wattlebird		
Artamus personatus	Masked Woodswallow		
Artamus superciliosus	White-browed Woodswallow		
Calamanthus campestris	Rufous Fieldwren		
Calidris acuminata	Sharp-tailed Sandpiper	M	
Charadrius bicinctus	Double-banded Plover		
Charadrius ruficapillus	Red-capped Plover		
Cheramoeca leucosterna	White-backed Swallow		
Chroicocephalus novaehollandiae	Silver Gull		
Circus assimilis	Spotted Harrier		
Colluricincla harmonica	Grey Shrike-thrush		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Corvus coronoides	Australian Raven		
Cracticus torquatus	Grey Butcherbird		
Egretta novaehollandiae	White-faced Heron		
Epthianura aurifrons	Orange Chat		
Falco cenchroides	Nankeen Kestrel		
Grallina cyanoleuca	Magpie-lark		
Hirundo neoxena	Welcome Swallow		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Ocyphaps lophotes	Crested Pigeon		
Pelecanus conspicillatus	Australian Pelican		
Petrochelidon nigricans	Tree Martin		
Phalacrocorax fuscescens	Black-faced Cormorant		
Phalacrocorax varius	Pied Cormorant		
Phaps elegans	Brush Bronzewing		
Pluvialis squatarola	Grey Plover	M	
Porzana fluminea	Australian Spotted Crake		
Rhipidura leucophrys	Willie Wagtail		
Thalasseus bergii	Crested Tern		
Todiramphus sanctus	Sacred Kingfisher		
Tribonyx ventralis	Black-tailed Native-hen		
Vanellus miles	Masked Lapwing		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

No mammal species recorded

Reptiles

Species	Common Name	Aus status	SA status	Record
Caretta caretta	Loggerhead Turtle	E	E	x
Amphibolurus norrisi	Mallee Tree-dragon			e
Ctenophorus fionni	Peninsula Dragon			c
Ctenophorus pictus	Painted Dragon			c
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Egernia stokesii	Gidgee Skink			e
Gehyra variegata	Tree Dtella			e
Hemiergis peronii	Four-toed Earless Skink			c
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			e
Lialis burtonis	Burton's Legless Lizard			x
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			e

Species	Common Name	Aus status	SA status	Record
Morethia obscura	Mallee Snake-eye			c
Parasuta spectabilis	Mallee Black-headed Snake			c
Ramphotyphlops bituberculatus	Rough-nosed Blind Snake			x
Tiliqua occipitalis	Western Bluetongue			c

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP20 Tumby Bay

Cell area 721 ha. Shoreline length 12.48 km.

Landforms

A flat coastal plain, with coarse sand beach and low foredune ridges; low ground behind the dune barrier is flood-prone. The shoreline appears to be adjusted to the pattern of the refracted swell, with only slow drift to the NE. At Salt Creek Beach (northern end of the cell), the Salt Creek appears to deliver large quantities of sand to the river mouth: nearshore there are sand flats <400m wide, and adjacent to the river there are larger dunes than elsewhere. Nearshore sand flats are also wide (c.400m) at the extreme southern end of the bay, again in an ebb tide delta. Dunes around the bay are low and 200 to 500m wide, generally stable - though with a badly damaged area west of Salt Creek; the township of Tumby Bay is built on flattened dunes.

Benthic Habitat

The bay is covered in dense seagrass, with a narrow band of inshore sand. Off Salt Creek Beach the inshore sands widen to 400m, to low profile reef then dense seagrass.

Biota

515 ha remnant vegetation, 71 % of cell. There are two flora survey sites, six herbarium record sites and 15 opportune fauna sites.
The dunes are almost entirely *Olearia axillaris, Leucopogon parviflorus* tall open shrubland over *Threlkeldia diffusa, Tetragonia implexicoma, Rhagodia candolleana ssp. candolleana, Pimelea serpyllifolia ssp. serpyllifolia* low shrubs over *Muehlenbeckia adpressa, Dianella brevicaulis, Carpobrotus rossii, Clematis microphylla var. microphylla, Senecio pinnatifoliu.* However, about three km from Tumby Bay there is an unusual area of *Allocasuarina verticillata* low woodland over +/-*Dodonaea viscosa ssp. spatulata* tall shrubs over *Avena barbata, Cheilanthes austrotenuifolia, +/-Lepidosperma viscidum, +/-Gonocarpus mezianus* low forbs located on the dunes on its landward side. In the northern part of the cell the low ground behind the dune is *Triodia scariosa, Avena barbata, Austrodanthonia caespitosa, +/-Austrostipa nitida* low hummock grassland.

Land Use/ Land Ownership

A narrow (c.15-100m) coastal reserve of unalloted Crown land extends along the coast from the north east cell boundary to approximately 1 km north of the Tumby Bay township. This section of coastal reserve is predominantly backed by privately owned land, although the western area is backed by a miscellaneous Crown lease and an area of Crown land Act reserve under the care, control and management of the DC of Tumby Bay. A large area of Crown land Act reserve

covers the coast between the unalloted Crown land coastal reserve and the Tumby Bay township, and extends over 800m inland including a large area of the coastal dunes immediately north of the township. Within the Tumby Bay township most of the coast is not within a Crown land coastal reserve, however, a section of the coast near the jetty and immediately north is Crown land Act reserve under the care, control and management of the District Council of Tumby Bay, and a narrow (c.10m) coastal reserve of unalloted Crown land fronts the houses immediately north of the marina outlet. The remainder of the cell is mostly privately owned.

Sir Joseph Banks Group Marine Park offshore

FIGURE 6.6 Salt Creek Beach. Photo: Coast Protection Board 2007

Uses (Field visits and local reports)

The coastal reserve at the northern end of Tumby Bay township has a network of walking trails through the coastal vegetation and is used regularly. Footballers use this area for training (running through sand) and horse-riders also utilise the trail network.
The beach north of Tumby Bay to the mouth of Salt Creek is regularly used by local youths for camping and motor-bike riding.
Numerous vehicle tracks occur in the sand dunes and samphire areas north of the township
Residential, including marina and Tumby Bay township
Agriculture – cropping (wheat, barley, oats) and grazing (sheep)
Boat launching
Professional and recreational fishing
Recreation and tourism – sight seeing, boat charters, holidaying, dog walking

Threats (Field visits and local reports)

Eco-tourism / tourism ventures
Introduced animals (fox, cats, rabbits)
Track creation

Uncontrolled camping
Uncontrolled ORV usage
Development
Boat launching (public safety, hydrocarbon spills)
PCASS
Recreational activities (eg. horse-riding, pedestrians, vehicles) damaging vegetation and impacting on dune stability.
Erosion of dunes and weed proliferation from stormwater discharge.

Opportunities (Field visits and local reports)

Projects to reinstate the foredune along the township foreshore and revegetate with indigenous plant species has been ongoing since 2003. Initiated by the Tumby Bay Progress Association it became an integrated project with DC of Tumby Bay and students from the Tumby Bay Area School propagating and planting all the native plants. With the success of this project, Council has taken it on-board and has been driving the foreshore rehabilitation for the last few years.
Boxthorn control has been undertaken in the past from the township to the Salt Creek mouth, but with no follow-up control the pest plant has re-established itself again throughout the vegetated coastal strip.
The local Landcare Group has been successful in gaining funding to undertake pest plant control from the northern edge of town along the coastal Crown strip north until their funding runs out, approximately 1 to 2 kms. Weeds targeted are Aleppo pines, succulents and boxthorns.
Recent access management works to close vehicle tracks near the rifle range north of the Tumby Bay township.
Stormwater infiltration basins have been installed at some coastal outfalls as part of the foreshore dune restoration works. Opportunities to improve performance of current basins were identified by Bebbington (Bebbington, L. Tumby Bay Foreshore Stormwater Assessment, 2009 Prepared for the EP NRM Board and District Council of Tumby Bay). Further improvements to coastal stormwater outfalls were identified in "Tumby Bay: Reducing stormwater impacts on coast and marine environments" (prepared for the EP NRM Board by DesignFlow 2010).

Conservation Analysis (GIS)

The total of conservation means is 110.97, a moderate total, ranking 39th in the region. The pattern of conservation values is clear: these are concentrated in the dune ridges, running north and east from the township.
The overall score for threatened flora is high. Endemicity of vegetation assemblages is high-medium throughout the cell, but highest in the dune ridges. There are no areas showing high species richness, but some moderate scores in the central wetlands and dunes. The Salt Creek estuary shows high habitat values for birds, including threatened species such as the state rare Australian Pied Oystercatcher (focal species); throughout the cell 90 bird species have been recorded, including the sate endangered Fairy Tern and the state vulnerable Eastern Curlew, Banded Stilt and Hooded Plover. 10 reptile and 1 butterfly species have also been recorded. Scores for reptiles and mammal habitat are concentrated in the central dunes. Moderate vegetation metrics scores and high viewshed scores help make up the total analysis priority.

Threat Analysis (GIS)

The threats total is high, 55.24; these high to medium- high threats are widely distributed through the cell, but include almost all the dune ridges.
The total is made up of higher than average scores from development zoning, land ownership, land use, viewshed, vegetation block degradation, distribution of invasive weeds and dune instability. Almost all these threatening factors (with the exception of development zoning) affect the dune ridges, where most conservation priorities accrue; there is also some evidence of ORV

activity in the dunes, (though less than in the wetland areas). North of Tumby Bay threats combine for the dunes and wetlands with ORV, waste treatment plant and weed distribution. Weeds and ORV also threaten the dunes near Salt Creek.

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	**Impacts and implications (for this cell)**	**Protect and manage habitat threats**	**Address landscape issues: fire, connectivity, refuges, hydrology**
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, dune and salt marsh change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Beach recession and dune instability (in the short term the rate may depend on the circulation of sediment stored in the embayment).	Continue to monitor existing DENR beach profiles (340004 – 7, and 340009). A further profile line to monitor changes near the mouth of Salt Creek should be established as soon as possible. Active management of dunes	
2070: +c.80cm.	Frequency and duration of marine flooding of low ground near Salt Creek and behind dunes increases, resulting in species and habitat change Possible sediment accumulation from marine ingress and terrestrial flooding.	Monitor species change in floodable areas.	
	Further sea level rise leads to beach and foredune erosion and dune migration landward.	Monitor dune movement (air photo time series). Slow dune changes through active management.	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides.	Continue to monitor beach profiles. Active management of dunes	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Intensity of large storms increases.	Low dunes backed by low ground are vulnerable to storm damage, overtopping, and rapid recession.	Dune habitats can only be retained by allowing rapid overwash recession of low dune ridges.	
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere. There will be an increased risk for species that are already vulnerable. Invasive species are likely to become more dominant.		Maintain NE-SW connectivity of vegetation within the coastal boundary
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage, with invasion of grass species.	Active dune management, including weed control	Ensure dunes are included in regional fire plan
'Flashy' run off: Drier creeks, but larger rare floods	Slope, bank and channel erosion potentially contribute to the greater work capacity of large floods in the Salt Creek. The volume of sediment movement through to the nearshore zone is potentially large.	The impact of these rare events depends largely on long term land management in the Salt Creek catchment.	
Groundwater lowering; saline incursion:	There is a potential local impact on water tables, including any perched water tables within the dunes, and vegetation survival	Adaptive management of plant assets	
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains sediment movement towards the north along the Gulf coast. Local movement of large quantities of sand in the nearshore zone may be accelerated as sea levels rise. Changes in the refracted pattern of swell and the wave climate have the potential to modify the plan-shape of the embayment.	Monitor beaches, see above.	

TABLE 6.7 Recommended Actions and Priority for EP20 Tumby Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Climate change and sea level rise is having multiple effects within the cell	Ensure the establishment and maintenance of a time series of aerial photographs at an appropriate resolution. Continue and supplement (see above) the DENR beach profile record, to accurately track beach and dune recession. Seek to improve the resilience of plant and animal habitats by taking opportunities to improve connectivity between vegetation blocks.	Medium (cons)	DENR, EP NRM, community groups
	Areas within cell identified as being important for endemic plant communities, threatened flora species and as habitat for threatened fauna species, with potential disturbance from agricultural activities, development zoning, recreational activities, land management practices, uncontrolled access, weeds and pest animals	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches, dogs on leashes, track management, pest animal and plant control, restrict access to sensitive locations. Install interpretive/ educational signage. Community education programs. Review development plan zoning to these areas to increase protection	High (cons/ threat)	DENR, private land owners, EP NRM, DPLG, DC of Tumby Bay, community groups
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	Medium	EP NRM, private land owners, DENR, DC of Tumby Bay, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Introduced animals (including areas of medium current rabbit activity); with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg. rabbits foxes, cats. Undertake control program as required.	Medium (threat)	EP NRM, private land owners, DENR
	Maintenance of existing and future coastal access management infrastructure	Use the EP NRM coastal infrastructure audit to develop and implement a maintenance program	Medium	EP NRM, DC of Tumby Bay, DENR, community
Dune, wetland and tussock grassland near Salt Creek	Valuable bird habitat degraded and disturbed through weeds, ORV and dune instability.	Develop and implement weed management plan, including control works as required. Review existing tracks with a view to rationalise unnecessary tracks. Implement actions to control or exclude off-road vehicle activity. Community education. Interpretive signage.	High (cons/ threat)	EP NRM, DENR, private land owners, DC of Tumby Bay, community
Dunes near to Tumby Bay	Medium high conservation values for plant associations and reptile habitat are threatened by uncontrolled vehicle and pedestrian activity and weeds	Develop and implement weed management plan, including control works as required. Review existing tracks with a view to rationalise unnecessary tracks. Implement actions to control or exclude off-road vehicle activity. Community education. Interpretive signage.	Medium	DC Tumby Bay, EP NRM, DENR, private land owners
	Unrestricted vehicle and pedestrian access and multiple tracks around the coast impacting on the coastal dune vegetation, dune erosion and instability, weed introduction, disturbance to native fauna species	Develop access management plan – including review of existing tracks with a view to rationalise. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Formalise and maintain pedestrian and vehicle tracks to remain. Install directional /educational signage. Community education	Medium (cons/ threat)	DC of Tumby Bay, DTEI, DENR, EP NRM, community, private land owners,
Tumby Bay township	Non-indigenous heritage site listed (Bratten Memorial, new jetty, War Memorial)	Ensure sites managed to protect from damage. Install interpretive educational signage where appropriate.	Low (threat)	DC of Tumby Bay, DENR

Component	Issue	Proposed Action	Priority of Action	Key Players
	Existing development impacting on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Work with private land owners to minimise impact from existing development, including education, restoration where appropriate and/or negotiation/enforcement to ensure the developments do not encroach on the coastal Crown reserve Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs and cats, etc	Medium (cons/ threat)	EP NRM, DC of Tumby Bay, DENR, private land owners, community groups
	Stormwater discharge impacting on impacts on coast and marine environment eg. dune erosion, weed proliferation in dunes, sedimentation and pollution in salt marsh and mangrove areas.	Prepare stormwater management plan for Tumby Bay incorporating recommendations from Bebbington (2009) and DesignFlow (2010)	High (cons/ threat)	DC of Tumby Bay, EP NRM, Stormwater Management Authority
Dunes north and north east of Tumby Bay township	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, dune instability, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	Medium	DENR, EP NRM, private land owners, DC of Tumby Bay
All dunes	Stress through climate change: including sea level rise and increasing aridity, leading to foredune recession and increased opportunity for invasion by grassy weeds.	Increase dune management effort to slow recession of dune landforms. Maintain monitoring record of change to this unstable landform/ habitat.	Medium (cons)	DENR, EP NRM, DC of Tumby Bay, community groups

Component	Issue	Proposed Action	Priority of Action	Key Players
All salt marsh and low lying areas	Salt marsh and low lying areas have the potential for acid sulfate soil following disturbance; in turn this would potentially threaten life forms offshore	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Medium (threat)	DC of Tumby bay, DENR, developers, private land owners
Beaches – north of Tumby Bay township	Vehicles and dogs on beaches a threat to meiofauna and shorebirds	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	Medium (cons/ threat)	DC of Tumby Bay, EP NRM, DTEI, EP LGA, DENR, Tourism SA, Birds Australia, community, private land owners

BIOTA

Flora

Remnant vegetation area (ha)	515.52 ha, 71.49% of cell area
# flora surveys / records	2 surveys, 6 herbarium record sites
# flora in cell	122
# conservation rated flora in cell	5
# non-indigenous flora in cell	39
Significant CDCS floristic community	*Melaleuca lanceolata* / *Tetragonia implexicoma* shrubland – 72% of SA records in EP
Protected area	No remnant vegetation protected

Weeds

Species	Common Name	Status	Study rating
Argyranthemum frutescens ssp.	Marguerite Daisy	RA	4
Argyranthemum frutescens ssp. foeniculaceum	Teneriffe Daisy	RA	4

Species	Common Name	Status	Study rating
Asparagus asparagoides (NC)	Bridal Creeper	D, RA	9
Lycium ferocissimum	African Boxthorn	D, RA	8
Oxalis pes-caprae	Soursob	D, RA	5
Pinus halepensis	Aleppo Pine	D, RA	5
Asphodelus fistulosus	Onion Weed	D	3
Amaranthus muricatus	Rough-fruit Amaranth		0
Amaranthus retroflexus	Red-root Amaranth		0
Avena barbata	Bearded Oat		2
Brassica tournefortii	Wild Turnip		3
Bromus rubens	Red Brome		2
Bupleurum semicompositum	Hare's Ear		0
Centaurea melitensis	Malta Thistle		1
Cotyledon orbiculata var. orbiculata	Pig's Ear		1
Digitaria sanguinalis	Crab Grass		0
Dysphania multifida	Scented Goosefoot		0
Ehrharta longiflora	Annual Veldt Grass		3
Emex australis	Three-corner Jack		0
Eragrostis cilianensis	Stink Grass		0
Galenia pubescens var. pubescens	Coastal Galenia		0
Hordeum glaucum	Blue Barley-grass		1
Hornungia procumbens	Oval Purse		0
Hypochaeris glabra	Smooth Cat's Ear		2
Hypochaeris radicata	Rough Cat's Ear		3
Limonium sinuatum	Notch-leaf Sea-lavender		3
Medicago polymorpha var. polymorpha	Burr-medic		1
Medicago truncatula	Barrel Medic		1
Mesembryanthemum nodiflorum	Slender Iceplant		2
Parapholis incurva	Curly Ryegrass		1
Pentaschistis airoides	False Hair-grass		0
Polypogon monspeliensis	Annual Beard-grass		0
Silybum marianum	Variegated Thistle		0
Sonchus oleraceus (NC)	Common Sow-thistle		0
Spergularia marina (NC)	Salt Sand-spurrey		0
Trachyandra divaricata	Dune onion weed	EW	0
Tribulus terrestris	Caltrop		0
Vicia monantha ssp. triflora			0
Vulpia myuros f. myuros	Rat's-tail Fescue		2

D: Declared weed, RA: Red alert weed, EW: Early warning

Native flora

Species	Common Name	Aus status	SA status
Acacia whibleyana	Whibley's Wattle	E	E
Acacia imbricata	Feathery Wattle	V	R
Centrolepis cephaloformis ssp. cephaloformis	Cushion Centrolepis		R
Crassula exserta	Large-fruit Crassula		R
Poa fax	Scaly Poa		R
Acacia cupularis	Cup Wattle		
Acacia euthycarpa	Wallowa		
Acacia farinosa	Mealy Wattle		
Acacia ligulata	Umbrella Bush		
Acacia rupicola	Rock Wattle		

Species	Common Name	Aus status	SA status
Acacia sclerophylla var. sclerophylla	Hard-leaf Wattle		
Acrotriche patula	Prickly Ground-berry		
Adriana quadripartita	Coast Bitter-bush		
Allocasuarina verticillata	Drooping Sheoak		
Alyxia buxifolia	Sea Box		
Aotus subspinescens	Mallee Aotus		
Atriplex semibaccata	Berry Saltbush		
Austrostipa mollis	Soft Spear-grass		
Baumea juncea	Bare Twig-rush		
Billardiera cymosa ssp. pseudocymosa	Sweet Apple-berry		
Caladenia septuosa	Eyre Peninsula Spider-orchid		
Calandrinia eremaea	Dryland Purslane		
Carpobrotus rossii (NC)	Native Pigface		
Cassytha sp.	Dodder-laurel		
Chrysocephalum apiculatum	Common Everlasting		
Convolvulus angustissimus ssp. peninsularum	Grassland Bindweed		
Crassula colorata var. colorata	Dense Crassula		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Cynoglossum suaveolens	Sweet Hound's-tongue		
Dianella brevicaulis	Short-stem Flax-lily		
Dianella brevicaulis/revoluta var.	Black-anther Flax-lily		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Einadia nutans ssp. nutans	Climbing Saltbush		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eremophila deserti	Turkey-bush		
Eucalyptus odorata	Peppermint Box		
Ficinia nodosa	Knobby Club-rush		
Frankenia pauciflora var. gunnii	Southern Sea-heath		
Gahnia filum	Thatching Grass		
Hakea cycloptera	Elm-seed Hakea		
Hakea rugosa	Dwarf Hakea		
Haloragis aspera	Rough Raspwort		
Halosarcia sp. (NC)	Samphire		
Helichrysum leucopsideum	Satin Everlasting		
Homoranthus homoranthoides	Port Lincoln Ground-myrtle		
Juncus kraussii	Sea Rush		
Kennedia prostrata	Scarlet Runner		
Lepilaena australis	Austral Water-mat		
Lysiana exocarpi ssp. exocarpi	Harlequin Mistletoe		
Maireana enchylaenoides	Wingless Fissure-plant		
Melaleuca acuminata ssp. acuminata	Mallee Honey-myrtle		
Melaleuca halmaturorum	Swamp Paper-bark		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Millotia muelleri	Common Bow-flower		
Muehlenbeckia adpressa	Climbing Lignum		
Nicotiana maritima	Coast Tobacco		
Olearia axillaris	Coast Daisy-bush		
Pimelea flava ssp. dichotoma	Diosma Riceflower		
Pittosporum angustifolium	Native Apricot		
Poa sp.	Meadow-grass/Tussock-grass		
Ptilotus spathulatus f. spathulatus	Pussy-tails		
Puccinellia stricta var. stricta	Australian Saltmarsh-grass		
Pyrorchis nigricans	Black Fire-orchid		

Species	Common Name	Aus status	SA status
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia parabolica	Mealy Saltbush		
Rhagodia preissii ssp. preissii	Mallee Saltbush		
Sarcocornia quinqueflora	Beaded Samphire		
Sclerolaena diacantha	Grey Bindyi		
Senecio glossanthus	Annual Groundsel		
Senecio glossanthus (NC)	Annual Groundsel		
Sida corrugata var. angustifolia	Grassland Sida		
Solanum capsiciforme	Capsicum Kangaroo-apple		
Spergularia marina	Salt Sand-spurrey		
Suaeda australis	Austral Seablite		
Tecticornia indica ssp.	Brown-head Samphire		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Teucrium racemosum	Grey Germander		
Threlkeldia diffusa	Coast Bonefruit		
Trachymene pilosa	Dwarf Trachymene		
Vittadinia gracilis	Woolly New Holland Daisy		
Wahlenbergia sp.	Native Bluebell		
Wahlenbergia stricta ssp. stricta	Tall Bluebell		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	100 recorded – 90 birds, 1 butterflies, 0 mammals, 10 reptiles, 0 amphibians (an additional 13 reptiles and 24 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	1 survey, 4 opportune sites, 1 reserve database record sites
# of threatened fauna in cell	12
# of non-indigenous fauna	5 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Columba livia	Rock Dove	Aves	x
Passer domesticus	House Sparrow	Aves	x
Streptopelia chinensis	Spotted Dove	Aves	x
Sturnus vulgaris	Common Starling	Aves	x
Turdus merula	Common Blackbird	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Sternula nereis	Fairy Tern		E
Cladorhynchus leucocephalus	Banded Stilt		V
Numenius madagascariensis	Eastern Curlew	M	V
Thinornis rubricollis	Hooded Plover		V

Species	Common Name	Aus status	SA status
Actitis hypoleucos	Common Sandpiper	M	R
Biziura lobata	Musk Duck		R
Calidris tenuirostris	Great Knot	M	R
Cereopsis novaehollandiae	Cape Barren Goose		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Neophema petrophila	Rock Parrot		R
Pluvialis fulva	Pacific Golden Plover	M	R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Anas castanea	Chestnut Teal		
Anas gracilis	Grey Teal		
Anas superciliosa	Pacific Black Duck		
Anthochaera carunculata	Red Wattlebird		
Anthus novaeseelandiae	Australasian Pipit		
Artamus cyanopterus	Dusky Woodswallow		
Artamus personatus	Masked Woodswallow		
Artamus superciliosus	White-browed Woodswallow		
Aythya australis	Hardhead (White-eyed Duck)		
Barnardius zonarius	Australian Ringneck, (Ring-necked Parrot)		
Calidris acuminata	Sharp-tailed Sandpiper	M	
Calidris ruficollis	Red-necked Stint	M	
Chalcites basalis	Horsfield's Bronze-cuckoo		
Chalcites osculans	Black-eared Cuckoo		
Charadrius ruficapillus	Red-capped Plover		
Chlidonias hybrida	Whiskered Tern		
Chroicocephalus novaehollandiae	Silver Gull		
Cincloramphus cruralis	Brown Songlark		
Circus assimilis	Spotted Harrier		
Colluricincla harmonica	Grey Shrike-thrush		
Corvus coronoides	Australian Raven		
Corvus mellori	Little Raven		
Cracticus tibicen	Australian Magpie		
Cygnus atratus	Black Swan		
Dicaeum hirundinaceum	Mistletoebird		
Egretta novaehollandiae	White-faced Heron		
Elanus axillaris	Black-shouldered Kite		
Elseyornis melanops	Black-fronted Dotterel		
Eolophus roseicapillus	Galah		
Eopsaltria griseogularis	Western Yellow Robin		
Epthianura albifrons	White-fronted Chat		
Falco cenchroides	Nankeen Kestrel		
Falco longipennis	Australian Hobby		
Fulica atra	Eurasian Coot		
Glossopsitta concinna	Musk Lorikeet		
Glossopsitta porphyrocephala	Purple-crowned Lorikeet		
Grallina cyanoleuca	Magpie-lark		
Himantopus himantopus	Black-winged Stilt		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Malacorhynchus membranaceus	Pink-eared Duck		
Malurus cyaneus	Superb Fairy-wren		

Species	Common Name	Aus status	SA status
Megalurus gramineus	Little Grassbird		
Microcarbo melanoleucos	Little Pied Cormorant		
Ocyphaps lophotes	Crested Pigeon		
Pardalotus striatus	Striated Pardalote		
Pelecanus conspicillatus	Australian Pelican		
Petrochelidon ariel	Fairy Martin		
Petrochelidon nigricans	Tree Martin		
Phalacrocorax fuscescens	Black-faced Cormorant		
Phalacrocorax sulcirostris	Little Black Cormorant		
Phalacrocorax varius	Pied Cormorant		
Phaps chalcoptera	Common Bronzewing		
Phylidonyris novaehollandiae	New Holland Honeyeater		
Pluvialis squatarola	Grey Plover	M	
Poliocephalus poliocephalus	Hoary-headed Grebe		
Pomatostomus superciliosus	White-browed Babbler		
Porzana fluminea	Australian Spotted Crake		
Porzana pusilla	Baillon's Crake		
Rhipidura albiscapa	Grey Fantail		
Rhipidura leucophrys	Willie Wagtail		
Scythrops novaehollandiae	Channel-billed Cuckoo		
Tadorna tadornoides	Australian Shelduck		
Thalasseus bergii	Crested Tern		
Todiramphus sanctus	Sacred Kingfisher		
Tribonyx ventralis	Black-tailed Native-hen		
Tringa nebularia	Common Greenshank	M	
Vanellus miles	Masked Lapwing		
Vanellus tricolor	Banded Lapwing		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Candalides heathi heathi	Rayed Blue	R	x
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p

Species	Common Name	Status*	Record
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

No mammal species recorded

Reptiles

Species	Common Name	Aus status	SA status	Record
Bassiana trilineata	Western Three-lined Skink		R	e
Amphibolurus norrisi	Mallee Tree-dragon			e
Aprasia inaurita	Red-tailed Worm-lizard			x
Christinus marmoratus	Marbled Gecko			x
Ctenophorus fionni	Peninsula Dragon			c
Ctenophorus pictus	Painted Dragon			x
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Egernia stokesii	Gidgee Skink			e
Gehyra variegata	Tree Dtella			e
Hemiergis peronii	Four-toed Earless Skink			x
Lerista bougainvillii	Bougainville's Skink			c
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			x
Lerista terdigitata	Southern Three-toed Slider			x
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			x
Morethia obscura	Mallee Snake-eye			c
Notechis scutatus	Eastern Tiger Snake	ssp		c
Parasuta spectabilis	Mallee Black-headed Snake			x
Pseudonaja inframacula	Peninsula Brown Snake			x
Tiliqua occipitalis	Western Bluetongue			x
Tympanocryptis lineata	Five-lined Earless Dragon			c

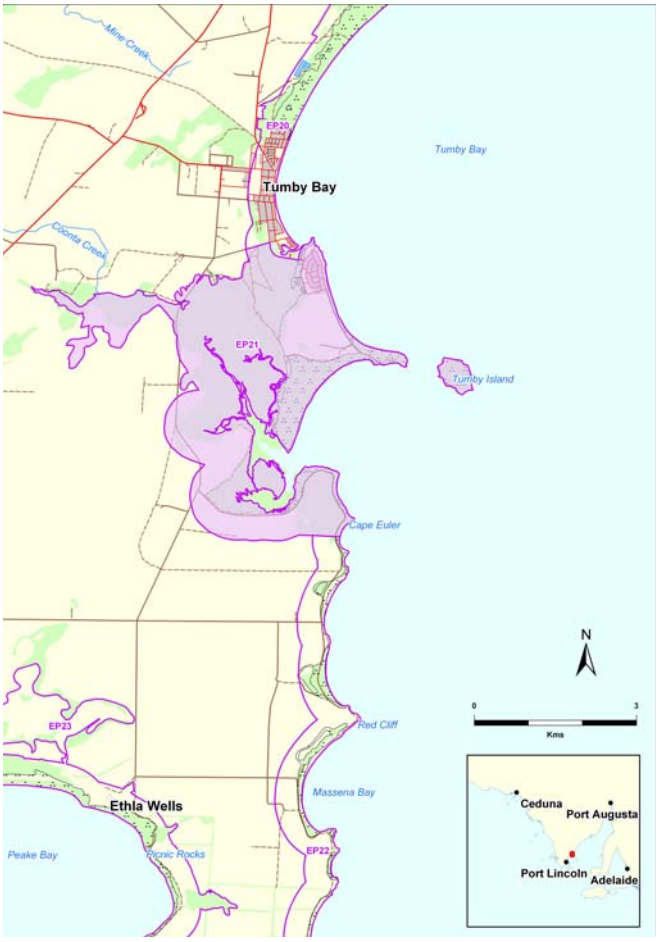
R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP21 Cape Euler/Tumby Island CP

Cell area 1,453 ha. Shoreline length 38.62 km.



Landforms

This cell is almost entirely a sedimented inlet, intertidal in elevation, largely in salt marsh vegetation (74% of native vegetation), and protected to some extent by sandflats and cuspate foreland sand accumulation in the lee of Tumby Island. There is a large volume of sand stored in the intertidal zone at the mouth of the inlet. The foreland extends to within 500m of Tumby Island, and is a Holocene sand feature over granite platforms and reef; the shore platform allows foot access to the island at low tide. The northern edge of the cell has been modified to boat mooring/ marina development. There are coarse sand beaches with some inshore reefs on the northern side of the cell. Short et al. 1986, p.72, note that the foredune ridges have accreted in recent years, with some shoreline progradation.

Benthic Habitat

Dense seagrass with wide bare sand areas, and narrow inshore sand.

Biota

1,015 ha is remnant vegetation; 75% of this is salt marsh. *Tecticornia sp.* and *Maireana oppositifolia* low shrubland, with mangroves near the tidal inlets. The dunes are *Olearia axillaris* mixed shrubland, and *Melaleuca lanceolata* shrubland. The inlet NE of Cape Euler (Second Creek) is lined by wide areas of mangrove. West of the Thuruna Road there is a *Melaleuca halmaturorum/ Ghania filum* wetland.
There are 36 BDBSA flora survey sites, 10 herbarium record sites, 1 fauna survey site (on Tumby Island – island conserved for seabird breeding) and 4 opportune fauna sites.

Land Use/ Land Ownership

Predominantly privately owned. A narrow coastal reserve extends around the foreshore, an area of Crown land Act reserve occurs at the southern end of the cell where the creek discharges to sea. Crown leasehold land occupies the north west portion of the cell and Tumby Island CP is 2% of the cell area.

Uses (Field visits and local reports)

Conservation
Recreation and tourism – fishing, swimming, sight-seeing, dog walking, camping
Agriculture

Beach boat launching
Residential
Onshore aquaculture in EP22 adjacent southern boundary of EP21

FIGURE 6.7 Cuspate foreland to Tumby Island, and (left) dunes and salt marsh of EP21. Photo: Coast Protection Board, 2007

Values (Field visits and local reports)

Tumby Island CP hosts a number of plants outside of their normal range/distribution including the threatened West Coast Mintbush (*Prostanthera calycina)*, the rare Australian broomrape (*Orobanche cernua var. Australiana*), Emu bush (*Eremophila glabra)* and other threatened flora species. (However, these species have not been recorded within the flora surveys that have been undertaken and entered into the BDBSA).

Threats (Field visits and local reports)

Much of the salt marsh is a storm surge hazard zone; and this area is subject to potential CASS.
Development, including proposed marina expansion onto mangrove and salt marsh areas with high conservation values
With increasing population, Tumby Island CP, coastal reserves and salt marsh areas will have increased visitation and increased impact from recreational activities.
Eco-tourism / tourism ventures
Boat launching (public safety, hydrocarbon spills)
Foreshore damage / debris / outflows from adjacent aquaculture

Opportunities (Field visits and local reports)

Active community Coastcare action in the salt marsh (eg. walking tracks and interpretation) has created a positive momentum to further conserve this area.
Develop and implement management plan for Tumby Island CP

Boxthorn control has been undertaken for a number of years along Ski beach and on Tumby Island CP by local volunteers and more recently GreenCorps volunteers with EP NRM staff. This has kept boxthorn numbers low, but on-going control work is paramount. In 2010, Lower Eyre Pest Management Group members cut and swab over 200 boxthorn plants.

Conservation Analysis (GIS)

Total of conservation priority values is 94.92, an average score for the region. The pattern of combined total conservation means is clear: the dune ridges north and south of the Tumby Island cuspate foreland have high total priority; elsewhere totals are low, with the exception of some medium totals within the salt marsh. Tumby Island CP totals are medium.
Total number of threatened species is high in many parts of the dune and salt marsh, notably threatened bird species; habitat for the Australian Pied Oystercatcher is found throughout the salt marsh; Beach Slider and Eastern Coast Skink in the coastal sand ridges. Samphire areas are recorded as of high wetland value.
Two mammals (feral), one reptile, one amphibian and 47 bird species have been recorded within this cell, including the state endangered Fairy Tern and the state vulnerable Eastern Curlew and Banded Stilt.

Threat Analysis (GIS)

The total of threat summary layers is 50.89, high for the region. High to medium high values are found throughout the cell, with the exception of low threat totals in the mangrove areas on the southern side of the major inlet. Threat totals are high on all dune areas, including Tumby Island. Above average threat values are found for the following layers: ORV activity (all parts of the cell except the CP), land ownership and land use, sea views and landscape amenity, vegetation block degradation and weeds, and acid sulfate soils potential (salt marsh).

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, dune and salt marsh change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Beach recession and dune instability (in the short term the rate may depend on the circulation of sediment stored in the nearshore zone).	Continue to monitor existing DENR beach profiles (310010 – 12: beach south of foreland, and 340008: salt marsh to sand flat). Active management of dunes	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
	Higher tides begin to impact salt marsh.	Consider land use and development plan changes to create buffer for salt marsh retreat.	
2070: +c.80cm.	Frequency and duration of marine flooding of salt marsh increases, resulting in species and habitat change and landward migration. Mangrove recession across former salt marsh. Possible sediment accumulation in salt marsh from marine ingress and terrestrial flooding.	Monitor salt marsh species and elevation changes. Continue implementation of strategic retreat of salt marsh.	
	Threats to tidal circulation within the salt marsh, threaten the Tecticornia species found here. Continued damage to foredunes; beach and dune recession.	Allow tidal circulation through the marina to the salt marsh.	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides.	Continue to monitor beach profiles. Active management of dunes	
Intensity of large storms increases.	Low dunes over hard rock, backed by low ground are extremely vulnerable to storm damage, overtopping, and rapid recession. Large sand storage in mouth of estuary will be driven into the inlet by storms.	Dune habitats can only be retained by allowing rapid overwash recession of low dune ridges. (Salt marsh recession buffer important).	
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere). There will be an increased risk for species that are already vulnerable. Invasive species may become more dominant.		Maintain NE-SW connectivity of vegetation within the coastal boundary
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage	Active dune management, including weed control	Ensure dunes are part of the regional fire plan.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
'Flashy' run off: Drier creeks, but larger rare floods	Intense rainfall events may lead to sediment deposition in salt marsh areas, (assisting salt marsh adaptation).		
Groundwater lowering; saline incursion:	Local impact on soil water and vegetation survival	Adaptive management of plant assets	
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains sediment movement towards the north along the Gulf coast. Local movement of large quantities of sand in the nearshore zone may be accelerated as sea levels rise.	Monitor beaches, see above.	

TABLE 6.8 Recommended Actions and Priority for EP21 Cape Euler/Tumby Island CP

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons/ threat)	DENR, EP NRM
	Species identified that are not within the BDBSA	Identify records and surveys that are not in the BDBSA (eg. private surveys/records, government surveys not yet entered). Evaluate/verify data and enter into the BDBSA	High (cons/ threat)	DENR, EP NRM, community
	Important area for a number of threatened and sensitive flora and fauna species, with potential disturbance from recreational activities and land management practices.	Review management of sensitive locations and species with a view to minimise damage and disturbance and increase protection eg. restrict vehicles on beaches, dogs on leashes, track management, pest animal and plant control, restrict access to sensitive locations. Install interpretive/ educational signage. Community education programs.	High (cons/threat)	DENR, EP NRM, DC of Tumby Bay, private landowners, community groups

Component	Issue	Proposed Action	Priority of Action	Key Players
	Climate change and sea level rise is having multiple effects within the cell	Ensure the establishment and maintenance of a time series of aerial photographs at an appropriate resolution. Continue and supplement (see above) the DENR beach profile record, to accurately track beach and dune recession. Seek to improve the resilience of plant and animal habitats by taking opportunities to improve connectivity between vegetation blocks.	Medium (cons)	DENR, EP NRM, DC of Tumby Bay, private land owners, community
		Take steps to allow recession and survival of mangroves and salt marsh, through the creation of retreat buffer zones on the development plan, and by allowing the circulation of tidal waters	High (cons/ threat)	DENR, EP NRM, DC of Tumby Bay, DPLG, private land owners, community
	Potential impact on breeding habitat of the endangered Eastern Osprey, particularly during the breeding season.	Develop site management and monitoring strategy. Ensure management/works programs are not undertaken during the breeding season. Community education.	Medium (cons/ threat)	DENR
	Maintenance of coastal access management infrastructure	Use the EP Coastal infrastructure audit to setup a maintenance program	Medium	EP NRM, DC of Tumby Bay, DENR, community groups
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Ensure continuity of current/previous weed control programs (eg. boxthorn control at Ski Beach and Tumby Island CP) Undertake education program on impact of garden escape plants and weed control program.	Medium (threat)	EP NRM, private land owners, DENR, DC of Tumby Bay, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Possible future development with potential impact on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, habitat loss, soil compaction, weed escapes, increased tracks, discharges to sensitive marine environment, etc)	Ensure future development is not located in areas of high conservation value or high sensitivity. Review development plan zoning to these areas to increase protection. Ensure any future development minimises impact to surrounding environment (eg. limit track creation, limit development footprint, prohibit/ minimise discharges to the marine environment). Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled pets, etc	Medium (cons/ threat)	DC of Tumby Bay, DPLG, DENR, EP NRM, private land owners, developers, community groups
	ORV activity occurs throughout the cell, shown in multiple tracks; with impact from soil compaction, native flora and fauna disturbance / damage, soil erosion and weed introduction.	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	Medium (cons/ threat)	DC of Tumby Bay, DENR, EP NRM, private land owners, community
	Introduced animals – rabbits identified in the south and centre of the cell; with potential impact on vegetation degradation, competition for food and habitat with native species.	Monitor and record existence and impacts of introduced pest animals eg rabbits, foxes, cats. Undertake control program as required.	Medium (cons/ threat)	EP NRM, DENR, private land owners, DC of Tumby Bay
All salt marsh areas	All salt marsh areas show the potential for acid sulfate soil following disturbance; in turn this would potentially threaten surrounding and offshore life forms.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	High (threat)	Private land owners, DC Tumby Bay, developers, DENR, EP NRM

Component	Issue	Proposed Action	Priority of Action	Key Players
Dunes north and south of Tumby Island cuspate foreland	These dunes are the highest conservation value areas within the cell; they are threatened by ORV and weeds; some rabbit activity has been recorded	Develop and implement weed and pest animal management plans, including control works as required. Review existing tracks with a view to rationalise unnecessary tracks. Implement actions to control or exclude off-road vehicle activity. Community education. Interpretive signage.	High (cons/ threat)	Private land owners, EP NRM, DC of Tumby Bay, DENR
All dunes	Stress through climate change: including sea level rise and increasing aridity, leading to foredune recession and increased opportunity for invasion by grassy weeds.	Increase dune management effort to slow recession of dune landforms. Maintain monitoring record of change to this unstable landform/ habitat.	Medium (cons)	DENR, EP NRM, DC of Tumby Bay, community groups
Tumby Island CP	Potential impact on conservation values, including from weeds and recreational activities.	Prepare and implement a management plan for the conservation park.	Medium (cons/ threat)	DENR
Tumby Bay township	Existing development impacting on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Work with private land owners to minimise impact from existing development, including education and/or restoration where appropriate. Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs and cats, ORV etc	Medium (cons/ threat)	EP NRM, DC of Tumby Bay, DENR, private land owners, community groups

BIOTA

Flora

Remnant vegetation area (ha)	1,014.81 ha, 69.83% of cell area
# flora surveys / records	36 surveys, 10 herbarium record sites, 1 threatened plant population record site.
# flora in cell	106
# conservation rated flora in cell	2
# non-indigenous flora in cell	15
Significant CDCS floristic community	*Olearia axillaris* /*Lasiopetalum discolour* shrubland – 52% of SA records in EP
Protected area	3% of remnant vegetation within Heritage Agreement

Weeds

Species	Common Name	Status	Study rating
Argyranthemum frutescens ssp.	Marguerite Daisy	RA	4
Euphorbia paralias	Sea Spurge	RA	5
Leptospermum laevigatum	Coast Tea-tree	RA	5
Mesembryanthemum crystallinum	Common Iceplant	RA	4
Asparagus asparagoides (NC)	Bridal Creeper	D, RA	9
Lycium ferocissimum	African Boxthorn	D, RA	8
Asphodelus fistulosus	Onion Weed	D	3
Galenia pubescens var. pubescens	Coastal Galenia		0
Mesembryanthemum nodiflorum	Slender Iceplant		2
Mesembryanthemum sp.	Iceplant		3
Parapholis incurva	Curly Ryegrass		1
Senecio pterophorus	African Daisy		2
Spergularia media (NC)	Coast Sand-spurrey		0
Stellaria media	Chickweed		0
Valerianella discoidea	Lesser Corn-salad		0

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Crassula exserta	Large-fruit Crassula		R
Eucalyptus conglobata ssp. conglobata	Port Lincoln Mallee		R*
Acacia calamifolia	Wallowa		
Acacia calamifolia (NC)	Wallowa		
Acacia gillii	Gill's Wattle		
Acacia ligulata	Umbrella Bush		
Acacia ligulata (NC)	Umbrella Bush		
Acacia nematophylla	Coast Wallowa		
Acrotriche patula	Prickly Ground-berry		
Adriana klotzschii (NC)	Coast Bitter-bush		
Allocasuarina verticillata	Drooping Sheoak		
Amyema melaleucae	Tea-tree Mistletoe		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Austrostipa elegantissima	Feather Spear-grass		
Austrostipa exilis	Heath Spear-grass		
Austrostipa flavescens	Coast Spear-grass		
Austrostipa stipoides	Coast Spear-grass		
Avicennia marina ssp. marina	Grey Mangrove		
Beyeria lechenaultii	Pale Turpentine Bush		
Billardiera cymosa (NC)	Sweet Apple-berry		
Brachyscome lineariloba	Hard-head Daisy		
Calandrinia calyptrata	Pink Purslane		
Calytrix tetragona	Common Fringe-myrtle		
Carpobrotus rossii (NC)	Native Pigface		
Cassytha glabella f. dispar	Slender Dodder-laurel		
Cassytha sp.	Dodder-laurel		
Centrolepis cephaloformis ssp.	Cushion Centrolepis		
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Compositae sp.	Daisy Family		
Crassula colorata var.	Dense Crassula		

Species	Common Name	Aus status	SA status
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Daucus glochidiatus	Native Carrot		
Dianella brevicaulis	Short-stem Flax-lily		
Dianella revoluta (NC)			
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eremophila crassifolia	Thick-leaf Emubush		
Eucalyptus gracilis	Yorrell		
Eucalyptus incrassata	Ridge-fruited Mallee		
Eutaxia microphylla	Common Eutaxia		
Exocarpos sparteus	Slender Cherry		
Ficinia nodosa	Knobby Club-rush		
Frankenia pauciflora var.	Southern Sea-heath		
Gramineae sp.	Grass Family		
Grevillea ilicifolia var. ilicifolia (NC)	Holly-leaf Grevillea		
Hakea cycloptera	Elm-seed Hakea		
Halosarcia sp. (NC)	Samphire		
Hibbertia virgata	Twiggy Guinea-flower		
Homoranthus wilhelmii	Wilhelm's Homoranthus		
Hybanthus floribundus ssp. floribundus	Shrub Violet		
Lasiopetalum discolor	Coast Velvet-bush		
Lawrencia squamata	Thorny Lawrencia		
Lepidosperma congestum			
Lepidosperma congestum (NC)	Clustered Sword-sedge		
Lepidosperma gladiatum	Coast Sword-sedge		
Leucophyta brownii	Coast Cushion Bush		
Leucopogon cordifolius	Heart-leaf Beard-heath		
Leucopogon parviflorus	Coast Beard-heath		
Lomandra effusa	Scented Mat-rush		
Lycium australe	Australian Boxthorn		
Maireana oppositifolia	Salt Bluebush		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Melaleuca uncinata (NC)	Broombush		
Millotia major			
Muehlenbeckia adpressa	Climbing Lignum		
Muehlenbeckia gunnii	Coastal Climbing Lignum		
Myoporum insulare	Common Boobialla		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pittosporum angustifolium	Native Apricot		
Poa poiformis var. poiformis	Coast Tussock-grass		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Samolus repens	Creeping Brookweed		
Sarcocornia blackiana	Thick-head Samphire		
Sarcocornia quinqueflora	Beaded Samphire		
Senecio glossanthus (NC)	Annual Groundsel		
Senecio pinnatifolius (NC)	Variable Groundsel		
Spyridium bifidum (NC)			
Spyridium bifidum var. bifidum (NC)	Forked Spyridium		
Tecticornia arbuscula	Shrubby Samphire		
Tecticornia halocnemoides ssp.	Grey Samphire		

Species	Common Name	Aus status	SA status
Tecticornia halocnemoides ssp. halocnemoides	Grey Samphire		
Tecticornia indica ssp.	Brown-head Samphire		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Teucrium racemosum	Grey Germander		
Threlkeldia diffusa	Coast Bonefruit		
Triglochin trichophora			
Westringia dampieri	Shore Westringia		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	50 recorded – 47 birds, 0 butterflies, 2 mammals, 1 reptiles, 1 amphibians (an additional 18 reptiles and 25 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	1 survey site, 4 opportune sites, 1 reserve database record site
# of threatened fauna in cell	12
# of non-indigenous fauna	6 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Columba livia	Rock Dove	Aves	x
Streptopelia chinensis	Spotted Dove	Aves	x
Sturnus vulgaris	Common Starling	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p
Mus musculus	House Mouse	Mammalia	x
Oryctolagus cuniculus	Rabbit (European Rabbit)	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Sternula nereis	Fairy Tern		E
Cladorhynchus leucocephalus	Banded Stilt		V
Numenius madagascariensis	Eastern Curlew	M	V
Arenaria interpres	Ruddy Turnstone	M	R
Calidris alba	Sanderling	M	R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Limosa lapponica	Bar-tailed Godwit	M	R
Neophema petrophila	Rock Parrot		R
Numenius phaeopus	Whimbrel	M	R
Pluvialis fulva	Pacific Golden Plover	M	R
Tringa brevipes	Grey-tailed Tattler	M	R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Anas castanea	Chestnut Teal		
Anas gracilis	Grey Teal		
Artamus cinereus	Black-faced Woodswallow		

Species	Common Name	Aus status	SA status
Artamus cyanopterus	Dusky Woodswallow		
Calidris acuminata	Sharp-tailed Sandpiper	M	
Calidris ferruginea	Curlew Sandpiper	M	
Calidris ruficollis	Red-necked Stint	M	
Charadrius ruficapillus	Red-capped Plover		
Chroicocephalus novaehollandiae	Silver Gull		
Corvus coronoides	Australian Raven		
Cygnus atratus	Black Swan		
Egretta novaehollandiae	White-faced Heron		
Elseyornis melanops	Black-fronted Dotterel		
Eolophus roseicapillus	Galah		
Epthianura albifrons	White-fronted Chat		
Falco cenchroides	Nankeen Kestrel		
Glyciphila melanops	Tawny-crowned Honeyeater		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Microcarbo melanoleucos	Little Pied Cormorant		
Pelecanus conspicillatus	Australian Pelican		
Phalacrocorax varius	Pied Cormorant		
Phylidonyris novaehollandiae	New Holland Honeyeater		
Pluvialis squatarola	Grey Plover	M	
Poliocephalus poliocephalus	Hoary-headed Grebe		
Rhipidura leucophrys	Willie Wagtail		
Thalasseus bergii	Crested Tern		
Tringa nebularia	Common Greenshank	M	
Vanellus miles	Masked Lapwing		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p

Species	Common Name	Status*	Record
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

No native mammal species recorded

Reptiles

Species	Common Name	Aus status	SA status	Record
Bassiana trilineata	Western Three-lined Skink		R	e
Amphibolurus norrisi	Mallee Tree-dragon			e
Christinus marmoratus	Marbled Gecko			e
Ctenophorus fionni	Peninsula Dragon			c
Ctenophorus pictus	Painted Dragon			c
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Egernia stokesii	Gidgee Skink			e
Gehyra variegata	Tree Dtella			e
Hemiergis peronii	Four-toed Earless Skink			c
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			e
Morethia obscura	Mallee Snake-eye			c
Notechis scutatus	Eastern Tiger Snake	ssp		c
Tiliqua occipitalis	Western Bluetongue			x
Tympanocryptis lineata	Five-lined Earless Dragon			c

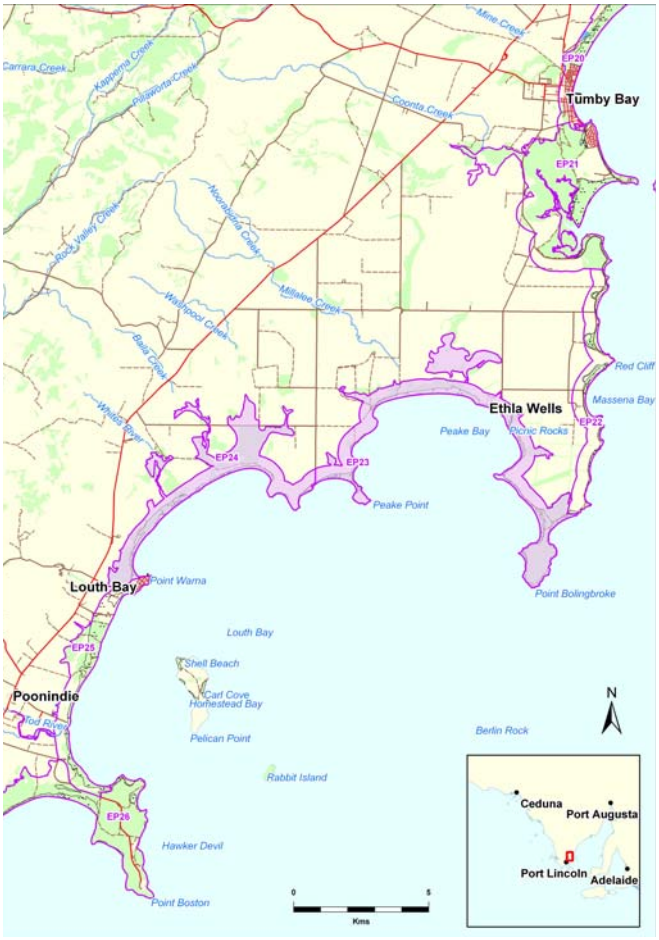
R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

Species	Common Name	Aus status	SA status	Record
Crinia signifera	Common Froglet			x

Cells EP23 Ethla Wells & EP24 Whites River

Combined cell area 2,210 ha. Combined shoreline length 36.3 km.



Landforms

This is a low coastal plain, with thin Pleistocene clays and sands over Donington suite basement granitic rocks. Much of the Pleistocene sediment is classified as alluvial, however red sands are evident. There are a number of sub-coastal saline hollows which appear to have originated in Pleistocene arid conditions: for example, south of Moonlight Bay Road, the morphology suggests a Pleistocene origin; behind the narrow dunes NW of Ethla Wells a substantial area of lacustrine/ playa sediments have been identified. These low lying saline areas contrast with Holocene estuarine deposits (including salt marsh and chenier ridges) trapped behind narrow late Holocene dune barriers, for example behind the dunes at Point Bolingbroke. Both these features are flood prone, brackish to saline, and contain coastal plant species. Inland from the southern headland a small area of gypsiferous clay dunes is found.

The cells include five hardrock low headlands and reefs, beach backed by narrow dunes, then brackish swamps subject to periodic inundation. The symmetrical shoreline form of the bay running north from Point Warna is a fine to medium sand, low energy beach, fronted by inshore sand and some rock platforms, and backed by narrow dune barriers. The headlands show large basement platforms and reefs, overlain by thin calcarenite and red sands. The gabbro and granitic rocks of the basement are well exposed in platforms at the headlands and reefs along the shore: these resistant outcrops determine the plan form of the shoreline in this cell. Both Peake Point and Point Bolingbroke appear to be hard rock islands linked by sand tombolos to the mainland.

Benthic Habitat

Dense to medium seagrass, with inshore sands; the headlands are fronted by wide granite shore platforms and reefs.

Biota

There is 1,098 ha of remnant vegetation in this combined cell. There is a total of 10 BDBSA flora survey points, 16 herbarium record sites and 4 opportune fauna records within these cells.
Dune areas are mainly shrubland: *Olearia axillaris, Leucopogon parviflorus* tall open shrubland; *Leucophyta brownii, +/-Austrostipa stipoides* low sparse shrubland – mid Louth Bay. However, dunes in Peake Bay show *Eucalyptus angulosa* mid mallee woodland. Behind the small dune barriers

lowlands hold salt marsh with *Tecticornia sp.*, wetlands with *Melaleuca halmaturorum* tall shrubland over *Gahnia filum* sedges.

FIGURE 6.8 Looking across Point Bolingbroke to Peake Bay. Dune barriers, salt marsh, cheniers, coastal plain. Photo: Coast Protection Board, 2007

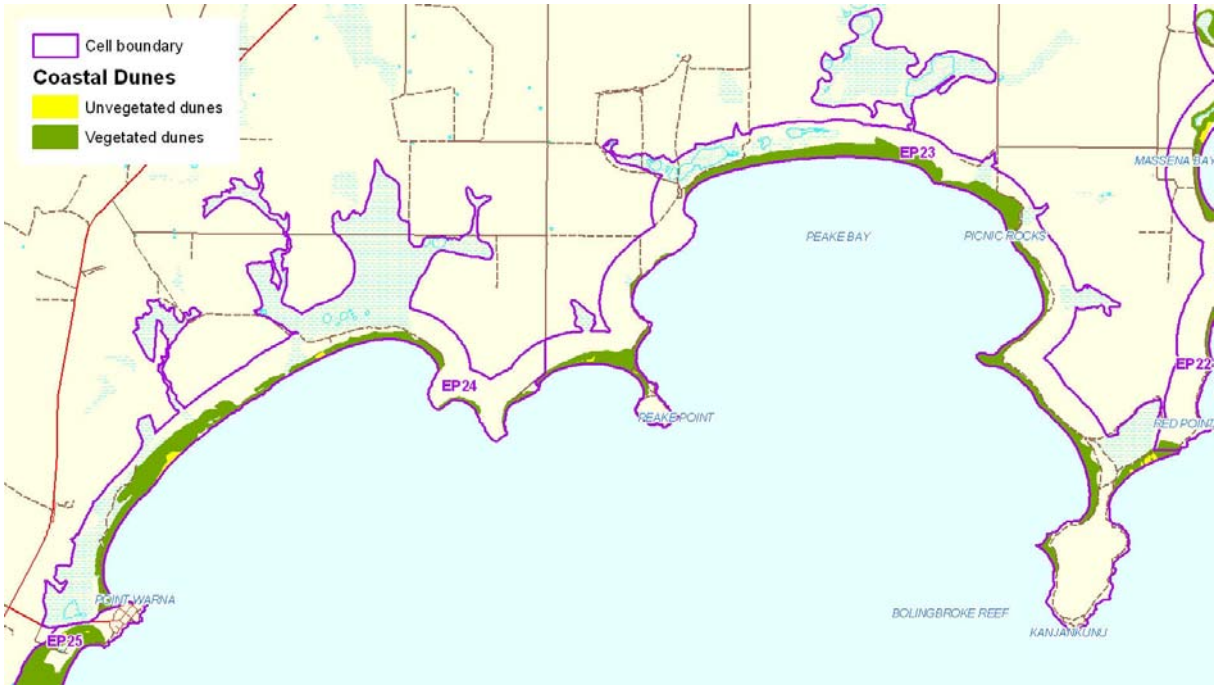


FIGURE 6.9 Wetlands and coastal dunes within EP23 and EP24

Land Use/ Land Ownership

242 ha of these cells is under Heritage Agreement on the end of Point Bolingbroke peninsula. (This appears to be thin sand over calcarenite, with an area of salt flat at the landward end). A thin coastal reserve occurs around most of these cells, although the central portion of EP28 does not have a coastal reserve at all. Peake Point is under a Crown lease. The coastal dunes immediately north of Louth Bay are under a Crown lands Act reserve. The remainder of the cell is privately owned

Uses (Field visits and local reports)

Mostly agricultural with a very narrow strip of coastal dune or cliff top vegetation along the foreshore.
Recreation: fishing, formal and informal camping, ORV
Agriculture - cropping
Boat launching- recreational
Offshore aquaculture
Land based aquaculture activities
Helipad

Values (Field visits and local reports)

The state endangered *Acacia enterocarpa* Jumping-jack Wattle occurs at Peake Point (but is not recorded within the BDBSA)

Threats (Field visits and local reports)

Small scale sand mining.
Potential impact on coastal vegetation and landscapes from agricultural activities (eg. agricultural weeds, grazing pressure, etc)
Vegetation and dunes erosion from ORV in dunes north of Louth
Vehicles on beach impacting on shore nesting birds and hazard to beach users.
Introduced animals (fox, rabbits)
Weed infestation in dunes (Aleppo pines, cotoneaster, box thorns, polygala, garden escapees)
Informal/formal camping: vegetation destruction for firewood, potential for pollution for septic system not designed for current usage rate.
Dune erosion
Marine debris
ORV damage to samphire and dunes areas
Development

Opportunities (Field visits and local reports)

Marine debris surveys are currently undertaken at 3 monthly intervals at Pt Bolingbroke by the EP NRM.
Southern Bluefin Tuna Association undertake beach cleanups annually.
Conservation and improvement works on Vegetation Heritage Agreements

Conservation Analysis (GIS)

Both cells have average mean conservation totals, 97.69 and 109.84. The map of conservation values is unusually straightforward: high and medium-high totals are recorded for the dunes; the wetlands and coastal plain have medium-low and low totals.
Both cells have higher than average scores for rarity and endemicity of plant communities; habitat for threatened birds (dunes and some wetlands), threatened reptile species (dunes) and threatened

mammal species (moderate totals, widespread); viewshed and viewscape are high; both cells have listed Indigenous heritage sites.
One mammal and 38 bird species have been recorded within these cells.

Threat Analysis (GIS)

Both cells have a high threat total: 51.44 and 55.03. The pattern of combined detailed threats is complex, with high totals widespread, but generally the sand dune areas show high to medium totals.
Development zoning, land ownership, viewshed, and land use are high for the region, as are scores for vegetation block degradation; EP23 has a very high score for invasive weeds.

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	**Impacts and implications (for this cell)**	**Protect and manage habitat threats**	**Address landscape issues: fire, connectivity, refuges, hydrology**
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, dune and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Beach recession and dune instability (in the short term the rate may depend on the circulation of sediment stored in the embayment).	Active management of dunes.	
	Sub coastal wetlands threatened by periodic storm tide inundation, leading to habitat change.	Monitor swamp, dune and shoreline change through the establishment of a DENR profile through Salt Swamp, running south from Moonlight Bay Road to Louth Bay.	
2070: +c.80cm.	Frequency and duration of marine flooding of sub-coastal swamps increases, resulting in species and habitat change Possible sediment accumulation from marine ingress and terrestrial flooding.	Monitor species change in floodable areas, shoreline and dunes.	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
	Further sea level rise leads to beach and foredune erosion and dune migration landward.	Monitor dune movement (air photo time series). Slow dune changes through active management. Valuable dune habitats are expected to migrate landwards across sub-coastal swamps: zoning to create buffer zones for retreat is needed.	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides.	Continue to monitor beach profiles. Active management of dunes	
Intensity of large storms increases.	Low dunes backed by low ground are vulnerable to storm damage, overtopping, and rapid recession.	Dune habitats can only be retained by allowing rapid overwash recession of low dune ridges.	
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere. There will be an increased risk for species that are already vulnerable. Invasive species are likely to become more dominant.		Maintain NE-SW connectivity of vegetation within the coastal boundary
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage, with invasion of grass species.	Active dune management, including weed control	Ensure dunes are included in regional fire plan
'Flashy' run off: Drier creeks, but larger rare floods	Creeks draining coastal slopes potentially transport increased sediment load to wetlands in rare peak events.	Monitoring to allow adaptive management of change.	
Groundwater lowering; saline incursion:	There is a potential local impact on water tables, including any perched water tables within the dunes, and vegetation survival	Adaptive management of plant assets	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains sediment movement towards the north along the Gulf coast. Local movement of large quantities of sand in the nearshore zone may be accelerated as sea levels rise. Changes in the refracted pattern of swell and the wave climate have the potential to modify the plan-shape of the embayment.	Monitor beaches, see above.	

TABLE 6.9 Recommended Actions and Priority for EP23 Ethla Wells & EP24 Whites River

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cells (EP23 & EP24)	Inadequate data on biodiversity and habitat values., particularly fauna	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Climate change and sea level rise is having multiple effects within the cell	Ensure the establishment and maintenance of a time series of aerial photographs at an appropriate resolution. Establish new DENR profile (see above), to accurately track beach and dune recession and to record change in coastal wetlands. Seek to improve the resilience of plant and animal habitats by taking opportunities to improve connectivity between vegetation blocks.	Medium (cons)	DENR, EP NRM, DC of Tumby Bay, community
	Informal camping and car parks occur throughout the cells, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	Medium (cons/ threat)	DENR, DC of Tumby Bay and Lower Eyre Peninsula, EP NRM, private land owners, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Existing development scattered throughout, impacting on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, dune instability, weed escapes, increased tracks, etc)	Work with private land owners to minimise impact from existing development, including education, restoration where appropriate and/or negotiation/enforcement to ensure the developments do not encroach on the coastal Crown reserve Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs and cats, ORVs, etc	Medium (cons/ threat)	EP NRM, DC of Tumby Bay, DC of Lower Eyre Peninsula, DENR, private land owners, community groups
	Unrestricted access and multiple vehicle tracks around the coast impacting on the coastal dune and samphire vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	Medium (cons/ threat)	Private landowners, DC of Tumby Bay and Lower Eyre Peninsula, DENR, EP NRM
	Areas within cells identified as being important for rare and endemic plant communities and as habitat for threatened species with little or no protection. Impact from agricultural activities, recreational activities, development zoning, uncontrolled access, weeds and pest animals	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches, dogs on leashes, track management, pest animal and plant control, restrict access to sensitive locations. Install interpretive/ educational signage. Community education programs. Review development plan zoning to these areas to increase protection	High (cons/ threat)	DENR, private land owners, EP NRM, DPLG, DC of Tumby Bay and Lower Eyre Peninsula, community
	Water runoff into samphire areas impacting on flora and fauna species	Promote and support revegetation/catchment management	Medium	Private landholders, , DC of Tumby Bay and Lower Eyre Peninsula, EP NRM

Component	Issue	Proposed Action	Priority of Action	Key Players
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, private land owners, community groups, EP NRM, DC of Tumby Bay and Lower Eyre Peninsula
Dunes, vegetated in *Leucophyta* □ *rownie,* +/- *Austrostipa stipoides* low sparse shrubland and in Eucalypt mallee woodland c. 2 – 4 km north of Point Warna	Highest total conservation area within the 2 cells, including shorebird habitat, dune reptile habitat; threatened by informal camping, ownership, land use, ORV and foredune dune instability.	Work with private landowner(s)/ managers to improve management, including reduce ORV impact by rationalising unnecessary tracks & camping areas, implementing actions to control or exclude (or seasonally exclude) off-road vehicles.	High (cons/ threat)	Private land owners, DC Lower Eyre Peninsula, EP NRM, DENR, community
	Weed infestation in dunes	Work with land owners/managers develop and implement a weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	Medium (cons/ threat)	Community, land holders, EP NRM, DC of Lower Eyre Peninsula
All dunes	Stress through climate change: including sea level rise, storm tides and increasing aridity, leading to foredune recession and whole dune recession, also increased opportunity for invasion by grassy weeds.	Increase dune management effort to slow recession of dune landforms. Maintain monitoring record of change to this unstable landform/ habitat.	Medium (cons/ threat)	DENR, EP NRM, DC of Tumby Bay and Lower Eyre Peninsula, community
EP23	Invasive weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	Medium (threat)	EP NRM, private land owners, DENR, DCs of Tumby Bay and Lower Eyre Peninsula, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg. rabbits and foxes. Undertake a control program as required.	Medium (cons/ threat)	EP NRM, private land owners, DENR, DCs of Tumby Bay and Lower Eyre Peninsula
Salt marsh and low lying areas	Salt marsh and low lying areas have the potential for acid sulfate soil following disturbance; in turn this would potentially threaten life forms offshore.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Medium (threat)	DC of Tumby Bay and Lower Eyre Peninsula, DENR, developers, private land owners
Beaches	Vehicles and dogs on numerous beaches a threat to meiofauna and shorebirds	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	Medium (cons/ threat)	DC of Tumby Bay, DC of Lower Eyre Peninsula, EP NRM, DTEI, DENR, EP LGA, Tourism SA, Birds Australia, community, private land owners
Peake Bay/ Pt. Bolingbroke	Marine debris with potential impact on native fauna species	Use marine debris survey data to target potential sources of debris and implement actions to minimise debris at the source.	Medium	Aquaculture industry, recreational fishers, EP NRM, PIRSA, community
Louth Bay north	ORV disturbance to beach nesting birds	Erect signage to warn of beach nesting birds during summer months. Investigate potential for dog free/ or dog on leash areas	Medium (cons/ threat)	DC of Lower Eyre Peninsula, EP NRM, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Formal & informal camping area with impact from multiple tracks, weeds, soil compaction, vegetation trampling and removal, local impact from visitors	Develop camping management plan, including actions to minimise visitor impacts, eg. barriers/ fencing to prevent spread and informal tracks, firewood collection, track rationalisation, formalisation of pedestrian access, signage, provision of appropriate amenities (capacity of septic system), vegetation protection, weed management, maintenance of facilities/ infrastructure.	Medium (cons/ threat)	DC of Lower Eyre Peninsula, EP NRM, community

BIOTA – EP23 & EP24 combined

Flora

Remnant vegetation area (ha)	1,098.52 ha, 49.7% of cell area
# flora surveys / records	10 surveys, 16 herbarium record sites, 1 threatened plant population record site
# flora in cell	213
# conservation rated flora in cell	4
# non-indigenous flora in cell	38
Significant CDCS floristic community	EP23 – *Eucalyptus* spp. / *Melaleuca lanceolata* / *Melaleuca uncinata* mallee - <20 (9) sites recorded along SA coast, 89% (8) of these in EP *Melaleuca lanceolata* / *Tetragonia implexicoma* shrubland – 72% of SA records in EP *Olearia axillaris* /*Lasiopetalum discolour* shrubland – 52% of SA records in EP EP24 – *Halosarcia indica* ssp shrubland – <20 (6) sites recorded along SA coast, 83% (5) of these in EP EP23 & EP24 - *Melaleuca halmaturorum* shrubland – <20 (8) sites recorded along SA coast, 50% of these in EP
Protected area	21.1% of remnant vegetation within Heritage Agreement

Weeds

Species	Common Name	Status	Study rating
Acacia cyclops	Western Coastal Wattle	RA	5
Mesembryanthemum crystallinum	Common Iceplant	RA	4
Polygala myrtifolia	Myrtle-leaf Milkwort	RA	9
Asparagus asparagoides (NC)	Bridal Creeper	D, RA	9
Lycium ferocissimum	African Boxthorn	D, RA	8
Diplotaxis tenuifolia	Lincoln Weed	D	3
Aira cupaniana	Small Hair-grass		0
Aira sp.	Hair-grass		0
Anagallis arvensis	Pimpernel		2

Species	Common Name	Status	Study rating
Avellinia michelii	Avellinia		0
Avena barbata	Bearded Oat		2
Brassica tournefortii	Wild Turnip		3
Bromus diandrus	Great Brome		2
Bupleurum semicompositum	Hare's Ear		0
Cakile maritima ssp. maritima	Two-horned Sea Rocket		1
Centaurium tenuiflorum	Branched Centaury		1
Cerastium glomeratum	Common Mouse-ear Chickweed		1
Ehrharta longiflora	Annual Veldt Grass		3
Erodium botrys	Long Heron's-bill		0
Hordeum glaucum	Blue Barley-grass		1
Hordeum marinum	Sea Barley-grass		1
Hypochaeris glabra	Smooth Cat's Ear		2
Isolepis marginata	Little Club-rush		0
Lamium amplexicaule var. amplexicaule	Deadnettle		0
Lolium rigidum	Wimmera Ryegrass		1
Medicago polymorpha var. polymorpha	Burr-medic		1
Melilotus indicus	King Island Melilot		1
Moraea setifolia	Thread Iris		0
Parapholis incurva	Curly Ryegrass		1
Plantago coronopus ssp. coronopus	Bucks-horn Plantain		2
Schismus barbatus	Arabian Grass		0
Silene nocturna	Mediterranean Catchfly		1
Sonchus oleraceus (NC)	Common Sow-thistle		0
Stellaria media	Chickweed		0
Trifolium arvense var. arvense	Hare's-foot Clover		2
Trifolium tomentosum	Woolly Clover		2
Vulpia myuros f. myuros	Rat's-tail Fescue		2
Zaluzianskya divaricata	Spreading Night-phlox		2

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Acacia whibleyana	Whibley's Wattle	E	E
Crassula exserta	Large-fruit Crassula		R
Myoporum parvifolium	Creeping Boobialla		R
Spyridium leucopogon	Silvery Spyridium		R
Acacia calamifolia	Wallowa		
Acacia calamifolia (NC)	Wallowa		
Acacia cupularis	Cup Wattle		
Acacia farinosa	Mealy Wattle		
Acacia halliana	Hall's Wattle		
Acacia ligulata	Umbrella Bush		
Acacia longifolia ssp.	Sallow Wattle		
Acacia rigens	Nealie		
Acacia rupicola	Rock Wattle		
Acacia sclerophylla var. sclerophylla	Hard-leaf Wattle		
Acacia spinescens	Spiny Wattle		
Acrotriche cordata	Blunt-leaf Ground-berry		
Acrotriche patula	Prickly Ground-berry		
Allocasuarina muelleriana ssp. muelleriana	Common Oak-bush		

Species	Common Name	Aus status	SA status
Alyxia buxifolia	Sea Box		
Amyema melaleucae	Tea-tree Mistletoe		
Angianthus preissianus	Salt Angianthus		
Apium annuum	Annual Celery		
Astroloma conostephioides	Flame Heath		
Atriplex cinerea	Coast Saltbush		
Atriplex semibaccata	Berry Saltbush		
Austrostipa drummondii	Cottony Spear-grass		
Austrostipa elegantissima	Feather Spear-grass		
Austrostipa exilis	Heath Spear-grass		
Austrostipa flavescens	Coast Spear-grass		
Austrostipa hemipogon	Half-beard Spear-grass		
Baeckea crassifolia	Desert Baeckea		
Beyeria lechenaultii	Pale Turpentine Bush		
Billardiera sp.	Apple-berry		
Billardiera versicolor	Yellow-flower Apple-berry		
Boronia coerulescens ssp. coerulescens	Blue Boronia		
Brachyscome ciliaris var. ciliaris	Variable Daisy		
Brachyscome lineariloba	Hard-head Daisy		
Brachyscome perpusilla	Tiny Daisy		
Bulbine semibarbata	Small Leek-lily		
Calandrinia calyptrata	Pink Purslane		
Calandrinia corrigioloides	Strap Purslane		
Calandrinia eremaea	Dryland Purslane		
Calandrinia granulifera	Pigmy Purslane		
Calytrix involucrata	Cup Fringe-myrtle		
Carpobrotus rossii (NC)	Native Pigface		
Carpobrotus sp.	Pigface		
Cassytha melantha	Coarse Dodder-laurel		
Cassytha peninsularis	Peninsula Dodder-laurel		
Cassytha peninsularis var. (NC)	Peninsula Dodder-laurel		
Centrolepis polygyna	Wiry Centrolepis		
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Comesperma calymega	Blue-spike Milkwort		
Correa backhouseana var. coriacea	Thick-leaf Correa		
Crassula colorata var.	Dense Crassula		
Crassula colorata var. acuminata	Dense Crassula		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Dampiera rosmarinifolia	Rosemary Dampiera		
Dianella brevicaulis	Short-stem Flax-lily		
Dianella brevicaulis/revoluta var.	Black-anther Flax-lily		
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Dillwynia hispida	Red Parrot-pea		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Dodonaea hexandra	Horned Hop-bush		
Dodonaea viscosa ssp.	Sticky Hop-bush		
Dodonaea viscosa ssp. spatulata	Sticky Hop-bush		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eremophila crassifolia	Thick-leaf Emubush		
Eucalyptus angulosa	Coast Ridge-fruited Mallee		
Eucalyptus dumosa	White Mallee		
Eucalyptus dumosa complex	White Mallee		
Eucalyptus gracilis	Yorrell		

Species	Common Name	Aus status	SA status
Eucalyptus incrassata	Ridge-fruited Mallee		
Eucalyptus socialis (NC)	Beaked Red Mallee		
Eutaxia microphylla	Common Eutaxia		
Eutaxia sp.	Eutaxia		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos syrticola	Coast Cherry		
Ficinia nodosa	Knobby Club-rush		
Frankenia pauciflora var.	Southern Sea-heath		
Frankenia pauciflora var. gunnii	Southern Sea-heath		
Gahnia deusta	Limestone Saw-sedge		
Gahnia filum	Thatching Grass		
Gahnia lanigera	Black Grass Saw-sedge		
Geijera linearifolia	Sheep Bush		
Glischrocaryon behrii	Golden Pennants		
Gonocarpus mezianus	Broad-leaf Raspwort		
Gonocarpus tetragynus	Small-leaf Raspwort		
Goodenia varia	Sticky Goodenia		
Grevillea ilicifolia complex	Holly-leaf Grevillea		
Grevillea ilicifolia var. ilicifolia (NC)	Holly-leaf Grevillea		
Hakea cycloptera	Elm-seed Hakea		
Hakea mitchellii	Heath Needlebush		
Haloragis sp.	Raspwort		
Halosarcia sp. (NC)	Samphire		
Helichrysum leucopsideum	Satin Everlasting		
Hemichroa pentandra	Trailing Hemichroa		
Hibbertia riparia (NC)	Guinea-flower		
Hibbertia sp. Glabriuscula (D.J.Whibley 9012)	Smooth Guinea-flower		
Hibbertia virgata	Twiggy Guinea-flower		
Homoranthus wilhelmii	Wilhelm's Homoranthus		
Hybanthus floribundus ssp. floribundus	Shrub Violet		
Lasiopetalum behrii	Pink Velvet-bush		
Lasiopetalum discolor	Coast Velvet-bush		
Lawrencia squamata	Thorny Lawrencia		
Lepidosperma congestum (NC)	Clustered Sword-sedge		
Lepidosperma gladiatum	Coast Sword-sedge		
Lepidosperma viscidum	Sticky Sword-sedge		
Leptospermum coriaceum	Dune Tea-tree		
Leucophyta brownii	Coast Cushion Bush		
Leucopogon cordifolius	Heart-leaf Beard-heath		
Leucopogon parviflorus	Coast Beard-heath		
Logania crassifolia	Coast Logania		
Logania ovata	Oval-leaf Logania		
Lomandra collina	Sand Mat-rush		
Lomandra leucocephala ssp. robusta	Woolly Mat-rush		
Lomandra micrantha ssp. micrantha	Small-flower Mat-rush		
Lysiana exocarpi ssp. exocarpi	Harlequin Mistletoe		
Maireana oppositifolia	Salt Bluebush		
Melaleuca acuminata ssp. acuminata	Mallee Honey-myrtle		
Melaleuca brevifolia	Short-leaf Honey-myrtle		
Melaleuca decussata	Totem-poles		
Melaleuca halmaturorum	Swamp Paper-bark		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Melaleuca uncinata (NC)	Broombush		

Species	Common Name	Aus status	SA status
Millotia major			
Millotia muelleri	Common Bow-flower		
Millotia myosotidifolia	Broad-leaf Millotia		
Muehlenbeckia adpressa	Climbing Lignum		
Muehlenbeckia gunnii	Coastal Climbing Lignum		
Myoporum insulare	Common Boobialla		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Olearia ramulosa	Twiggy Daisy-bush		
Opercularia turpis	Twiggy Stinkweed		
Phebalium bullatum	Silvery Phebalium		
Pimelea glauca	Smooth Riceflower		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pimelea stricta	Erect Riceflower		
Pittosporum angustifolium	Native Apricot		
Poa sp.	Meadow-grass/Tussock-grass		
Poranthera triandra	Three-petal Poranthera		
Prostanthera serpyllifolia ssp. microphylla	Small-leaf Mintbush		
Prostanthera serpyllifolia ssp. microphylla (purplish-green flowers)	Small-leaf Mintbush		
Pterostylis sanguinea	Blood Greenhood		
Ptilotus spathulatus f. spathulatus	Pussy-tails		
Pultenaea acerosa	Bristly Bush-pea		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia crassifolia	Fleshy Saltbush		
Salsola tragus	Buckbush		
Santalum acuminatum	Quandong		
Sarcocornia blackiana	Thick-head Samphire		
Scaevola crassifolia	Cushion Fanflower		
Schoenus racemosus	Sandhill Bog-rush		
Senecio glossanthus	Annual Groundsel		
Senecio glossanthus (NC)	Annual Groundsel		
Senecio pinnatifolius (NC)	Variable Groundsel		
Spinifex hirsutus (NC)	Rolling Spinifex		
Spyridium phylicoides	Narrow-leaf Spyridium		
Stenanthemum leucophractum	White Cryptandra		
Suaeda australis	Austral Seablite		
Tecticornia indica ssp.	Brown-head Samphire		
Tecticornia pterygosperma ssp. pterygosperma	Winged-seed Samphire		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Thysanotus baueri	Mallee Fringe-lily		
Thysanotus patersonii	Twining Fringe-lily		
Trachymene pilosa	Dwarf Trachymene		
Triglochin mucronata	Prickly Arrowgrass		
Triodia irritans	Spinifex		
Triodia scariosa	Spinifex		
Vittadinia australasica var. australasica	Sticky New Holland Daisy		
Vittadinia gracilis	Woolly New Holland Daisy		
Westringia dampieri	Shore Westringia		
Wilsonia rotundifolia	Round-leaf Wilsonia		

Fauna

# of fauna in cell	39 recorded – 38 birds, 0 butterflies, 1 mammals, 0 reptiles, 0 amphibians (an additional 18 reptiles, 25 butterflies and 1 mammal identified by experts as possibly occurring)
# of fauna surveys / records	4 opportune sites, 1 reserve database record sites
# of threatened fauna in cell	1
# of non-indigenous fauna	5 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Alauda arvensis	Eurasian Skylark	Aves	x
Columba livia	Rock Dove	Aves	x
Passer domesticus	House Sparrow	Aves	x
Sturnus vulgaris	Common Starling	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p
Canis lupus	Dog, Dingo	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Cereopsis novaehollandiae	Cape Barren Goose		R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Anas castanea	Chestnut Teal		
Anas gracilis	Grey Teal		
Anthochaera carunculata	Red Wattlebird		
Artamus cyanopterus	Dusky Woodswallow		
Aythya australis	Hardhead (White-eyed Duck)		
Chroicocephalus novaehollandiae	Silver Gull		
Colluricincla harmonica	Grey Shrike-thrush		
Corvus coronoides	Australian Raven		
Cracticus tibicen	Australian Magpie		
Cygnus atratus	Black Swan		
Drymodes brunneopygia	Southern Scrub-robin		
Egretta novaehollandiae	White-faced Heron		
Eopsaltria griseogularis	Western Yellow Robin		
Erythrogonys cinctus	Red-kneed Dotterel		
Falco cenchroides	Nankeen Kestrel		
Fulica atra	Eurasian Coot		
Grallina cyanoleuca	Magpie-lark		
Hirundo neoxena	Welcome Swallow		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Malacorhynchus membranaceus	Pink-eared Duck		
Malurus pulcherrimus	Blue-breasted Fairy-wren		
Microcarbo melanoleucos	Little Pied Cormorant		
Pelecanus conspicillatus	Australian Pelican		
Petrochelidon ariel	Fairy Martin		
Phalacrocorax fuscescens	Black-faced Cormorant		
Phylidonyris novaehollandiae	New Holland Honeyeater		

Species	Common Name	Aus status	SA status
Poliocephalus poliocephalus	Hoary-headed Grebe		
Rhipidura leucophrys	Willie Wagtail		
Thalasseus bergii	Crested Tern		
Tribonyx ventralis	Black-tailed Native-hen		
Vanellus miles	Masked Lapwing		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status	Record
Trichosurus vulpecula	Common Brushtail Possum		R	p*

R: Rare, V: Vulnerable, E: Endangered
*p: species could possibly be there

Reptiles

Species	Common Name	Aus status	SA status	Record
Bassiana trilineata	Western Three-lined Skink		R	e
Amphibolurus norrisi	Mallee Tree-dragon			e
Christinus marmoratus	Marbled Gecko			e

Species	Common Name	Aus status	SA status	Record
Ctenophorus fionni	Peninsula Dragon			c
Ctenophorus pictus	Painted Dragon			c
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Egernia stokesii	Gidgee Skink			e
Gehyra variegata	Tree Dtella			e
Hemiergis peronii	Four-toed Earless Skink			c
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			e
Morethia obscura	Mallee Snake-eye			c
Notechis scutatus	Eastern Tiger Snake	ssp		c
Tympanocryptis lineata	Five-lined Earless Dragon			c

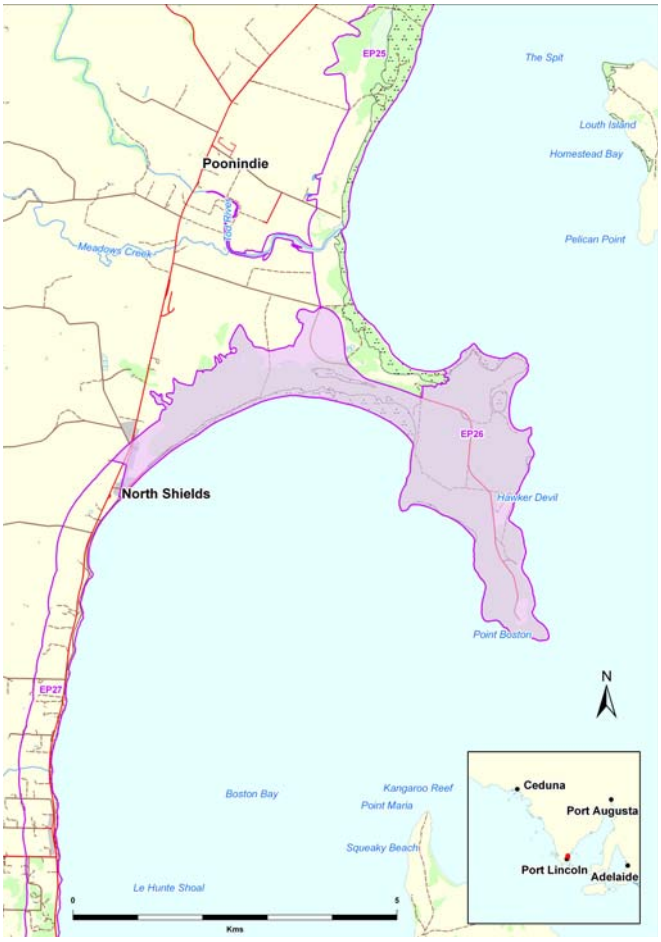
R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP26 Point Boston

Cell area 925 ha. Shoreline length 16.81 km.



Landforms

Point Boston is an oval shaped low rise of basement rock Lincoln Complex, capped in part with thin calcarenite and Holocene sands. The point shows low granite cliffs over sloping shore platforms. The low lying floodable land at the stem of the peninsula shows a narrow accumulation of Holocene beach ridges in the form of a 'tombolos'. The shoreline of the northern end of Boston Bay is a narrow, reflective, coarse sand beach and backed by narrow low vegetated dunes, fronted by shallow sand flats up to 400m wide.

Benthic Habitat

Dense seagrass with some inshore sand in north Boston Bay. Sand and seagrass on the western side of the peninsula; seagrass, granite reef then sand on the east.

Biota

There are 781 ha of remnant vegetation, or 84.5% of the cell. 1 BDBSA flora survey site, 4 herbarium record sites and 6 opportune fauna sites occur within this cell.
There is a locally complex pattern of vegetation: the small dune areas in *Olearia axillaris, Leucopogon parviflorus* tall open shrubland; at the head of Point Boston the narrow dune barrier is backed by low lying *Melaleuca halmaturorum* tall shrubland over *Gahnia filum* sedges; then saline *Tecticornia arbuscula* low shrubland over *Suaeda australis, Sarcocornia quinqueflora, Sarcocornia blackiana.* The calcrete surfaces of the headland is mainly in *Acacia dodonaeifolia* tall shrubland and *Leucopogon parviflorus, Acacia longifolia ssp. sophorae, Olearia axillaris, +/-Myoporum insulare* tall shrubland. Eucalyptus mallee woodland remains mainly on the higher parts, with one area of *Gramineae sp., Lomandra sp., Lepidosperma viscidum, Gahnia lanigera* mid tussock grassland on the eastern side of the peninsula.

Land Use/ Land Ownership

A narrow (c.30-70m) coastal reserve of unalloted Crown land extends around the coast of this cell, except for the southern approximately 1.5km which is Crown land Act reserve under the care, control and management of the District Council of Lower Eyre Peninsula and is only 1-30m wide. The coastal reserve is backed by privately owned land and includes part of the North Shields township, the large proposed Point Boston residential development (currently in receivership) and also an area under Heritage Agreement near the tip of Point Boston peninsula.

FIGURE 6.10 Point Boston; Boston Bay on left. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

Recreation: fishing, ORV, boating, camping, walking
Private land/ Community managed land
Large area of Vegetation Heritage Agreement
Point Boston Peninsula development
North Shields township
Land based aquaculture
Offshore aquaculture

Values (Field visits and local reports)

(Hooded plovers breed here – not on database

Threats (Field visits and local reports)

Feral plant and animals, including garden plant escapees in dunes north of North Shields
Proximity to aquaculture
Marine debris
Point Boston Peninsula development in receivership
Future development – with potential increased visitation impacting on sensitive coastal features and species
Uncontrolled camping
Uncontrolled ORV usage
Boat launching (public safety, hydrocarbon spills) at North Shields
Potential stormwater impacts on coast and marine environment (eg. spread of weeds, erosion)

Opportunities (Field visits and local reports)

Beaches regularly cleaned of debris by community.

Maintain the pest animal and plant control undertaken by the Point Boston Peninsula development.
Conservation and improvement works on Vegetation Heritage Agreements

Conservation Analysis (GIS)

The sum of conservation means is 111.01, an average total and ranked 38th for the region. The pattern of detailed summary values shows medium to high totals in the dunes and lowland swamps at the north end of Boston Bay, (with the exception of 'Big White'); on the peninsula generally medium to low and low values prevail.
Higher than average conservation layers include: threatened status for the vegetation community; rarity of vegetation communities; priority of sites with threatened fauna species (patchy overall, but high near North Shields); habitat for threatened bird species (areas subject to inundation at the N end of the bay); habitat for threatened reptile species (sand dune areas); habitat for threatened mammals (Point Boston); habitat for the Beach Slider and the Bight Coast Skink is recorded in the sand dune areas; areas subject to inundation near the head of the bay show a high priority for wetland significance.
There are two mammal, two reptile, three amphibian and 43 bird species recorded in this cell: including the state endangered White-bellied Sea-Eagle and the state vulnerable Diamond Firetail.

Threat Analysis (GIS)

Total of threat means is 60.50, high for the region. Apart from some small parts of Point Boston and some small dune and foredune areas, threat totals are high to very high throughout this cell. A number of threats show higher totals than average: ORV impact (throughout the cell), development zoning (other than two small areas of 'coastal zone', this is high throughout); land ownership (all privately owned, but HA at Point Boston); land use (all high/ medium except HA); viewshed; distribution of invasive weeds (high, except for a small dune area at the northern end of Boston Bay), and numbers of rabbits (notably through the Point Boston peninsula) are major contributors to the threat total.

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, dune and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Sea level rise: 2030 : +c.20cm	Beach recession and dune instability (in the short term the rate may depend on the circulation of sediment stored in the nearshore zone).	Active management of dunes. Continue monitoring DENR profiles 325001 - 5	
	Sub coastal wetlands threatened by periodic storm tide inundation, leading to habitat change.	Monitor swamp habitat change through the establishment of a DENR profile. The sub-coastal wetlands c. 1 – 2km NE of North Shields appear to be the most suitable as they show moderate/ high conservation value totals: the highest for the degraded local wetlands	
2070: +c.80cm.	Frequency and duration of marine flooding of sub-coastal swamps increases, resulting in species and habitat change	Continue to monitor species change in floodable areas, shoreline and dunes.	
	Further sea level rise leads to further beach and foredune erosion and dune migration landward.	Monitor dune movement (air photo time series). Slow dune changes through active management. Valuable dune habitats are expected to migrate landwards across sub-coastal swamps: zoning to create buffer zones for retreat is needed.	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides.	Continue to monitor beach profiles. Active management of dunes	
Intensity of large storms increases.	Low dunes backed by low ground are vulnerable to storm damage, overtopping, and rapid recession.	Dune habitats can only be retained by allowing rapid overwash recession of low dune ridges.	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere. There will be an increased risk for species that are already vulnerable. Invasive species are likely to become more dominant.		Maintain NE-SW connectivity of vegetation within the coastal boundary
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage, with invasion of grass species.	Active dune management, including weed control	Ensure dunes are included in regional fire plan
'Flashy' run off: Drier creeks, but larger rare floods	Creeks draining coastal slopes potentially transport increased sediment load to wetlands in rare peak events.	Monitoring to allow adaptive management of change.	
Groundwater lowering; saline incursion:	There is a potential local impact on water tables, including any perched water tables within the dunes, and vegetation survival	Adaptive management of plant assets	
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains sediment movement towards the north along the Gulf coast. Local movement of large quantities of sand in the nearshore zone may be accelerated as sea levels rise. Changes in the refracted pattern of swell and the wave climate have the potential to modify the plan-shape of the embayment.	Monitor beaches, see above.	

TABLE 6.10 Recommended Actions and Priority for EP26 Point Boston

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Very inadequate data on biodiversity and habitat values.	Undertake coastal flora and fauna surveys to inform future management directions.	High	DENR, EP NRM

Component	Issue	Proposed Action	Priority of Action	Key Players
	Unrestricted access, multiple vehicle tracks and informal car parks around the coast, with impact on coastal dune, salt marsh and cliff top vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing access with a view to rationalise unnecessary tracks and car parks. Block access (eg. fencing/rocks) to tracks and car parks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks or car parks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	Medium (cons/ threat)	Private land owners, DC of Lower Eyre Peninsula, DENR, EP NRM, community
	Areas within cell identified as being important for rare and endemic plant communities and as habitat for threatened species, with potential disturbance from development zoning, recreational activities, land management practices, uncontrolled access, weeds and pest animals	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches, dogs on leashes, track management, pest animal and plant control, restrict access to sensitive locations. Install interpretive/ educational signage. Community education programs. Review development plan zoning to these areas to increase protection	High (cons/ threat)	DENR, private land owners, EP NRM, DPLG, DC of Lower Eyre Peninsula, community groups
	Informal camping occurs on the coast, with potential impact from soil compaction, vegetation damage, increased fire risk, dune instability, weed introduction	Monitor impacts of camping. Review locations, management and need for camping in this location, with consideration to close and sign areas inappropriate for camping and/or formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping is to be allowed	Low (threat)	DENR, DC of Lower Eyre Peninsula, EP NRM, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Existing development impacting on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, discharges to marine environment, etc)	Work with private land owners (including aquaculture operators) to minimise impact from existing development, including education, restoration where appropriate and/or negotiation/enforcement to ensure the developments do not encroach on the coastal Crown reserve Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs and cats, ORV etc	Medium (cons/ threat)	EP NRM, DC of Lower Eyre Peninsula, DENR, private land owners, community groups
	Introduced animals (rabbits active throughout much of this cell); with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg. rabbits foxes, cats. Undertake control program as required.	Medium (cons/ threat)	EP NRM, private land owners, DENR, DC of Lower Eyre Peninsula
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	Medium (cons/ threat)	EP NRM, private land owners, DENR, DC of Lower Eyre Peninsula, community
	Climate change and sea level rise is having multiple effects within the cell	Ensure the establishment and maintenance of a time series of aerial photographs at an appropriate resolution. Establish new DENR profile (see above), to accurately track beach and dune recession and to record change in coastal wetlands Seek to improve the resilience of plant and animal habitats by taking opportunities to improve connectivity between vegetation blocks.	Medium (cons)	DENR, EP NRM, DC of Lower Eyre Peninsula, private land owners, community

Component	Issue	Proposed Action	Priority of Action	Key Players
Sub-coastal wetland	This has been classified as a wetland of value; but inadequate habitat values recorded. Invasive weeds and rabbits reported in this area.	Biological survey needed in this area. Monitor and record weed & pest animal species and distribution. Undertake weed & pest animal control program as required.	Medium (cons/ threat)	DC Lower Eyre Peninsula, EP NRM, DENR, private land owner(s)
	Salt marsh and low lying areas have the potential for acid sulfate soil following disturbance; in turn this would potentially threaten life forms offshore.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Low (threat)	DC of Lower Eyre Peninsula, DENR, developers, private land owners
Beaches and dunes	Medium- high conservation dunes at head (north end) of Boston Bay have incomplete development zone protection. ('Big White' blowout shows the effect of inappropriate past use). This area, and adjacent wetland, shows damaging ORV activity, invasive weeds – including bridal creeper, boxthorn, garden plant escapees and an incursion of rabbits.	Review zoning of these dune areas. Monitor and record weed & pest animal species and distribution. Undertake weed & pest animal control program. Review existing tracks with a view to rationalise unnecessary tracks. Implement actions to control or exclude off-road vehicle activity to dunes and adjacent wetlands.	Medium (cons/ threat)	DC Lower Eyre Peninsula, DPLG, EP NRM, DENR, private landowner(s)
All dunes	Stress through climate change: including sea level rise, storm tides and increasing aridity, leading to foredune recession and whole dune recession, also increased opportunity for invasion by grassy weeds.	Increase dune management effort to slow recession of dune landforms. Maintain monitoring record of change to this unstable landform/ habitat.	Medium (cons/ threat)	DENR, EP NRM, DC of Lower Eyre Peninsula, community groups
Point Boston	Continuity of pest animal and plant control programs, with the risk of increased pest plant and animals if works are not continued.	Ensure pest animal and plant control works are maintained	Medium (cons/ threat)	Landholder, community, EP NRM
North Shields	Potential stormwater impacts on coast and marine environment (eg. spread of weeds, erosion, pollution)	Monitor impacts, implement water sensitive urban design practices if/when required.	Low (threat)	DC of Lower Eyre Peninsula, EP NRM, Stormwater Management Authority

Component	Issue	Proposed Action	Priority of Action	Key Players
	Non-indigenous heritage site listed (North Shields Jetty)	Ensure sites managed to protect from damage. Install interpretive educational signage where appropriate.	Low (threat)	DC of Lower Eyre Peninsula, DENR,
Beaches	Vehicles and dogs on beaches a threat to meiofauna and shorebirds	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	Medium (cons/ threat)	DC of Lower Eyre Peninsula, EP NRM, DTEI, EP LGA, DENR, Tourism SA, Birds Australia, community
	Marine debris with potential impact on native fauna species	Investigate opportunities for, and/or support, ongoing marine debris cleanup programs. Undertake education program targeting fishers, campers, aquaculture operators	Medium	PIRSA, EP NRM, DENR, aquaculture operators, community, DC of Lower Eyre Peninsula, Tourism SA

BIOTA

Flora

Remnant vegetation area (ha)	781.22 ha, 84.50 % of cell area
# flora surveys / records	1 surveys, 4 herbarium record sites
# flora in cell	86
# conservation rated flora in cell	5
# non-indigenous flora in cell	20
Significant CDCS floristic community	*Melaleuca uncinata* shrubland - <20 (5) sites recorded along SA coast
Protected area	7% of remnant vegetation within Heritage Agreement

Weeds

Species	Common Name	Status	Study rating
Ehrharta calycina	Perennial Veldt Grass	RA	6
Gazania rigens	Gazania	RA	6
Asparagus asparagoides (NC)	Bridal Creeper	D, RA	9
Lycium ferocissimum	African Boxthorn	D, RA	8
Marrubium vulgare	Horehound	D, RA	5
Pinus halepensis	Aleppo Pine	D, RA	5
Asphodelus fistulosus	Onion Weed	D	3
Aira sp.	Hair-grass		0
Anagallis arvensis	Pimpernel		2
Avellinia michelii	Avellinia		0
Briza minor	Lesser Quaking-grass		2
Bupleurum semicompositum	Hare's Ear		0
Cerastium glomeratum	Common Mouse-ear Chickweed		1
Cotyledon orbiculata var. orbiculata	Pig's Ear		1
Ehrharta longiflora	Annual Veldt Grass		3
Hypochaeris glabra	Smooth Cat's Ear		2
Parentucellia latifolia	Red Bartsia		0
Pentaschistis airoides	False Hair-grass		0
Vulpia sp.	Fescue		2
Zaluzianskya divaricata	Spreading Night-phlox		2

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Billardiera sp. Yorke Peninsula (P.C.Heyligers 80164)	Lehmann's Apple-berry		E
Drosera stricticaulis	Erect Sundew		V
Acacia dodonaeifolia	Hop-bush Wattle		R
Levenhookia stipitata			R
Wurmbea decumbens	Trailing Nancy		R
Actinobole uliginosum	Flannel Cudweed		
Astroloma conostephioides	Flame Heath		
Astroloma humifusum	Cranberry Heath		
Austrodanthonia setacea	Small-flower Wallaby-grass		
Austrostipa scabra ssp. falcata	Slender Spear-grass		
Babingtonia behrii	Silver Broombush		
Blennospora drummondii	Dwarf Button-flower		
Brachyscome lineariloba	Hard-head Daisy		
Caladenia septuosa	Eyre Peninsula Spider-orchid		
Calandrinia corrigioloides	Strap Purslane		
Calandrinia eremaea	Dryland Purslane		
Calandrinia granulifera	Pigmy Purslane		
Calytrix involucrata	Cup Fringe-myrtle		
Cassytha glabella f. dispar	Slender Dodder-laurel		
Centrolepis polygyna	Wiry Centrolepis		
Centrolepis strigosa ssp. strigosa	Hairy Centrolepis		
Chamaescilla corymbosa var. corymbosa	Blue Squill		
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Crassula colorata var.	Dense Crassula		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		

Species	Common Name	Aus status	SA status
Daucus glochidiatus	Native Carrot		
Dianella brevicaulis	Short-stem Flax-lily		
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Dodonaea hexandra	Horned Hop-bush		
Eucalyptus angulosa	Coast Ridge-fruited Mallee		
Euchiton sphaericus	Annual Cudweed		
Hakea cycloptera	Elm-seed Hakea		
Hibbertia sericea var. major (NC)	Large Guinea-flower		
Hibbertia sp. Glabriuscula (D.J.Whibley 9012)	Smooth Guinea-flower		
Hyalosperma demissum	Dwarf Sunray		
Hybanthus floribundus ssp. floribundus	Shrub Violet		
Hydrocotyle capillaris	Thread Pennywort		
Hydrocotyle pilifera var. glabrata	Buttercup Pennywort		
Lepidosperma carphoides	Black Rapier-sedge		
Lepidosperma viscidum	Sticky Sword-sedge		
Leptospermum coriaceum	Dune Tea-tree		
Levenhookia dubia	Hairy Stylewort		
Lomandra micrantha ssp.	Small-flower Mat-rush		
Melaleuca uncinata (NC)	Broombush		
Microtis arenaria	Notched Onion-orchid		
Millotia tenuifolia var. tenuifolia	Soft Millotia		
Mitrasacme paradoxa (NC)	Wiry Mitrewort		
Neurachne alopecuroidea	Fox-tail Mulga-grass		
Opercularia scabrida	Stalked Stinkweed		
Ophioglossum lusitanicum	Austral Adder's-tongue		
Plantago hispida	Hairy Plantain		
Plantago sp. B (R.Bates 44765)	Little Plantain		
Podotheca angustifolia	Sticky Long-heads		
Poranthera microphylla (NC)	Small Poranthera		
Pterostylis sanguinea	Blood Greenhood		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Schoenus apogon	Common Bog-rush		
Schoenus breviculmis	Matted Bog-rush		
Schoenus nanus	Little Bog-rush		
Siloxerus multiflorus	Small Wrinklewort		
Thysanotus patersonii	Twining Fringe-lily		
Trachymene cyanopetala	Purple Trachymene		
Trachymene pilosa	Dwarf Trachymene		
Triglochin centrocarpum (NC)	Dwarf Arrowgrass		
Wahlenbergia gracilenta	Annual Bluebell		
Xanthorrhoea semiplana ssp.	Yacca		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	50 recorded – 43 birds, 0 butterflies, 2 mammals, 2 reptiles, 3 amphibians (an additional 16 reptiles and 25 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	6 opportune sites
# of threatened fauna in cell	7
# of non-indigenous fauna	4 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Passer domesticus	House Sparrow	Aves	x
Sturnus vulgaris	Common Starling	Aves	x
Turdus merula	Common Blackbird	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p
Oryctolagus cuniculus	Rabbit (European Rabbit)	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Stagonopleura guttata	Diamond Firetail		V
Anas rhynchotis	Australasian Shoveler		R
Burhinus grallarius	Bush Stone-curlew		R
Cereopsis novaehollandiae	Cape Barren Goose		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Neophema petrophila	Rock Parrot		R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Anas castanea	Chestnut Teal		
Anas gracilis	Grey Teal		
Anas superciliosa	Pacific Black Duck		
Anthochaera carunculata	Red Wattlebird		
Aythya australis	Hardhead (White-eyed Duck)		
Calidris acuminata	Sharp-tailed Sandpiper	M	
Calidris ferruginea	Curlew Sandpiper	M	
Calidris ruficollis	Red-necked Stint	M	
Chlidonias hybrida	Whiskered Tern		
Chroicocephalus novaehollandiae	Silver Gull		
Corvus coronoides	Australian Raven		
Egretta novaehollandiae	White-faced Heron		
Elseyornis melanops	Black-fronted Dotterel		
Eolophus roseicapillus	Galah		
Eudyptula minor	Little Penguin		
Falco cenchroides	Nankeen Kestrel		
Himantopus himantopus	Black-winged Stilt		
Hirundo neoxena	Welcome Swallow		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Malurus cyaneus	Superb Fairy-wren		
Ocyphaps lophotes	Crested Pigeon		
Pelecanus conspicillatus	Australian Pelican		
Phalacrocorax fuscescens	Black-faced Cormorant		
Phylidonyris novaehollandiae	New Holland Honeyeater		
Rhipidura leucophrys	Willie Wagtail		
Tachybaptus novaehollandiae	Australasian Grebe, (Little Grebe)		
Thalasseus bergii	Crested Tern		
Tringa nebularia	Common Greenshank	M	
Tyto javanica	Eastern Barn Owl		
Vanellus miles	Masked Lapwing		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Macropus robustus	Euro		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Bassiana trilineata	Western Three-lined Skink		R	e
Amphibolurus norrisi	Mallee Tree-dragon			e
Christinus marmoratus	Marbled Gecko			x
Ctenophorus fionni	Peninsula Dragon			c
Ctenophorus pictus	Painted Dragon			c
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Egernia stokesii	Gidgee Skink			e
Gehyra variegata	Tree Dtella			e
Hemiergis peronii	Four-toed Earless Skink			x
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e

Species	Common Name	Aus status	SA status	Record
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			e
Morethia obscura	Mallee Snake-eye			c
Notechis scutatus	Eastern Tiger Snake	ssp		c
Tympanocryptis lineata	Five-lined Earless Dragon			c

R: Rare, V: Vulnerable, E: Endangered

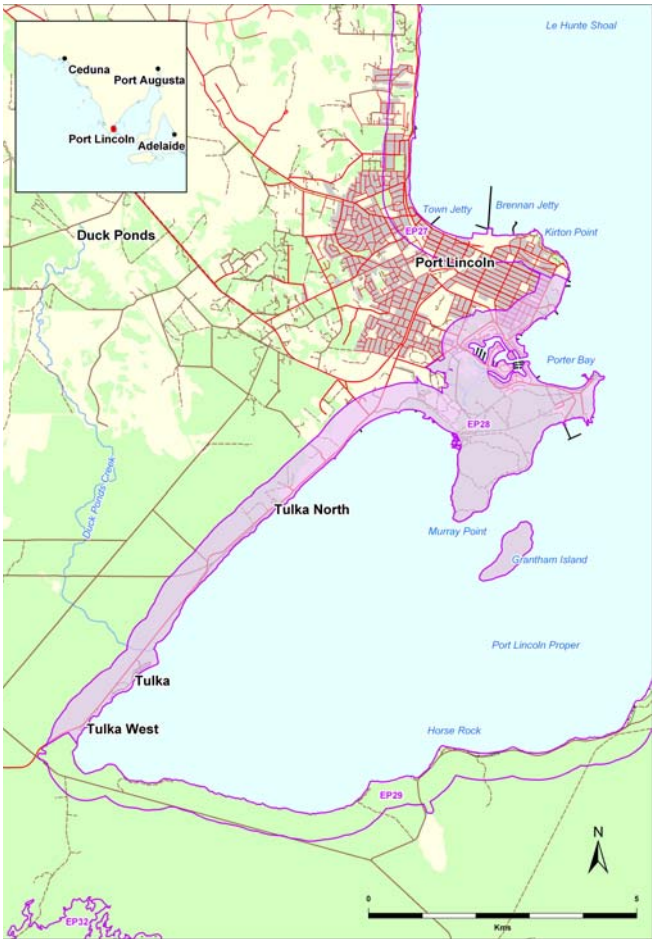
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

Species	Common Name	Aus status	SA status	Record
Crinia signifera	Common Froglet			x
Limnodynastes tasmaniensis	Spotted Marsh Frog			x
Neobatrachus pictus	Burrowing frog			x

Cell EP28 Lincoln Cove Marina

Cell area 1,191 ha. Shoreline length 35.76 km.



Landforms

This cell makes up the northern shore of Proper Bay, from the head of the Bay to Billy's Light Point and the shore of Porter Bay to Kirton Point. The shore has limited coarse sands of local origin, and is mainly in low cliffs of basement Donington suite rocks, with some low calcarenite cliffs immediately NE of Tulka. Wave energy within Proper Bay is close to zero, and the embayment north of Murray Point is accreting quantities of fine sand in wide intertidal flats; at Tulka a small foreland of sand is matched by a larger feature immediately below low tide that may be a mixture of creek deltaic deposits and marine sand movement. This appears to be one of several sedimentary accumulation features along the shore. At the head of Proper Bay there are wide sandy intertidal flats, backed by salt marshes and calcareous beach ridges. Along the shore of the bay to Tulka there are coarse sand beaches, fronted by wide low tide sand and rock flats with seagrass patches. Near Murray Point the shore continues as very low cliffs, with sand and boulder beach fragments and small rock platforms, fronted with sand flats. At Billy Lights Point there is a basement rock platform, with sandy beaches on each side; the sandy beach continues around Porter Bay to a small length of cliff at Kirton Point.

Benthic Habitat

Commonwealth mapping shows dense seagrass within Tulka Bay, and inshore at the marina.

Biota

838 ha; including a small area of salt marsh adjacent to the Pt Lincoln Cove marina, with intact inter-tidal samphire and intact supra-tidal melaleuca woodland. The shore of Proper Bay can be generalized to *Eucalyptus diversifolia* ssp. *diversifolia* mid mallee woodland over +/-*Melaleuca lanceolata*, +/-*Melaleuca uncinata* tall shrubs, over *Acrotriche patula*, +/-*Lasiopetalum discolor* low shrubs. The low mallee heath and shrubland also covers the Murray Point and Billy Lights Point headland, including Alcocks Wattle and Port Lincoln Mallee. Small areas of wet tussock *Gahnia* grassland/ sedgeland are found at Tulka and at the western end of Tulka Bay. This cell has 13 BDBSA flora survey sites, 4 opportune flora sites and 35 herbarium record sites; there is 1 fauna survey site and 40 opportune fauna sites.

FIGURE 6.11 Billy Lights Point (right), Porter Bay and Lincoln Cove. Photo: Coast Protection Board, 2007

Land Use/ Land Ownership

Much of this cell is privately owned and used for residential, industrial and recreational purposes. The cell includes the southern end of the city of Port Lincoln, the Port Lincoln marina and the shack settlement at Tulka. From the northern boundary of the cell to Murray's Point, the coast has areas with a coastal reserve and areas with no reserve. Most of the areas with a coastal reserve are Crown land Act reserves under the care, control and management of the City of Port Lincoln. From Murray's Point to the southern cell boundary a coastal reserve abuts most of the coast, part of which is unalloted Crown land and part of which (particularly surrounding the Tulka settlement) is Crown land Act reserve under the care, control and management of the City of Port Lincoln.

Uses (Field visits and local reports)

Urban and residential uses.
Aquaculture pen maintenance area
Offshore aquaculture zone
Professional fishing
Recreation and tourism – fishing, walking, boating, charter fishing and shark diving
Industrial activities
Wastewater treatment plant at Billy Lights Point

Threats (Field visits and local reports)

Possible re-zoning and development of Murray Point peninsula (currently deferred development)
Loss of mangrove and salt marsh through marina extension.
Damage to intertidal zone and coastal zone in aquaculture pen maintenance area
Discharges from industrial/ commercial activities

PCASS
Boat launching (public safety, hydrocarbon spills)
Weed infestation from garden escape plants
Stormwater impacts – eg. erosion, pollution, weeds
Marine debris
Further development

Opportunities (Field visits and local reports)

Implementation of the "Port Lincoln: reducing stormwater impacts on coast and marine environments". Prepared for the EP NRM Board by DesignFlow 2010
Weed control programs have been undertaken along the coastal reserve by community groups.
Access management projects have been undertaken along the coastal reserve by community groups and the City of Port Lincoln (eg. Parnkalla Trail)

Conservation Analysis (GIS)

The total of conservation means is 123.67, which is high for the region and 19th in ranking. Two parts of the cell are above average to high in total: the remnant vegetation from Tulka North to Tulka and the Murrays Point/ Billy Lights Point headland; elsewhere low to medium and low values prevail. Small mangrove and Melaleuca stands areas south of Lincoln Cove accrue medium to high totals. Grantham Island totals are close to average.
Vegetation community total values for threatened status and rarity are high, and total number of all threatened species is high to moderate. The value for species richness, total number of species, is high near Tulka North, Tulka and in small remnant areas near Lincoln Cove. The Murray Point Peninsula is a valuable habitat for birds, some reptiles and mammals, butterflies (also in remnant bush SW of Tulka North), and the Eastern Osprey (focal species). Sea views, vegetation patch metrics, indigenous heritage all score highly for this cell. There is a significant geological feature at Kirton Point and a non-Indigenous heritage listed property at Arrandale House and outbuildings, NE of Tulka North.
There are three reptile, two amphibian, one mammal and 92 bird species recorded in this cell, including the state endangered Eastern Osprey, Western Whipbird (Eastern ssp.) and Southern Emu-wren (Eyre Peninsula ssp.), also the state vulnerable Banded Stilt.

Threat Analysis (GIS)

The total of threat summary layers is 56.64, high for the region. The highest threat totals are within the area north east from Tulka North; to the SW along the shore of Proper Bay there are generally lower totals; the rest of the around the southern fringes of Port Lincoln is medium high to high in total.
The main threat scores are for ORV, development zoning, land ownership and zoning, viewshed, existing development, vegetation block degradation, and significant weeds. ORV impact is recorded throughout the cell, but is most concentrated along the Proper Bay section, for 2 km on either side of Tulka North, and also between the mangroves SW of the Lincoln Cove marina and the shore of Proper Bay. Development zoning is recorded as a threat across the Murray Point peninsula, which lacks a coastal zone, and immediately NE of Tulka North. Land ownership, viewscape and land use show relatively high values through the cell; (note the WWTP near Billy Lights Point has not been recorded on the assessment). The distribution of weeds is patchy through the cell: moderate on the Murray Point peninsula, but very high between Tulka and Tulka North.

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	**Impacts and implications (for this cell)**	**Protect and manage habitat threats**	**Address landscape issues: fire, connectivity, refuges, hydrology**
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Minor shoreline adjustment within Proper Bay.	Monitor change	
2070: +c.80cm.	Salt marsh at the SW and NE edges of Proper Bay threatened by tidal inundation, leading to habitat change.	Monitor species change in floodable areas.	
	Further shoreline adjustment in Proper Bay as beaches recede; sand shores of Porter Bay eroded	Monitor change as shown by aerial photographic record, (Proper Bay), and DENR profiles (Porter Bay).	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides.	Continue to monitor beach profiles.	
Intensity of large storms increases.	Low ground between Tulka North and Murray Point subject to tidal flooding. (Extent of change depending on local rate of sediment accumulation).		
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere. There will be an increased risk for species that are already vulnerable. Invasive species are likely to become more dominant.		Maintain connectivity of remnant vegetation blocks.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage, with invasion of grass species.	Active dune management, including weed control	Ensure dunes are included in regional fire plan
'Flashy' run off: Drier creeks, but larger rare floods	Storm drains draining coastal slopes potentially transport increased sediment load to wetlands and nearshore areas in rare peak events.	Monitoring to allow adaptive management of change.	
Groundwater lowering; saline incursion:	There is a potential local impact on water tables, including any perched water tables within the dunes, and vegetation survival	Adaptive management of plant assets	
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains sediment movement towards the north along the Gulf coast. Local movement of large quantities of sand in the nearshore zone may be accelerated as sea levels rise. Changes in the refracted pattern of swell and the wave climate have the potential to modify the plan-shape of the embayment.	Monitor beaches, see above.	

TABLE 6.11 Recommended Actions and Priority for EP28 Lincoln Cove Marina

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	Medium	DENR, EP NRM
	Potential impact on breeding habitat of the endangered Eastern Osprey, particularly during the breeding season.	Develop site management and monitoring strategy. Ensure management/works programs are not undertaken during the breeding season. Community education.	High	DENR, EP NRM

Component	Issue	Proposed Action	Priority of Action	Key Players
	Climate change and sea level rise is having multiple effects within the cell	Ensure the establishment and maintenance of a time series of aerial photographs at an appropriate resolution. Seek to improve the resilience of plant and animal habitats by taking opportunities to improve connectivity between vegetation blocks.	Medium (cons)	DENR, EP NRM, DC of Lower Eyre Peninsula, private land owners, community
	Existing development impacting on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, discharges into the marine environment from commercial/industrial sites, damage to foreshore and intertidal environment from aquaculture infrastructure, etc)	Work with private land owners to minimise impact from existing development, including education and restoration where appropriate. Work with commercial/industrial operators to prevent discharges into the marine environment. Work with aquaculture industry to prevent damage to the coastal and marine environment from aquaculture infrastructure (eg. cleaning and maintenance of tuna rings). Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs and cats, ORV/ tracks, litter, etc	High (cons/ threat)	EP NRM, City of Port Lincoln, DC of Lower Eyre Peninsula, PIRSA, EPA, DENR, aquaculture industry, private land owners, community groups
	Weed species identified throughout cell, including woody weeds such as *Polygala myrtifolia*, contributing to fuel loads and out competing native species.	Support ongoing/ current weed management programs/projects. Develop and implement weed management plan for areas without a plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	High (cons/ threat)	EP NRM, private land owners, DENR, City of Port Lincoln, DC of Lower Eyre Peninsula, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Possible future industrial, commercial &/or residential development with potential impact on high conservation values of surrounding area (eg. loss of sensitive coastal vegetation eg. salt marsh, domestic animals disturbing/destroying native species, soil compaction, weed escapes, increased tracks, discharges to sensitive marine environment, etc)	Review development plan zoning to high conservation value areas to increase protection. Ensure future development is not located in areas of high conservation value or high sensitivity. Ensure future development minimises impact to surrounding environment (eg. limit track creation, limit development footprint, minimise vegetation removal, prohibit/minimise discharges to the marine environment). Require stormwater quality improvement works of any new development. Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled pets, etc	High (cons/ threat)	City of Port Lincoln, DC of Lower Eyre Peninsula, DENR, DPLG, EP NRM, private land owners, developers, community groups
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, City of Port Lincoln, private land owners, community groups, EP NRM
	Stormwater impacts on coast and marine environment (eg. spread of weeds, erosion, pollution)	Implement recommendations from DesignFlow 2010 report	High (cons/ threat)	City of Port Lincoln, EP NRM, Stormwater Management Authority
	Climate change projections suggest larger peak storm water flows, with impacts on wetlands and nearshore	Monitor and review storm water system response and impacts.	Medium (threat)	City of Port Lincoln, EP NRM, Stormwater Management Authority

Component	Issue	Proposed Action	Priority of Action	Key Players
	Maintenance of coastal access management infrastructure	Use the EP Coastal infrastructure audit to setup a maintenance program	Medium	DENR, City of Port Lincoln, DC of Lower Eyre Peninsula, EP NRM, community groups
	Areas of unrestricted vehicle and/or pedestrian access around the coast, with impact on coastal vegetation, soil compaction and erosion, weed introduction, dune disturbance to native fauna species	Develop access management plan – including review of existing access with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any vehicle tracks that are not well defined, or are causing water run-off erosion. Formalise and maintain pedestrian access. Install directional /educational signage. Community education	High (cons/ threat)	City of Port Lincoln, DC of Lower Eyre Peninsula, DENR, EP NRM, community groups
Murray's Point composite peninsula (deferred development zone)	This high conservation value area is only tentatively preserved by current planning zoning. Recent biological assessment has underlined the value of this area. Pressure for development follows from its location and its current planning status.	That council consider recognizing the conservation value of the land, through re-zoning the area 'coastal conservation'.	High (cons/ threat)	City of Port Lincoln, DPLG
Tulka to Tulka North	This area is valuable for the conservation of rare and threatened plant communities, species richness, and bird habitat. The area is threatened by weeds and ORV activity	Develop and implement weed management plan. Review existing tracks with a view to rationalise unnecessary tracks. Implement actions to control or exclude off-road vehicle activity.	High (cons/ threat)	DC Lower Eyre Peninsula, EP NRM, DENR, private land owners, community
	Non-indigenous heritage site listed – Flinders Cairn (Water Supply)	Ensure sites managed to protect from damage. Install interpretive educational signage.	Medium	DC of Lower Eyre Peninsula, DENR

Component	Issue	Proposed Action	Priority of Action	Key Players
NE shore of Proper Bay	Response to accelerating sea level rise and sediment movement along this shore is uncertain	Continue to monitor change with high resolution aerial photograph time series.	Medium (threat)	EP NRM, DENR, City of Port Lincoln
Grantham Island	Weed species identified on island, previous boxthorn control program undertaken with the risk of reinfestation if control works are not continued and maintained.	Continue to undertake weed control program to ensure the level of control already achieved is maintained.	High (cons/ threat)	EP NRM, DENR, City of Port Lincoln
All salt marsh areas	All salt marsh areas show the potential for acid sulfate soil following disturbance; in turn this would potentially threaten life forms offshore.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Medium (cons/ threat)	City of Port Lincoln, DENR, DPLG, developers, private land owners
Kirton Point	Significant geological feature present – GSA reference E2.1 (see section 3.4.1)	Interpretive signage	Low (threat)	GSA SA branch, City of Port Lincoln, EP NRM, DENR

BIOTA

Flora

Remnant vegetation area (ha)	837.81 ha, 70.36 % of cell area
# flora surveys / records	13 surveys, 4 opportune sites, 35 herbarium record sites
# flora in cell	308
# conservation rated flora in cell	8
# non-indigenous flora in cell	85
Significant CDCS floristic community	*Eucalyptus diversifolia* / *Gonocarpus mezianus* mallee – <20 (9) sites recorded along the SA coast
Protected area	No remnant vegetation protected

Weeds

Species	Common Name	Status	Study rating
Acacia cyclops	Western Coastal Wattle	RA	5
Acacia saligna	Golden Wreath Wattle	RA	5
Argyranthemum frutescens ssp.	Marguerite Daisy	RA	4
Asparagus declinatus		RA	8
Coprosma repens	New Zealand Mirror-bush	RA	4
Euphorbia paralias	Sea Spurge	RA	5

Species	Common Name	Status	Study rating
Euphorbia peplus	Petty Spurge	RA	5
Freesia cultivar	Freesia	RA	7
Gazania rigens	Gazania	RA	6
Juncus acutus	Sharp Rush	RA	4
Limonium companyonis	Sea-lavender	RA	7
Mesembryanthemum crystallinum	Common Iceplant	RA	4
Pennisetum clandestinum	Kikuyu	RA	4
Polygala myrtifolia	Myrtle-leaf Milkwort	RA	9
Rhamnus alaternus	Blowfly Bush	RA	8
Asparagus asparagoides (NC)	Bridal Creeper	D, RA	9
Euphorbia terracina	False Caper	D, RA	5
Lycium ferocissimum	African Boxthorn	D, RA	8
Marrubium vulgare	Horehound	D, RA	5
Olea europaea ssp.	Olive	D, RA	5
Oxalis pes-caprae	Soursob	D, RA	5
Pinus halepensis	Aleppo Pine	D, RA	5
Asphodelus fistulosus	Onion Weed	D	3
Diplotaxis tenuifolia	Lincoln Weed	D	3
Agave americana	Century Plant		1
Ammi majus	False Bishop's Weed		0
Anagallis arvensis	Pimpernel		2
Aster subulatus	Aster-weed		0
Atriplex prostrata	Creeping Saltbush		0
Avena barbata	Bearded Oat		2
Brassica nigra	Black Mustard		0
Brassica tournefortii	Wild Turnip		3
Bromus diandrus	Great Brome		2
Bromus hordeaceus ssp. hordeaceus	Soft Brome		2
Bromus madritensis	Compact Brome		2
Buglossoides arvensis	Sheepweed		0
Bupleurum semicompositum	Hare's Ear		0
Cakile maritima ssp. maritima	Two-horned Sea Rocket		1
Catapodium rigidum	Rigid Fescue		1
Centaurea melitensis	Malta Thistle		1
Centaurium tenuiflorum	Branched Centaury		1
Cerastium balearicum	Chickweed		1
Chenopodium murale	Nettle-leaf Goosefoot		0
Coleonema pulchellum	Diosma		3
Cotoneaster simonsii	Cotoneaster		0
Crepis pusilla	Dandelion Crepis		0
Critesion murinum ssp. (NC)	Barley-grass		0
Ehrharta longiflora	Annual Veldt Grass		3
Eucalyptus gomphocephala	Tuart		3
Foeniculum vulgare	Fennel		0
Fumaria capreolata	White-flower Fumitory		0
Galenia pubescens var. pubescens	Coastal Galenia		0
Galium murale	Small Bedstraw		0
Hirschfeldia incana	Hoary Mustard		0
Lagurus ovatus	Hare's Tail Grass		2
Limonium hyblaeum			3
Lolium perenne	Perennial Ryegrass		1
Lolium rigidum	Wimmera Ryegrass		1
Malva dendromorpha	Tree Mallow		3

Species	Common Name	Status	Study rating
Malva parviflora	Small-flower Marshmallow		0
Medicago polymorpha var. polymorpha	Burr-medic		1
Melilotus indicus	King Island Melilot		1
Mesembryanthemum sp.	Iceplant		3
Minuartia mediterranea	Slender Sandwort		0
Moraea setifolia	Thread Iris		0
Oncosiphon suffruticosum	Calomba Daisy		0
Papaver hybridum	Rough Poppy		0
Parapholis incurva	Curly Ryegrass		1
Petrorhagia sp.	Pink		0
Piptatherum miliaceum	Rice Millet		2
Pittosporum undulatum	Sweet Pittosporum		0
Polycarpon tetraphyllum	Four-leaf Allseed		0
Polypogon maritimus	Coast Beard-grass		0
Polypogon monspeliensis	Annual Beard-grass		0
Rostraria cristata	Annual Cat's-tail		2
Scabiosa atropurpurea	Pincushion		3
Senecio pterophorus	African Daisy		2
Sonchus asper ssp.	Rough Sow-thistle		0
Sonchus oleraceus	Common Sow-thistle		0
Spergularia marina (NC)	Salt Sand-spurrey		0
Stenotaphrum secundatum	Buffalo Grass		2
Trifolium angustifolium	Narrow-leaf Clover		2
Trifolium campestre	Hop Clover		2
Vicia sativa ssp.	Common Vetch		0
Vulpia myuros f.	Fescue		2

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Caladenia dilatata	Late Spider-orchid		E
Veronica gracilis	Slender Speedwell		V
Eucalyptus conglobata ssp. conglobata	Port Lincoln Mallee		R*
Acacia alcockii	Alcock's Wattle		R
Acacia dodonaeifolia	Hop-bush Wattle		R
Lepidium pseudoruderale			R
Sphaerolobium minus	Leafless Globe-pea		R
Spyridium spathulatum	Spoon-leaf Spyridium		R
Acacia acinacea	Wreath Wattle		
Acacia anceps			
Acacia anceps (NC)	Angled Wattle		
Acacia calamifolia	Wallowa		
Acacia calamifolia (NC)	Wallowa		
Acacia cupularis	Cup Wattle		
Acacia leiophylla	Coast Golden Wattle		
Acacia ligulata	Umbrella Bush		
Acacia myrtifolia var. myrtifolia (NC)	Myrtle Wattle		
Acacia nematophylla	Coast Wallowa		
Acacia paradoxa	Kangaroo Thorn		
Acacia rupicola	Rock Wattle		
Acacia spinescens	Spiny Wattle		

Species	Common Name	Aus status	SA status
Acacia triquetra	Mallee Wreath Wattle		
Acrotriche cordata	Blunt-leaf Ground-berry		
Acrotriche patula	Prickly Ground-berry		
Adenanthos terminalis	Yellow Gland-flower		
Adriana quadripartita	Coast Bitter-bush		
Allocasuarina muelleriana ssp. muelleriana	Common Oak-bush		
Allocasuarina verticillata	Drooping Sheoak		
Alyxia buxifolia	Sea Box		
Amyema melaleucae	Tea-tree Mistletoe		
Angianthus preissianus	Salt Angianthus		
Aphanes australiana	Australian Piert		
Apium annuum	Annual Celery		
Apium prostratum var. filiforme	Native Celery		
Arthropodium minus	Small Vanilla-lily		
Astroloma conostephioides	Flame Heath		
Astroloma humifusum	Cranberry Heath		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrodanthonia setacea	Small-flower Wallaby-grass		
Austrostipa acrociliata	Graceful Spear-grass		
Austrostipa eremophila	Rusty Spear-grass		
Austrostipa flavescens	Coast Spear-grass		
Austrostipa hemipogon	Half-beard Spear-grass		
Austrostipa stipoides	Coast Spear-grass		
Babingtonia behrii	Silver Broombush		
Beyeria lechenaultii	Pale Turpentine Bush		
Billardiera cymosa ssp. pseudocymosa	Sweet Apple-berry		
Billardiera sericophora	Silky Apple-berry		
Billardiera versicolor	Yellow-flower Apple-berry		
Caladenia capillata	Wispy Spider-orchid		
Calytrix tetragona	Common Fringe-myrtle		
Carpobrotus modestus	Inland Pigface		
Carpobrotus rossii	Native Pigface		
Carpobrotus rossii (NC)	Native Pigface		
Cassytha glabella f. dispar	Slender Dodder-laurel		
Cassytha melantha	Coarse Dodder-laurel		
Cassytha peninsularis	Peninsula Dodder-laurel		
Cassytha pubescens	Downy Dodder-laurel		
Cheiranthera alternifolia	Hand-flower		
Clematis microphylla			
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Comesperma volubile	Love Creeper		
Correa backhouseana var. coriacea	Thick-leaf Correa		
Correa pulchella	Salmon Correa		
Corybas sp.	Helmet-orchid		
Craspedia variabilis	Billy-buttons		
Crassula colligata ssp. lamprosperma			
Dianella brevicaulis	Short-stem Flax-lily		
Dianella brevicaulis/revoluta var.	Black-anther Flax-lily		
Dianella revoluta (NC)			
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Diuris orientis	Wallflower Donkey-orchid		

Species	Common Name	Aus status	SA status
Dodonaea hexandra	Horned Hop-bush		
Dodonaea humilis	Dwarf Hop-bush		
Dodonaea viscosa ssp. spatulata	Sticky Hop-bush		
Drosera macrantha ssp. planchonii	Climbing Sundew		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eremophila behriana	Rough Emubush		
Eriochilus cucullatus	Parson's Bands		
Eriochloa pseudoacrotricha	Perennial Cupgrass		
Eucalyptus albopurpurea	Purple-flowered Mallee Box		
Eucalyptus angulosa	Coast Ridge-fruited Mallee		
Eucalyptus brachycalyx	Gilja		
Eucalyptus diversifolia (NC)	Coastal White Mallee		
Eucalyptus diversifolia ssp. diversifolia	Coastal White Mallee		
Eucalyptus gracilis	Yorrell		
Eucalyptus leptophylla	Narrow-leaf Red Mallee		
Eucalyptus oleosa (NC)	Red Mallee		
Eucalyptus oleosa ssp. ampliata	Red Mallee		
Eucalyptus pileata	Capped Mallee		
Eucalyptus rugosa	Coastal White Mallee		
Eutaxia microphylla	Common Eutaxia		
Eutaxia sp.	Eutaxia		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos sparteus	Slender Cherry		
Exocarpos syrticola	Coast Cherry		
Gahnia deusta	Limestone Saw-sedge		
Gahnia filum	Thatching Grass		
Gahnia lanigera	Black Grass Saw-sedge		
Geijera linearifolia	Sheep Bush		
Genoplesium rufum	Red Midge-orchid		
Gonocarpus mezianus	Broad-leaf Raspwort		
Goodenia blackiana	Native Primrose		
Goodenia geniculata	Bent Goodenia		
Goodenia varia	Sticky Goodenia		
Goodenia willisiana	Silver Goodenia		
Goodia medicaginea	Western Golden-tip		
Grevillea aspera	Rough Grevillea		
Grevillea ilicifolia var. ilicifolia (NC)	Holly-leaf Grevillea		
Hakea cycloptera	Elm-seed Hakea		
Halophila australis	Paddle Weed		
Haloragis acutangula f. inflata	Smooth Raspwort		
Haloragis acutangula f. semiangulata	Smooth Raspwort		
Haloragis acutangula f. tetraglebosa	Smooth Raspwort		
Hardenbergia violacea	Native Lilac		
Heliotropium europaeum	Common Heliotrope		
Hemichroa pentandra	Trailing Hemichroa		
Hibbertia platyphylla ssp. platyphylla			
Hibbertia riparia (NC)	Guinea-flower		
Hypoxis glabella var. glabella	Tiny Star		
Lasiopetalum baueri	Slender Velvet-bush		
Lasiopetalum behrii	Pink Velvet-bush		
Lasiopetalum discolor	Coast Velvet-bush		
Lasiopetalum schulzenii	Drooping Velvet-bush		
Lawrencia spicata	Salt Lawrencia		

Species	Common Name	Aus status	SA status
Lawrencia squamata	Thorny Lawrencia		
Lepidosperma carphoides	Black Rapier-sedge		
Lepidosperma congestum			
Lepidosperma viscidum	Sticky Sword-sedge		
Leptorhynchos waitzia	Button Immortelle		
Leucopogon parviflorus	Coast Beard-heath		
Lichen sp.			
Logania ovata	Oval-leaf Logania		
Lomandra collina	Sand Mat-rush		
Lysiana exocarpi ssp. exocarpi	Harlequin Mistletoe		
Maireana brevifolia	Short-leaf Bluebush		
Malva preissiana	Australian Hollyhock		
Melaleuca acuminata ssp. acuminata	Mallee Honey-myrtle		
Melaleuca brevifolia	Short-leaf Honey-myrtle		
Melaleuca decussata	Totem-poles		
Melaleuca halmaturorum	Swamp Paper-bark		
Melaleuca lanceolata	Dryland Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Melaleuca uncinata (NC)	Broombush		
Microcybe pauciflora ssp. pauciflora	Yellow Microcybe		
Microtis arenaria	Notched Onion-orchid		
Microtis sp.	Onion-orchid		
Moss sp.			
Muehlenbeckia adpressa	Climbing Lignum		
Muehlenbeckia gunnii	Coastal Climbing Lignum		
Myoporum brevipes	Warty Boobialla		
Myoporum insulare	Common Boobialla		
Myoporum viscosum	Sticky Boobialla		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Olearia brachyphylla	Short-leaf Daisy-bush		
Olearia ciliata var. ciliata	Fringed Daisy-bush		
Olearia teretifolia	Cypress Daisy-bush		
Opercularia scabrida	Stalked Stinkweed		
Opercularia turpis	Twiggy Stinkweed		
Pimelea glauca	Smooth Riceflower		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pittosporum angustifolium	Native Apricot		
Poa labillardieri var. labillardieri	Common Tussock-grass		
Poa poiformis var. poiformis	Coast Tussock-grass		
Podotheca angustifolia	Sticky Long-heads		
Pomaderris obcordata	Wedge-leaf Pomaderris		
Pomaderris oraria (NC)	Coast Pomaderris		
Poranthera triandra	Three-petal Poranthera		
Posidonia australis	Southern Tapeweed		
Posidonia sinuosa	Narrow-leaf Tapeweed		
Prasophyllum elatum	Tall Leek-orchid		
Prostanthera serpyllifolia ssp. serpyllifolia	Thyme Mintbush		
Pterostylis sanguinea	Blood Greenhood		
Puccinellia stricta var. stricta	Australian Saltmarsh-grass		
Pultenaea acerosa	Bristly Bush-pea		
Pultenaea canaliculata var.	Soft Bush-pea		
Pultenaea tenuifolia	Narrow-leaf Bush-pea		

Species	Common Name	Aus status	SA status
Pultenaea trinervis	Three-nerve Bush-pea		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia crassifolia	Fleshy Saltbush		
Ruppia tuberosa	Widgeon Grass		
Samolus repens	Creeping Brookweed		
Santalum acuminatum	Quandong		
Sarcocornia blackiana	Thick-head Samphire		
Sarcocornia quinqueflora	Beaded Samphire		
Scaevola aemula	Fairy Fanflower		
Scaevola angustata	Coast Fanflower		
Scaevola crassifolia	Cushion Fanflower		
Scaevola linearis ssp. linearis	Rough Fanflower		
Schoenus breviculmis	Matted Bog-rush		
Schoenus deformis	Small Bog-rush		
Sebaea ovata	Yellow Sebaea		
Senecio pinnatifolius (NC)	Variable Groundsel		
Senecio spanomerus			
Solanum symonii	Symon's Kangaroo-apple		
Sonchus hydrophilus	Native Sow-thistle		
Spyridium nitidum	Shining Spyridium		
Spyridium phylicoides	Narrow-leaf Spyridium		
Stackhousia aspericocca ssp. One-sided inflorescence (W.R.Barker 697)	One-sided Candles		
Stenanthemum leucophractum	White Cryptandra		
Suaeda australis	Austral Seablite		
Tecticornia arbuscula	Shrubby Samphire		
Tecticornia halocnemoides ssp. halocnemoides	Grey Samphire		
Tecticornia indica ssp. bidens	Brown-head Samphire		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Thelymitra benthamiana	Leopard Sun-orchid		
Thelymitra luteocilium	Yellow-tuft Sun Orchid		
Threlkeldia diffusa	Coast Bonefruit		
Thysanotus patersonii	Twining Fringe-lily		
Trachymene pilosa	Dwarf Trachymene		
Tricoryne tenella	Tufted Yellow Rush-lily		
Trymalium wayi	Grey Trymalium		
Vittadinia australasica var. australasica	Sticky New Holland Daisy		
Vittadinia sp.	New Holland Daisy		
Xanthorrhoea semiplana ssp.	Yacca		
Xanthorrhoea semiplana ssp. semiplana	Yacca		
Zygophyllum apiculatum	Pointed Twinleaf		
Zygophyllum billardierei	Coast Twinleaf		
Zygophyllum billardierei (NC)	Coast Twinleaf		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	98 recorded – 92 birds, 0 butterflies, 1 mammals, 3 reptiles, 2 amphibians (an additional 17 reptiles and 25 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	1 survey, 40 opportune sites
# of threatened fauna in cell	12
# of non-indigenous fauna	5 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Alauda arvensis	Eurasian Skylark	Aves	x
Columba livia	Rock Dove	Aves	x
Passer domesticus	House Sparrow	Aves	x
Sturnus vulgaris	Common Starling	Aves	x
Turdus merula	Common Blackbird	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Pandion cristatus	Eastern Osprey	M	E
Psophodes nigrogularis leucogaster	Western Whipbird (Eastern subspecies)	V	E
Stipiturus malachurus parimeda	Southern Emu-wren (Eyre Peninsula ssp)	V	E
Cladorhynchus leucocephalus	Banded Stilt		V
Actitis hypoleucos	Common Sandpiper	M	R
Anas rhynchotis	Australasian Shoveler		R
Calidris alba	Sanderling	M	R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Neophema petrophila	Rock Parrot		R
Tringa glareola	Wood Sandpiper	M	R
Turnix varius	Painted Button-quail		R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Acanthiza apicalis	Inland Thornbill		
Accipiter cirrocephalus	Collared Sparrowhawk		
Anas castanea	Chestnut Teal		
Anas gracilis	Grey Teal		
Anas superciliosa	Pacific Black Duck		
Anthochaera carunculata	Red Wattlebird		
Ardea modesta	Eastern Great Egret		
Aythya australis	Hardhead (White-eyed Duck)		
Barnardius zonarius	Australian Ringneck, (Ring-necked Parrot)		
Calidris acuminata	Sharp-tailed Sandpiper	M	
Calidris ruficollis	Red-necked Stint	M	
Chalcites basalis	Horsfield's Bronze-cuckoo		
Charadrius ruficapillus	Red-capped Plover		
Chroicocephalus novaehollandiae	Silver Gull		
Colluricincla harmonica	Grey Shrike-thrush		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		

Species	Common Name	Aus status	SA status
Corvus bennetti	Little Crow		
Corvus coronoides	Australian Raven		
Corvus mellori	Little Raven		
Coturnix pectoralis	Stubble Quail		
Cracticus tibicen	Australian Magpie		
Cracticus torquatus	Grey Butcherbird		
Cygnus atratus	Black Swan		
Drymodes brunneopygia	Southern Scrub-robin		
Egretta novaehollandiae	White-faced Heron		
Elanus axillaris	Black-shouldered Kite		
Eolophus roseicapillus	Galah		
Epthianura albifrons	White-fronted Chat		
Erythrogonys cinctus	Red-kneed Dotterel		
Falco cenchroides	Nankeen Kestrel		
Falco longipennis	Australian Hobby		
Fulica atra	Eurasian Coot		
Glossopsitta porphyrocephala	Purple-crowned Lorikeet		
Glyciphila melanops	Tawny-crowned Honeyeater		
Grallina cyanoleuca	Magpie-lark		
Himantopus himantopus	Black-winged Stilt		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Larus pacificus	Pacific Gull		
Lichenostomus cratitius	Purple-gaped Honeyeater		ssp
Malurus cyaneus	Superb Fairy-wren		
Malurus pulcherrimus	Blue-breasted Fairy-wren		
Megalurus gramineus	Little Grassbird		
Melithreptus brevirostris	Brown-headed Honeyeater		
Microcarbo melanoleucos	Little Pied Cormorant		
Pardalotus punctatus	Spotted Pardalote		
Pardalotus striatus	Striated Pardalote		
Pelecanus conspicillatus	Australian Pelican		
Phalacrocorax fuscescens	Black-faced Cormorant		
Phalacrocorax sulcirostris	Little Black Cormorant		
Phalacrocorax varius	Pied Cormorant		
Phaps chalcoptera	Common Bronzewing		
Phaps elegans	Brush Bronzewing		
Phylidonyris novaehollandiae	New Holland Honeyeater		
Pluvialis squatarola	Grey Plover	M	
Poliocephalus poliocephalus	Hoary-headed Grebe		
Pomatostomus superciliosus	White-browed Babbler		
Porzana fluminea	Australian Spotted Crake		
Psophodes nigrogularis	Western Whipbird	ssp	ssp
Recurvirostra novaehollandiae	Red-necked Avocet		
Rhipidura albiscapa	Grey Fantail		
Rhipidura leucophrys	Willie Wagtail		
Sericornis frontalis	White-browed Scrubwren		
Smicrornis brevirostris	Weebill		
Strepera versicolor	Grey Currawong		ssp
Tachybaptus novaehollandiae	Australasian Grebe, (Little Grebe)		
Thalasseus bergii	Crested Tern		
Todiramphus sanctus	Sacred Kingfisher		
Tribonyx ventralis	Black-tailed Native-hen		

Species	Common Name	Aus status	SA status
Trichoglossus haematodus	Rainbow Lorikeet		
Tringa nebularia	Common Greenshank	M	
Vanellus miles	Masked Lapwing		
Vanellus tricolor	Banded Lapwing		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Macropus fuliginosus	Western Grey Kangaroo		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Bassiana trilineata	Western Three-lined Skink		R	e
Amphibolurus norrisi	Mallee Tree-dragon			e
Christinus marmoratus	Marbled Gecko			x

Species	Common Name	Aus status	SA status	Record
Ctenophorus fionni	Peninsula Dragon			c
Ctenophorus pictus	Painted Dragon			c
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Egernia stokesii	Gidgee Skink			e
Gehyra variegata	Tree Dtella			e
Hemiergis peronii	Four-toed Earless Skink			c
Lampropholis delicata	Delicate Skink			x
Lerista dorsalis	Southern Four-toed Slider			x
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			e
Morethia obscura	Mallee Snake-eye			c
Nephrurus milii	Barking Gecko			c
Notechis scutatus	Eastern Tiger Snake	ssp		c
Tympanocryptis lineata	Five-lined Earless Dragon			c

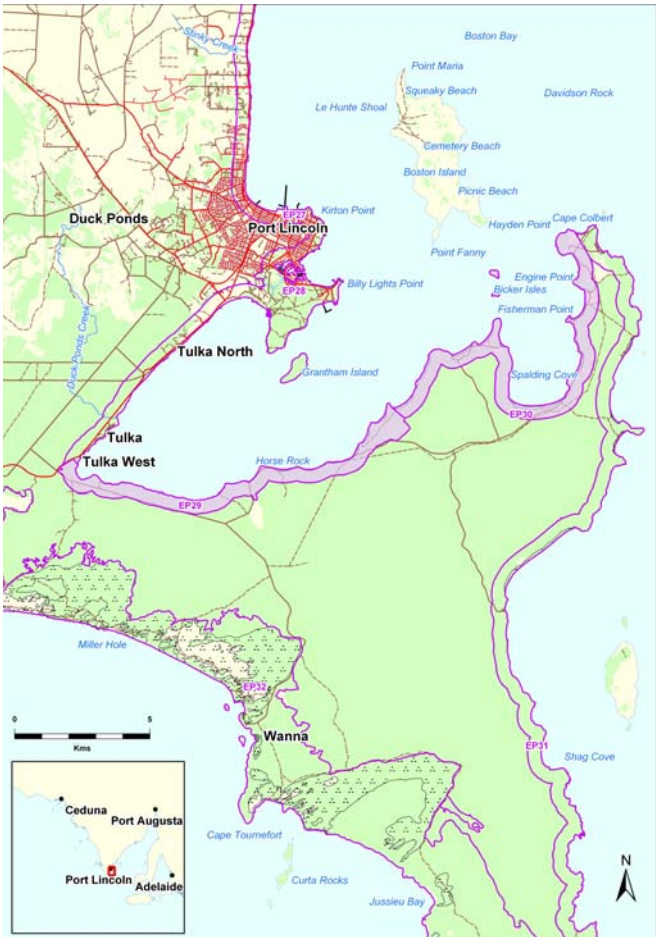
R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

Species	Common Name	Aus status	SA status	Record
Crinia signifera	Common Froglet			x
Neobatrachus pictus	Burrowing frog			x

Cells EP29 Cutting Grass Flat & EP30 Spalding Cove/ Cape Colbert

Combined cell area 1,729 ha. Combined shoreline length 39.38 km.



Landforms

These cells comprise the northern shore of Lincoln National Park, facing on to the low energy waters of Proper Bay. At the head of the bay there is a small salt marsh area, with numerous low shelly sand ridges. The Proper Bay shore comprises low calcarenite cliffs and narrow coarse sand beaches, fronted by low tide ridged sand flats; these become wider in open embayments east of Horse Rock. The body of the cell is a well vegetated, low, undulating plateau of Pleistocene calcarenite over basement rocks: most of these two cells is underlain by the basement granitic and metamorphic rocks, and a bedrock shore platform is exposed at Cape Colbert and Surfleet Point.

Benthic Habitat

Proper Bay is almost entirely dense seagrass.

Biota

These cells contain 17 flora and 2 fauna BDBSA survey sites, as well as 82 herbarium flora record sites and 48 opportune fauna sites. Almost the whole cell is *Eucalyptus diversifolia ssp. diversifolia* mid-mallee woodland over +/- *Melaleuca lanceolata* +/- *Melaleuca uncinata.* Cape Colbert has areas of *Alyxia buxifolia* shrubland.
Although much of this area has been under some form of protection for 60 years, in earlier times there had been grazing by sheep and horses, as well as small areas of clearance, as for example at Surfleet Point.

Land Use/ Land Ownership

The whole of these two cells are within Lincoln NP.

Uses (Field visits and local reports)

Conservation
Recreation and tourism: camping, fishing boating, walking, nature observation, sight seeing, ORV use, diving
Boat launching from beach
Professional fishing

FIGURE 6.12 Proper Bay, Lincoln National Park, Surfleet Point (left), Spalding Bay, Cape Colbert peninsula (rear). Photo: Coast Protection Board, 2007

Values (Field visits and local reports)

Breeding pairs of both the state vulnerable Hooded Plover and the state rare Australian Pied Oystercatcher and critically endangered (West Region) Bush Stone-curlew (Cooper 2003, roadkill collected, Birds Australia Bird Atlas, Shorebirds 2020 Population Monitoring Program, National Hooded Plover Biennial Counts, Jane Cooper regional coordinator EP Shorebirds 2020 program).

Threats (Field visits and local reports)

Marine debris
Proximity to aquaculture
Uncontrolled camping
Uncontrolled ORV usage
Collection of fire wood
Boat launching (public safety, hydrocarbon spills)
Illegal entry of dogs in NP
Feral plant and animal
Wild fire
Opportunistic ORV beach access between the Head of Proper Bay and Spalding Cove

Opportunities (Field visits and local reports)

Ongoing implementation of Lincoln NP Management Plan 2004.

Conservation Analysis (GIS)

These cells have high summed conservation priority: 123.27 and 147.61. There are only small parts, including the head of Proper Bay, of these combined cells which are not above average in

total conservation priority, and the highest values are found around the shores of Spalding Cove. The high total priority scores for these two cells are at least in part due to some scores accruing in almost all categories.
The entire area has very high values for vegetation patch metrics and butterfly habitat; high values for rarity of plant species and vegetation assemblage endemism, habitat for the Eastern Osprey and the White-bellied Sea-Eagle, and also registered indigenous heritage sites. Moderate to high values for habitat for bird species and habitat for threatened bird species shows a patchy distribution through the area. There are nine mammal, 16 reptile and 93 bird species recorded within these cells, including the state endangered Southern Emu-wren (EP ssp), Fairy Tern, and the White-bellied Sea-Eagle; also the state vulnerable Hooded Plover and Heath Goanna. Moderately high priority as habitat for threatened reptile species and all reptile species is widely distributed through the cells.
A significant geological feature (Lower Eyre Peninsula 10C), recording the outcrop of the basement Donington Suite rocks, is found along the shore of Spalding Cove and at Cape Colbert.

Threat Analysis (GIS)

Both cells have low threat totals, 29.46 and 34.89. The map of combined detailed threat scores shows some accumulation of scores at Cape Colbert, but low totals elsewhere.
The national parks status of the land renders the various development, ownership, and land use variables low in total. Viewshed, vegetation patch degradation (proportion of exotic plants), ORV tracks, camping and day use areas and the distribution of invasive weeds constitute the main threats for this part of the coast. High weed threats (including Polygala and Bridal Creeper), are concentrated between Horse Rock and the head of Proper Bay, with moderate values around the shore of Spalding Cove. The Cape Colbert area shows cleared areas, allowing the introduction of weeds (Iceplant, Boxthorn, Bridal Creeper), and multiple tracks.

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Loss of small pocket beaches fronting low calcarenite cliffs. Erosion of beach within Spalding Bay	Monitor change using high resolution aerial photograph time series. Establish DENR profile to monitor dune, beach and nearshore within Spalding Bay.	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
2070: +c.80cm.	Salt marsh at the WSW and end of Proper Bay threatened by tidal inundation, leading to habitat change.	Monitor species change in floodable areas.	
	Further shoreline adjustment in Proper Bay as pocket beaches are lost; beach and dune of Spalding Bay eroded; dune recession	Monitor change as shown by aerial photographic record, (Proper Bay), and DENR profiles (Spalding Cove).	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Storm tide flooding above highest known tides.	Monitor species change in floodable areas.	
Intensity of large storms increases.	Tidal flooding potentially extensive at head of Proper Bay	Monitor species change in floodable areas.	
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere. There will be an increased risk for species that are already vulnerable. Invasive species are likely to become more dominant.		Maintain connectivity of remnant vegetation blocks.
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage, with invasion of grass species.	Active dune management, including weed control	Ensure dunes are included in regional fire plan
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	There is a potential local impact on water tables, including any perched water tables within the dunes, and vegetation survival	Adaptive management of plant assets	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains sediment movement Local movement of large quantities of sand in the nearshore zone may be accelerated as sea levels rise.	Monitor beaches, see above.	

TABLE 6.12 Recommended Actions and Priority for EP29 Cutting Grass Flat & EP30 Spalding Cove/ Cape Colbert

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cells – EP29 & EP30	The NP has high conservation values	Ongoing implementation of the Management Plan to protect threatened species and minimise impacts and threats to flora and fauna.	High (cons)	DENR
	Climate change and sea level rise is having multiple effects within the cell	Ensure the establishment and maintenance of a time series of aerial photographs at an appropriate high resolution. Establish new DENR profile within Spalding Cove (see above), to accurately track beach and dune recession	Medium (cons)	DENR, EP NRM, DC of Lower Eyre Peninsula, private land owners, community
	Numerous formal and informal camping areas occur throughout the cells, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Continue to manage and maintain formal camping areas to minimise impacts eg. barriers/ fencing to prevent spread and informal tracks, signage, provision of appropriate amenities, weed management, maintenance of facilities/ infrastructure. Monitor impacts of informal camping. Review locations and impact. Close, rehabilitate, sign and maintain areas inappropriate for camping. Formalise, manage & maintain areas where camping and car parks are permitted.	Medium (cons/ threat)	DENR

Component	Issue	Proposed Action	Priority of Action	Key Players
	Significant shorebird breeding and feeding habitat, with potential disturbance from people, vehicles, pest animals, etc	Develop and implement site management and monitoring strategies to protect these valuable, eg. interpretive signage, fencing off nests, use of chick shelters, temporary signage in breeding territories, restricting vehicles on beaches during breeding/migratory season. Review beach boat launching locations with a view to rationalise. Undertake and/or support ongoing shorebird monitoring programs. Community education and awareness programs, eg. "chicks on beach".	High (cons/ threat)	DENR, EP NRM, community groups, Birds Australia
	Unrestricted access and multiple vehicle tracks around the coast impacting on the coastal dune and cliff top vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	Medium (cons/ threat)	DENR
	Marine debris with potential impact on native fauna species	Investigate opportunities for, and/or support, ongoing marine debris cleanup programs. Monitor to determine amount and likely sources of debris. Undertake education program targeting fishers, campers, aquaculture operators	Medium (threat)	PIRSA, EP NRM, DENR, aquaculture operators, community
Surfleet Point to Cape Donington	Significant geological feature present– GSA reference E31 and E2.2 (see section 3.4.1)	Interpretive signage	Low (threat)	GSA SA branch, DENR

Component	Issue	Proposed Action	Priority of Action	Key Players
EP30 whole cell	Non-indigenous heritage sites listed – Cottege, near Cape Colbert, Stone Tank and Ruin, Surfleet Cove - with potential impact from recreational activities	Ensure sites managed to protect from damage. Install interpretive educational signage where appropriate.	Medium (cons/ threat)	DENR, community
	Potential impact on breeding habitat of the endangered White-bellied Sea-Eagle, particularly during the breeding season.	Develop site management and monitoring strategy, including consideration to closure, relocation or seasonal closures of roads/walking tracks/car parks in the near vicinity. Ensure park management works/programs are not undertaken near breeding site during the breeding season. Community education.	High (cons/ threat)	DENR, EP NRM, community
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, community groups, EP NRM
	Introduced animals – rabbits identified near Engine Point and west of Surfleet Point; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg. rabbits foxes, cats. Undertake control program as required.	Medium (threat)	DENR
All dunes	Stress through climate change: including sea level rise, storm tides and increasing aridity, leading to foredune recession and whole dune recession, also increased opportunity for invasion by grassy weeds.	Increase dune management effort to slow recession of dune landforms. Maintain monitoring record of change to this unstable habitat.	High (cons/ threat)	DENR, EP NRM, community groups
Cape Dennington, Spalding Cove and western half of EP29	Invasive weeds recorded (ice plant, bridal creeper, boxthorn) in an area of high conservation value.	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required).	Medium (cons/ threat)	DENR, EP NRM, community groups

BIOTA – EP29 & EP30 combined

Flora

Remnant vegetation area (ha)	1599.03 ha, 92.48% of cell area
# flora surveys / records	17 surveys, 82 herbarium record sites
# flora in cell	195
# conservation rated flora in cell	6
# non-indigenous flora in cell	49
Significant CDCS floristic community	EP30 – *Melaleuca halmaturorum* shrubland – <20 (8) sites recorded along SA coast, 50% of these in EP EP30 – *Melaleuca lanceolata* / *Tetragonia implexicoma* shrubland – 72% of SA records in EP
Protected area	100% of remnant vegetation protected within Lincoln NP

Weeds

Species	Common Name	Status	Study rating
Acacia saline	Golden Wreath Wattle	RA	5
Dipogon lignosus	Lavatory Creeper	RA	4
Euphorbia paralias	Sea Spurge	RA	5
Mesembryanthemum crystallinum	Common Iceplant	RA	4
Polygala myrtifolia	Myrtle-leaf Milkwort	RA	9
Asparagus asparagoides (NC)	Bridal Creeper	D, RA	9
Lycium ferocissimum	African Boxthorn	D, RA	8
Marrubium vulgare	Horehound	D, RA	5
Oxalis pes-caprae	Soursob	D, RA	5
Asphodelus fistulosus	Onion Weed	D	3
Carduus tenuiflorus	Slender Thistle	D	2
Echium plantagineum	Salvation Jane	D	2
Aira cupaniana	Small Hair-grass		0
Anagallis arvensis	Pimpernel		2
Arctotheca calendula	Cape Weed		1
Avellinia michelii	Avellinia		0
Avena barbata	Bearded Oat		2
Bartsia trixago	Bellardia		0
Bromus rubens	Red Brome		2
Bupleurum semicompositum	Hare's Ear		0
Cakile maritima ssp. maritima	Two-horned Sea Rocket		1
Catapodium rigidum	Rigid Fescue		1
Centaurium erythraea	Common Centaury		1
Centaurium tenuiflorum	Branched Centaury		1
Cerastium glomeratum	Common Mouse-ear Chickweed		1
Chenopodium glaucum	Glaucous Goosefoot		0
Erodium botrys	Long Heron's-bill		0
Erodium cicutarium	Cut-leaf Heron's-bill		0
Galium murale	Small Bedstraw		0
Hypericum perforatum	St John's Wort		0
Lagurus ovatus	Hare's Tail Grass		2
Medicago sp.	Medic		1
Melilotus indicus	King Island Melilot		1
Mesembryanthemum nodiflorum	Slender Iceplant		2
Minuartia mediterranea	Slender Sandwort		0
Parentucellia latifolia	Red Bartsia		0

Species	Common Name	Status	Study rating
Physalis peruviana	Cape Gooseberry		0
Reseda luteola	Wild Mignonette		0
Rostraria cristata	Annual Cat's-tail		2
Scabiosa atropurpurea	Pincushion		3
Senecio pterophorus	African Daisy		2
Sherardia arvensis	Field Madder		0
Solanum nigrum	Black Nightshade		2
Sonchus oleraceus (NC)	Common Sow-thistle		0
Stellaria media	Chickweed		0
Trifolium campestre	Hop Clover		2
Vinca major	Blue Periwinkle		1
Vulpia myuros f.	Fescue		2
Vulpia myuros f. myuros	Rat's-tail Fescue		2

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Prasophyllum calcicola	Limestone Leek-orchid		V
Acacia alcockii	Alcock's Wattle		R
Eucalyptus conglobata ssp. conglobata	Port Lincoln Mallee		R*
Phyllanthus calycinus	Snowdrop Spurge		R
Tecticornia lepidosperma			R
Xanthorrhoea semiplana ssp. tateana	Tate's Grass-tree		R
Acacia anceps			
Acacia brachybotrya	Grey Mulga-bush		
Acacia calamifolia (NC)	Wallowa		
Acacia cupularis	Cup Wattle		
Acacia nematophylla	Coast Wallowa		
Acacia paradoxa	Kangaroo Thorn		
Acacia rupicola	Rock Wattle		
Acaena echinata	Sheep's Burr		
Acrotriche cordata	Blunt-leaf Ground-berry		
Acrotriche patula	Prickly Ground-berry		
Alyogyne huegelii	Native Hibiscus		
Alyxia buxifolia	Sea Box		
Amyema melaleucae	Tea-tree Mistletoe		
Apalochlamys spectabilis	Showy Firebush		
Apium prostratum var.	Native Celery		
Apium prostratum var. prostratum	Native Celery		
Asteridea athrixioides f. athrixioides	Wirewort		
Atriplex cinerea	Coast Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrostipa elegantissima	Feather Spear-grass		
Austrostipa eremophila	Rusty Spear-grass		
Austrostipa exilis	Heath Spear-grass		
Austrostipa flavescens	Coast Spear-grass		
Austrostipa semibarbata	Fibrous Spear-grass		
Austrostipa stipoides	Coast Spear-grass		
Beyeria lechenaultii	Pale Turpentine Bush		
Billardiera versicolor	Yellow-flower Apple-berry		

Species	Common Name	Aus status	SA status
Bulbine semibarbata	Small Leek-lily		
Caladenia capillata	Wispy Spider-orchid		
Calandrinia calyptrata	Pink Purslane		
Calandrinia eremaea	Dryland Purslane		
Callitris canescens	Scrubby Cypress Pine		
Calytrix tetragona	Common Fringe-myrtle		
Carpobrotus rossii	Native Pigface		
Carpobrotus rossii (NC)	Native Pigface		
Cassytha melantha	Coarse Dodder-laurel		
Cassytha peninsularis	Peninsula Dodder-laurel		
Cheiranthera alternifolia	Hand-flower		
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Comesperma volubile	Love Creeper		
Convolvulus remotus	Grassy Bindweed		
Correa backhouseana var. coriacea	Thick-leaf Correa		
Correa pulchella	Salmon Correa		
Crassula colligata ssp. lamprosperma			
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Daucus glochidiatus	Native Carrot		
Dianella brevicaulis	Short-stem Flax-lily		
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Dodonaea humilis	Dwarf Hop-bush		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eucalyptus albopurpurea	Purple-flowered Mallee Box		
Eucalyptus diversifolia (NC)	Coastal White Mallee		
Eucalyptus diversifolia ssp. diversifolia	Coastal White Mallee		
Eucalyptus gracilis	Yorrell		
Eucalyptus oleosa (NC)	Red Mallee		
Eucalyptus oleosa ssp. ampliata	Red Mallee		
Eucalyptus rugosa	Coastal White Mallee		
Eutaxia sp.	Eutaxia		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos sparteus	Slender Cherry		
Frankenia pauciflora var.	Southern Sea-heath		
Gahnia deusta	Limestone Saw-sedge		
Gahnia filum	Thatching Grass		
Galium migrans (NC)	Loose Bedstraw		
Geijera linearifolia	Sheep Bush		
Gnaphalium indutum ssp. indutum	Tiny Cudweed		
Goodenia blackiana	Native Primrose		
Grevillea pauciflora ssp. pauciflora	Few-flower Grevillea		
Haloragis acutangula f. inflata	Smooth Raspwort		
Haloragis acutangula f. tetraglebosa	Smooth Raspwort		
Haloragis acutangula f. turbinata	Smooth Raspwort		
Hardenbergia violacea	Native Lilac		
Hibbertia platyphylla ssp. platyphylla			
Hibbertia riparia (NC)	Guinea-flower		
Ixodia achillaeoides ssp. achillaeoides	Coast Ixodia		
Ixodia achillaeoides ssp. alata	Hills Daisy		
Juncus kraussii	Sea Rush		
Lasiopetalum baueri	Slender Velvet-bush		
Lasiopetalum discolor	Coast Velvet-bush		

Species	Common Name	Aus status	SA status
Lawrencia squamata	Thorny Lawrencia		
Lepidosperma congestum (NC)	Clustered Sword-sedge		
Leucopogon parviflorus	Coast Beard-heath		
Lichen sp.			
Linum marginale	Native Flax		
Logania ovata	Oval-leaf Logania		
Malva preissiana	Australian Hollyhock		
Melaleuca decussata	Totem-poles		
Melaleuca halmaturorum	Swamp Paper-bark		
Melaleuca lanceolata	Dryland Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Mitrasacme paradoxa (NC)	Wiry Mitrewort		
Moss sp.			
Muehlenbeckia adpressa	Climbing Lignum		
Muehlenbeckia gunnii	Coastal Climbing Lignum		
Myoporum brevipes	Warty Boobialla		
Myoporum insulare	Common Boobialla		
Myoporum viscosum	Sticky Boobialla		
Nicotiana maritima	Coast Tobacco		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Olearia minor	Heath Daisy-bush		
Parietaria cardiostegia	Mallee Smooth-nettle		
Pelargonium littorale	Native Pelargonium		
Pimelea glauca	Smooth Riceflower		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pittosporum angustifolium	Native Apricot		
Poa labillardieri var. labillardieri	Common Tussock-grass		
Poa poiformis var. poiformis	Coast Tussock-grass		
Pomaderris obcordata	Wedge-leaf Pomaderris		
Poranthera triandra	Three-petal Poranthera		
Pterostylis dolichochila	Mallee Shell-orchid		
Pterostylis sanguinea	Blood Greenhood		
Ranunculus sessiliflorus var. sessiliflorus	Annual Buttercup		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia crassifolia	Fleshy Saltbush		
Samolus repens	Creeping Brookweed		
Sarcocornia quinqueflora	Beaded Samphire		
Sclerolaena diacantha	Grey Bindyi		
Sebaea ovata	Yellow Sebaea		
Senecio glossanthus	Annual Groundsel		
Senecio glossanthus (NC)	Annual Groundsel		
Solanum capsiciforme	Capsicum Kangaroo-apple		
Solanum symonii	Symon's Kangaroo-apple		
Sonchus hydrophilus	Native Sow-thistle		
Suaeda australis	Austral Seablite		
Tecticornia halocnemoides ssp. halocnemoides	Grey Samphire		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Thelymitra nuda	Scented Sun-orchid		
Threlkeldia diffusa	Coast Bonefruit		
Thysanotus patersonii	Twining Fringe-lily		
Trachymene pilosa	Dwarf Trachymene		

Species	Common Name	Aus status	SA status
Vittadinia australasica var. australasica	Sticky New Holland Daisy		
Vittadinia megacephala	Giant New Holland Daisy		
Zygophyllum angustifolium	Scrambling Twinleaf		
Zygophyllum apiculatum	Pointed Twinleaf		
Zygophyllum billardierei	Coast Twinleaf		
Zygophyllum billardierei (NC)	Coast Twinleaf		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	118 recorded – 93 birds, 0 butterflies, 9 mammals, 16 reptiles, 0 amphibians (an additional 13 reptiles and 25 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	2 surveys, 48 opportune sites
# of threatened fauna in cell	17
# of non-indigenous fauna	6 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Sturnus vulgaris	Common Starling	Aves	x
Turdus merula	Common Blackbird	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p
Felis catus	Cat (Feral Cat)	Mammalia	x
Mus musculus	House Mouse	Mammalia	x
Oryctolagus cuniculus	Rabbit (European Rabbit)	Mammalia	x
Vulpes vulpes	Fox (Red Fox)	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Pandion cristatus	Eastern Osprey	M	E
Psophodes nigrogularis leucogaster	Western Whipbird (Eastern subspecies)	V	E
Sternula nereis	Fairy Tern		E
Stipiturus malachurus parimeda	Southern Emu-wren (Eyre Peninsula ssp)	V	E
Thinornis rubricollis	Hooded Plover		V
Arenaria interpres	Ruddy Turnstone	M	R
Burhinus grallarius	Bush Stone-curlew		R
Cereopsis novaehollandiae	Cape Barren Goose		R
Falco peregrinus	Peregrine Falcon		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Neophema petrophila	Rock Parrot		R
Turnix varius	Painted Button-quail		R
Acanthiza apicalis	Inland Thornbill		
Acanthiza chrysorrhoa	Yellow-rumped Thornbill		
Acanthiza iredalei	Slender-billed Thornbill		

Species	Common Name	Aus status	SA status
Accipiter cirrocephalus	Collared Sparrowhawk		
Accipiter fasciatus	Brown Goshawk		
Aegotheles cristatus	Australian Owlet-nightjar		
Anas castanea	Chestnut Teal		
Anas gracilis	Grey Teal		
Anthochaera carunculata	Red Wattlebird		
Artamus cyanopterus	Dusky Woodswallow		
Barnardius zonarius	Australian Ringneck, (Ring-necked Parrot)		
Barnardius zonarius zonarius	Port Lincoln Parrot (Australian ringneck sub sp.)		
Cacomantis flabelliformis	Fan-tailed Cuckoo		
Calamanthus campestris	Rufous Fieldwren		
Calidris ferruginea	Curlew Sandpiper	M	
Calidris ruficollis	Red-necked Stint	M	
Chalcites basalis	Horsfield's Bronze-cuckoo		
Chalcites lucidus	Shining Bronze-Cuckoo		
Chalcites osculans	Black-eared Cuckoo		
Charadrius ruficapillus	Red-capped Plover		
Chroicocephalus novaehollandiae	Silver Gull		
Circus approximans	Swamp Harrier		
Circus assimilis	Spotted Harrier		
Colluricincla harmonica	Grey Shrike-thrush		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Corvus coronoides	Australian Raven		
Corvus mellori	Little Raven		
Cracticus tibicen	Australian Magpie		
Cygnus atratus	Black Swan		
Dromaius novaehollandiae	Emu		
Drymodes brunneopygia	Southern Scrub-robin		
Egretta novaehollandiae	White-faced Heron		
Eolophus roseicapillus	Galah		
Eopsaltria griseogularis	Western Yellow Robin		
Eurostopodus argus	Spotted Nightjar		
Falco cenchroides	Nankeen Kestrel		
Glossopsitta porphyrocephala	Purple-crowned Lorikeet		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Larus pacificus	Pacific Gull		
Lichenostomus cratitius	Purple-gaped Honeyeater		ssp
Lichenostomus virescens	Singing Honeyeater		
Malurus cyaneus	Superb Fairy-wren		
Malurus pulcherrimus	Blue-breasted Fairy-wren		
Manorina flavigula	Yellow-throated Miner		
Megalurus gramineus	Little Grassbird		
Melithreptus brevirostris	Brown-headed Honeyeater		
Microcarbo melanoleucos	Little Pied Cormorant		
Morus serrator	Australasian Gannet		
Ninox novaeseelandiae	Southern Boobook		
Pardalotus punctatus	Spotted Pardalote		
Pardalotus striatus	Striated Pardalote		
Pelecanus conspicillatus	Australian Pelican		
Petrochelidon nigricans	Tree Martin		
Phalacrocorax carbo	Great Cormorant		

Species	Common Name	Aus status	SA status
Phalacrocorax fuscescens	Black-faced Cormorant		
Phalacrocorax sulcirostris	Little Black Cormorant		
Phalacrocorax varius	Pied Cormorant		
Phaps chalcoptera	Common Bronzewing		
Phaps elegans	Brush Bronzewing		
Phylidonyris novaehollandiae	New Holland Honeyeater		
Pluvialis squatarola	Grey Plover	M	
Poliocephalus poliocephalus	Hoary-headed Grebe		
Pomatostomus superciliosus	White-browed Babbler		
Psophodes nigrogularis	Western Whipbird	ssp	ssp
Rhipidura albiscapa	Grey Fantail		
Sericornis frontalis	White-browed Scrubwren		
Smicrornis brevirostris	Weebill		
Stipiturus malachurus	Southern Emu-wren	ssp	ssp
Strepera versicolor	Grey Currawong		ssp
Tadorna tadornoides	Australian Shelduck		
Thalasseus bergii	Crested Tern		
Tribonyx ventralis	Black-tailed Native-hen		
Tringa nebularia	Common Greenshank	M	
Tyto javanica	Eastern Barn Owl		
Vanellus miles	Masked Lapwing		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom

x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Cercartetus concinnus	Western Pygmy-possum		
Chalinolobus morio	Chocolate Wattled Bat		
Macropus fuliginosus	Western Grey Kangaroo		
Nyctophilus geoffroyi	Lesser Long-eared Bat		
Rattus fuscipes	Bush Rat		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Varanus rosenbergi	Heath Goanna		V	x
Bassiana trilineata	Western Three-lined Skink		R	x
Morelia spilota	Carpet Python		R	x
Pseudemoia baudini	Bight Coast Skink		R	c
Amphibolurus norrisi	Mallee Tree-dragon			e
Aprasia striolata	Lined Worm-lizard			c
Christinus marmoratus	Marbled Gecko			x
Ctenophorus fionni	Peninsula Dragon			x
Ctenophorus pictus	Painted Dragon			c
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			x
Delma butleri	Spinifex Snake-lizard			x
Diplodactylus calcicolus	South Coast Gecko			x
Drysdalia mastersii	Master's Snake			c
Egernia stokesii	Gidgee Skink			x
Gehyra variegata	Tree Dtella			e
Hemiergis peronii	Four-toed Earless Skink			x
Lampropholis delicata	Delicate Skink			c
Lerista bougainvillii	Bougainville's Skink			c
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			x
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			e
Nephrurus milii	Barking Gecko			x
Notechis scutatus	Eastern Tiger Snake	ssp		x
Pogona barbata	Eastern Bearded Dragon			x
Pseudonaja inframacula	Peninsula Brown Snake			x
Tympanocryptis lineata	Five-lined Earless Dragon			x

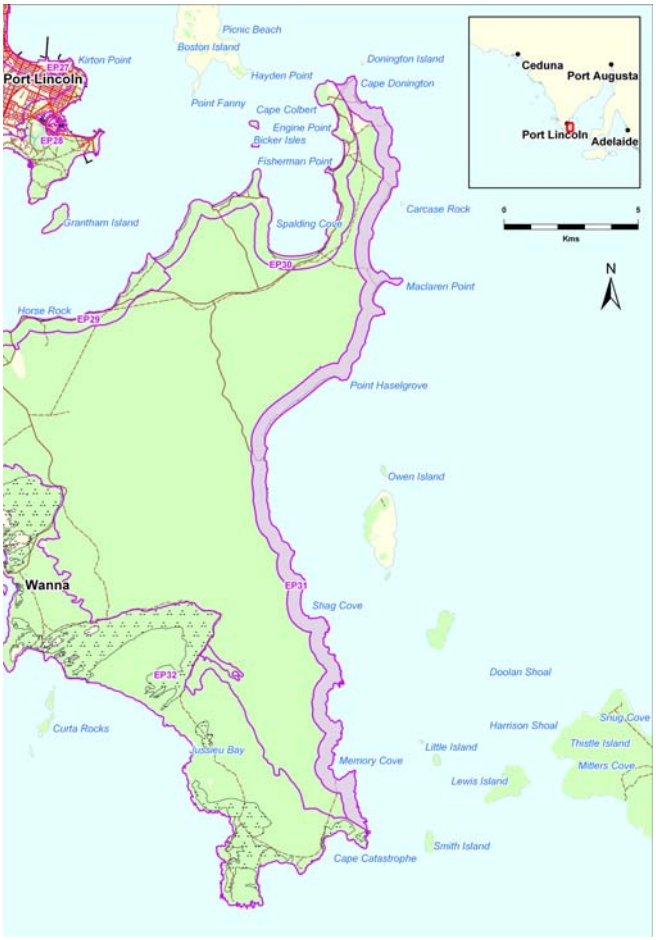
R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP31 Cape Colbert to Cape Catastrophe

Cell area is 1,802 ha. Shoreline length 43.87 km.



Landforms

The Protorozoic basement - the metamorphic Donington Complex - outcrops along 58% of the shoreline, in low irregular cliffs, boulder beaches and platforms; much of the rest of the cell is medium to low energy coarse sand beach (c.29%), the largest being the beach and narrow Holocene dune north of Taylors Landing campsite to Point Haselgrove. Wave energy is low, with many sheltering islands offshore. The basement rocks are granitic in character, forming sloping inter-tidal platforms. Elsewhere the basement is largely overlain by Pleistocene calcarenite, which forms irregular undulating hills and coastal slopes. The narrow white sand Holocene dunes immediately south of Maclaren Point act as a barrier trapping a swampy area of sedge and swamp paperbark.

Biota

1,723 ha of remnant vegetation: 96% of the cell. Eucalyptus mallee forest and woodland: *Eucalyptus diversifolia ssp. diversifolia* mid mallee woodland over +/-*Melaleuca lanceolata*, +/-*Melaleuca uncinata* tall shrubs over *Acrotriche patula*, +/-*Lasiopetalum discolor* low shrubs. From Memory Cove to Cape Catastrophe the clifftops are in shrubland: *Alyxia buxifolia, Beyeria lechenaultii, Lasiopetalum discolor, Geijera linearifolia* low shrubland over *Acrotriche patula, Carpobrotus rossii*. The small wetland south of Maclaren Point is a shrub and sedgeland with *Melaleuca halmaturorum* tall shrubland over *Gahnia filum* sedges over *Comesperma volubile, Samolus repens.*
There are 11 flora and 1 fauna BDBSA survey sites in this cell, there are also 46 herbarium flora record sites and 42 opportune fauna sites.
Although much of this area has been under some form of protection for 60 years, in earlier times there had been grazing by sheep and horses, as well as small areas of clearance, as for example at Cape Donington.

Benthic Habitat

Mapping shows extensive limestone and some granite reefs along this coast; shoreline mapping reports inshore sands and sea grass. South of Memory Cove extensive sand areas are mapped.

Land Use/ Land Ownership

The cell is entirely protected by Lincoln NP and Memory Cove Wilderness Protection Area. Thorny Passage Marine Park is offshore of southern portion of cell.

FIGURE 6.13 Taylors Landing, campsite; boundary of Lincoln NP and Memory Cove Wilderness Area. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

Conservation
Recreation and tourism: camping, fishing boating, walking, nature observation, sight seeing, ORV use, diving
Boat launching from beach

Threats (Field visits and local reports)

Uncontrolled ORV usage
Uncontrolled camping
Collection of fire wood
Boat launching (public safety, hydrocarbon spills)
Illegal entry of dogs in NP
Feral plants and animal
Wild fire

Opportunities (Field visits and local reports)

Ongoing implementation of Lincoln National Park Management Plan 2004 and Memory Cove Wilderness Protection Area Management Plan, 2005.

Conservation Analysis (GIS)

The total of summary means is high for the region, 130.16: 14th in rank by value. The spread of values is almost even throughout the cell: medium to medium-high detailed total values are found across the area, with only small isolated locations having low totals; equally, few spots showed very high totals.

High to medium high conservation scores are recorded for vegetation communities for rarity in SA; endemic habitat; numbers of threatened species; bird habitat; habitat for threatened reptiles and all reptile species; habitat for mammals; the White-bellied Sea-Eagle (focal species); very high values for butterfly habitat is found throughout the cell; high scores accumulate for vegetation metrics – size, shape and connectivity. Cliffs and platforms in Donington Suite rocks (Donington Suite, Tournefort Metadolerite, Memory Cove Charnockite, Hutchison Group, Flinders Group) are listed as a significant geological feature.
Ten mammal, 12 reptile and 72 bird species have been recorded in this cell including: the state endangered Southern Emu-wren (EP ssp), Eastern Osprey and White-bellied Sea-Eagle; as well as the state vulnerable Hooded Plover and Heath Goanna.

Threat Analysis (GIS)

Total of threat summary layers is low for the region, 27.43. There are some threat values for viewshed and scenic amenity, some moderate totals for proportion of exotic species and the distribution of invasive weeds; but little else. Possible threats, such as ORV, have low totals; although some areas of impact are notable, as at Cape Donington.

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	**Impacts and implications (for this cell)**	**Protect and manage habitat threats**	**Address landscape issues: fire, connectivity, refuges, hydrology**
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, dune and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Beach recession and dune instability	Active management of dunes.	
2070: +c.80cm.	Further sea level rise leads to beach and foredune erosion and dune migration landward. Pocket beaches lost	Monitor dune movement (air photo time series). Slow dune changes through active management.	
Storms: *Frequency* continues to show great variation on a decadal scale.	Storm tide flooding above highest known tides.		
Intensity of large storms increases.	(as sea level rise)		

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere. There will be an increased risk for species that are already vulnerable. Invasive species are likely to become more dominant.		Maintain connectivity of vegetation
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage, with invasion of grass species.	Active dune management, including weed control	Ensure dunes are included in regional fire plan
'Flashy' run off: Drier creeks, but larger rare floods	N/A.		
Groundwater lowering; saline incursion:	There is a potential local impact on water tables, including any perched water tables within the dunes, and vegetation survival. (Potentially significant for this cell)	Monitoring of water table levels. Adaptive management of plant assets	
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains sediment movement towards the north along the coast. Local movement of large quantities of sand in the nearshore zone may be accelerated as sea levels rise. Changes in the refracted pattern of swell and the wave climate have the potential to modify the plan-shape of the embayment.	Monitor beaches, see above.	

TABLE 6.13 Recommended Actions and Priority for EP31 Cape Colbert to Cape Catastrophe

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	The National Park and Wilderness Protection Area have high conservation values.	Ongoing implementation of the Management Plans to protect threatened species and minimise impacts and threats to flora and fauna.	High (cons)	DENR

Component	Issue	Proposed Action	Priority of Action	Key Players
	Climate change and sea level rise is having multiple effects within the cell.	Ensure the establishment and maintenance of a time series of aerial photographs at an appropriate resolution. Seek to improve the resilience of plant and animal habitats by taking opportunities to improve connectivity between vegetation blocks.	Medium (cons)	DENR, EP NRM, community groups
	Numerous formal and informal camping areas occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Continue to manage and maintain formal camping areas to minimise impacts eg. barriers/ fencing to prevent spread and informal tracks, signage, provision of appropriate amenities, weed management, maintenance of facilities/ infrastructure. Monitor impacts of informal camping. Review locations and impact. Close, rehabilitate, sign and maintain areas inappropriate for camping. Formalise, manage & maintain areas where camping and car parks are permitted.	Medium (cons/ threat)	DENR
	Potential impact on breeding habitats of the endangered White-bellied Sea-Eagle, particularly during the breeding season.	Develop site management and monitoring strategy, including consideration to seasonal closures of roads/walking tracks in the near vicinity. Ensure park management works/programs are not undertaken near breeding sites during the breeding season. Community education.	High (cons)	DENR
	Significant geological feature present – GSA reference E31 and E2.2 (see section 3.4.1)	Interpretive signage	Low (threat)	GSA SA branch, DENR
	Water tables within calcarenite potentially significantly lowered by climate change, with impact on habitats.	Monitor water table levels	Medium (threats)	EP NRM, DENR, DFW, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Non-indigenous heritage sites listed – Cottage, near Cape Colbert, Memory Cove Tablet Site, Memory Cove Wilderness Protection Area - with potential impact from recreational activities.	Ensure sites managed to protect from damage. Install interpretive educational signage where appropriate.	Medium (cons/ threat)	DENR, community
All dunes	Stress through climate change: including sea level rise, storm tides and increasing aridity, leading to foredune recession and whole dune recession, also increased opportunity for invasion by grassy weeds.	Increase dune management effort to slow recession of dune landforms. Maintain monitoring record of change to this unstable landform/ habitat.	High (cons/ threat)	DENR, EP NRM
Northern third of cell (particularly around Cape Donington)	Medium to high conservation totals are threatened by degradation from numbers of exotic plants and invasive weeds (eg. iceplant and bridal creeper).	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required).	Medium (cons/ threat)	DENR, EP NRM
	Unrestricted access, multiple vehicle tracks, beach access and informal car parks around the coast, with impacts on coastal dune, and cliff top vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species, including meiofauna, shorebirds and intertidal species.	Develop access/traffic management plan – including review of existing access with a view to rationalise unnecessary tracks, beach access and car parks. Block access (eg. fencing/rocks) to tracks and car parks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks or car parks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	Medium (cons/ threat)	DENR
	Introduced animals – rabbits identified; with impact on vegetation degradation, competition for food and habitat.	Monitor and record existence and impacts of introduced pest animals, eg. Rabbits, foxes, cats. Undertake control program as required.	Medium (cons/ threat)	DENR, EP NRM

Component	Issue	Proposed Action	Priority of Action	Key Players
	Numerous informal tracks and car parks close to cliff edge; safety hazard and impact from soil compaction, vegetation damage, weed introduction, fauna disturbance, soil stability and water runoff erosion.	Review with a view to close or reroute tracks and car parks that are too close to cliff edge.	High (hazard/ cons/ threat)	DENR

BIOTA

Flora

Remnant vegetation area (ha)	1,723.88 ha, 95.68% of cell area
# flora surveys / records	11 surveys, 46 herbarium record sites
# flora in cell	242 (note: includes some marine species)
# conservation rated flora in cell	3
# non-indigenous flora in cell	24
Significant CDCS floristic community	*Atriplex cinerea* shrublands – 20 sites recorded within SA, 60% of these in EP *Melaleuca lanceolata* / *Tetragonia implexicoma* shrubland – 72% of records in EP
Protected area	99.7% of vegetation protected within Lincoln National Park and Memory Cove Wilderness Protection Area

Weeds

Species	Common Name	Status	Study rating
Euphorbia peplus	Petty Spurge	RA	5
Asparagus asparagoides (NC)	Bridal Creeper	D, RA	9
Lycium ferocissimum	African Boxthorn	D, RA	8
Marrubium vulgare	Horehound	D, RA	5
Asphodelus fistulosus	Onion Weed	D	3
Anagallis arvensis	Pimpernel		2
Avellinia michelii	Avellinia		0
Cakile maritima ssp. maritima	Two-horned Sea Rocket		1
Catapodium rigidum	Rigid Fescue		1
Cerastium pumilum	Chickweed		0
Dittrichia graveolens	Stinkweed		1
Galium murale	Small Bedstraw		0
Geranium molle var. molle	Soft Geranium		0
Isolepis marginata	Little Club-rush		0
Lagurus ovatus	Hare's Tail Grass		2
Melilotus indicus	King Island Melilot		1
Minuartia mediterranea	Slender Sandwort		0
Parapholis incurva	Curly Ryegrass		1
Rostraria cristata	Annual Cat's-tail		2
Solanum nigrum	Black Nightshade		2

Species	Common Name	Status	Study rating
Sonchus oleraceus (NC)	Common Sow-thistle		0
Stellaria media	Chickweed		0
Urospermum picroides	False Hawkbit		0
Vulpia myuros f. megalura	Fox-tail Fescue		2

D: Declared weed, RA: Red alert weed

Native flora*

Species	Common Name	Aus status	SA status
Acacia alcockii	Alcock's Wattle		R
Anthocercis anisantha ssp. anisantha	Port Lincoln Ray-flower		R
Poa fax	Scaly Poa		R
Acacia anceps (NC)	Angled Wattle		
Acacia calamifolia (NC)	Wallowa		
Acacia pycnantha	Golden Wattle		
Acacia rupicola	Rock Wattle		
Acacia sp. Winged (C.R.Alcock 4936)	Angled Wattle		
Acacia spinescens	Spiny Wattle		
Acacia triquetra	Mallee Wreath Wattle		
Acianthus pusillus	Mosquito Orchid		
Acrocarpia paniculata			
Acrotriche cordata	Blunt-leaf Ground-berry		
Acrotriche patula	Prickly Ground-berry		
Allocasuarina muelleriana ssp. muelleriana	Common Oak-bush		
Allocasuarina sp.	Sheoak/Oak-bush		
Alyxia buxifolia	Sea Box		
Amyema melaleucae	Tea-tree Mistletoe		
Aphanes australiana (NC)	Australian Piert		
Apium annuum	Annual Celery		
Apjohnia laetevirens			
Areschougia congesta			
Atriplex cinerea	Coast Saltbush		
Austrostipa exilis	Heath Spear-grass		
Austrostipa flavescens	Coast Spear-grass		
Austrostipa stipoides	Coast Spear-grass		
Beyeria lechenaultii	Pale Turpentine Bush		
Botryocladia sonderi			
Bromus arenarius	Sand Brome		
Caladenia carnea	Pink Fingers		
Caladenia latifolia	Pink Caladenia		
Calandrinia brevipedata	Short-stalked Purslane		
Calandrinia eremaea	Dryland Purslane		
Callitris canescens	Scrubby Cypress Pine		
Calytrix tetragona	Common Fringe-myrtle		
Carpobrotus rossii (NC)	Native Pigface		
Cassytha peninsularis	Peninsula Dodder-laurel		
Caulerpa cactoides			
Caulerpa flexilis			
Caulerpa longifolia f. crispata			
Caulocystis uvifera			
Centrolepis cephaloformis ssp.	Cushion Centrolepis		
Centrolepis polygyna	Wiry Centrolepis		

Species	Common Name	Aus status	SA status
Chamaescilla corymbosa var. corymbosa	Blue Squill		
Cheiranthera alternifolia	Hand-flower		
Choretrum glomeratum var. glomeratum	White Sour-bush		
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Cliftonaea pectinata			
Codium duthieae			
Codium harveyi			
Codium muelleri			
Comesperma volubile	Love Creeper		
Correa pulchella	Salmon Correa		
Correa reflexa (NC)	Common Correa		
Corybas despectans	Coast Helmet-orchid		
Corybas sp.	Helmet-orchid		
Craspedia variabilis	Billy-buttons		
Crassula decumbens var. decumbens	Spreading Crassula		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Crassula sp.	Crassula/Stonecrop		
Cyrtostylis robusta	Robust Gnat-orchid		
Cystophora botryocystis			
Cystophora monilifera			
Cystophora moniliformis			
Cystophora siliquosa			
Cystophora subfarcinata			
Cystoseira trinodis			
Daucus glochidiatus	Native Carrot		
Delisea pulchra			
Dianella brevicaulis	Short-stem Flax-lily		
Dianella brevicaulis/revoluta var.	Black-anther Flax-lily		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Diuris orientis	Wallflower Donkey-orchid		
Dodonaea humilis	Dwarf Hop-bush		
Dodonaea viscosa ssp. spatulata	Sticky Hop-bush		
Drosera macrantha ssp. planchonii	Climbing Sundew		
Echinothamnion hystrix			
Ecklonia radiata			
Epiglossum smithiae			
Eriochilus cucullatus	Parson's Bands		
Eucalyptus albopurpurea	Purple-flowered Mallee Box		
Eucalyptus angulosa	Coast Ridge-fruited Mallee		
Eucalyptus diversifolia (NC)	Coastal White Mallee		
Eucalyptus diversifolia ssp. diversifolia	Coastal White Mallee		
Eucalyptus gracilis	Yorrell		
Eucalyptus lansdowneana ssp. (NC)			
Eucalyptus oleosa ssp. ampliata	Red Mallee		
Eucalyptus oleosa ssp. oleosa	Red Mallee		
Eucalyptus phenax (NC)	Sessile-fruit White Mallee		
Eucalyptus porosa	Mallee Box		
Eucalyptus rugosa	Coastal White Mallee		
Eutaxia microphylla	Common Eutaxia		
Eutaxia sp.	Eutaxia		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos sparteus	Slender Cherry		
Exocarpos syrticola	Coast Cherry		

Species	Common Name	Aus status	SA status
Ficinia nodosa	Knobby Club-rush		
Gahnia deusta	Limestone Saw-sedge		
Galium leptogonium	Reflexed Bedstraw		
Ganonema codii			
Geijera linearifolia	Sheep Bush		
Gelidium australe			
Geranium retrorsum	Grassland Geranium		
Gnaphalium indutum ssp. indutum	Tiny Cudweed		
Goodenia varia	Sticky Goodenia		
Goodenia willisiana	Silver Goodenia		
Grevillea pauciflora ssp. pauciflora	Few-flower Grevillea		
Griffithsia teges			
Hakea rugosa	Dwarf Hakea		
Hakea vittata	Limestone Needlebush		
Haliptilon roseum			
Halopteris funicularis			
Halopteris pseudospicata			
Haloragis aspera	Rough Raspwort		
Halymenia muelleri			
Helichrysum leucopsideum	Satin Everlasting		
Hibbertia sp.	Guinea-flower		
Hibbertia stricta var. (NC)	Stalked Guinea-flower		
Homoeostrichus sinclairii			
Hydrocotyle capillaris	Thread Pennywort		
Hypnea ramentacea			
Hypoxis glabella var. glabella	Tiny Star		
Ixodia achillaeoides ssp. achillaeoides	Coast Ixodia		
Kallymenia cribrosa			
Kennedia prostrata	Scarlet Runner		
Lasiopetalum baueri	Slender Velvet-bush		
Lasiopetalum behrii	Pink Velvet-bush		
Lasiopetalum discolor	Coast Velvet-bush		
Lasiopetalum schulzenii	Drooping Velvet-bush		
Lepidosperma congestum (NC)	Clustered Sword-sedge		
Lepidosperma gladiatum	Coast Sword-sedge		
Lepidosperma viscidum	Sticky Sword-sedge		
Leucophyta brownii	Coast Cushion Bush		
Leucopogon cordifolius	Heart-leaf Beard-heath		
Leucopogon parviflorus	Coast Beard-heath		
Liagora harveyana			
Lobelia gibbosa	Tall Lobelia		
Lobospira bicuspidata			
Logania crassifolia	Coast Logania		
Melaleuca decussata	Totem-poles		
Melaleuca gibbosa	Slender Honey-myrtle		
Melaleuca halmaturorum	Swamp Paper-bark		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Melaleuca uncinata (NC)	Broombush		
Metagoniolithon radiatum			
Metagoniolithon stelliferum			
Microseris lanceolata	Yam Daisy		
Millotia muelleri	Common Bow-flower		
Mitrasacme paradoxa (NC)	Wiry Mitrewort		

Species	Common Name	Aus status	SA status
Muehlenbeckia gunnii	Coastal Climbing Lignum		
Mychodea aciculare			
Myoporum brevipes	Warty Boobialla		
Myoporum insulare	Common Boobialla		
Myoporum viscosum	Sticky Boobialla		
Myosotis australis	Austral Forget-me-not		
Olearia axillaris	Coast Daisy-bush		
Olearia ciliata var. ciliata	Fringed Daisy-bush		
Opercularia turpis	Twiggy Stinkweed		
Opercularia varia	Variable Stinkweed		
Pachydictyon paniculatum			
Pachydictyon polycladum			
Parietaria cardiostegia	Mallee Smooth-nettle		
Pimelea glauca	Smooth Riceflower		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pittosporum angustifolium	Native Apricot		
Plantago sp. B (R.Bates 44765)	Little Plantain		
Platoma foliosum			
Pleurosorus rutifolius	Blanket Fern		
Plocamium angustum			
Plocamium mertensii			
Plocamium preissianum			
Poa poiformis var. poiformis	Coast Tussock-grass		
Podolepis rugata var. littoralis	Coast Copper-wire Daisy		
Podotheca angustifolia	Sticky Long-heads		
Pomaderris flabellaris	Fan Pomaderris		
Pomaderris obcordata	Wedge-leaf Pomaderris		
Pomaderris paniculosa ssp. paniculosa	Mallee Pomaderris		
Pomaderris paniculosa ssp. paralia	Coast Pomaderris		
Prostanthera serpyllifolia ssp. serpyllifolia	Thyme Mintbush		
Pterostylis plumosa	Bearded Greenhood		
Pultenaea acerosa	Bristly Bush-pea		
Pultenaea tenuifolia	Narrow-leaf Bush-pea		
Pultenaea vestita	Feather Bush-pea		
Ranunculus sessiliflorus var. sessiliflorus	Annual Buttercup		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhodophyllis multipartita			
Rhodymenia foliifera			
Sagina maritima	Sea Pearlwort		
Samolus repens	Creeping Brookweed		
Sarcocornia quinqueflora	Beaded Samphire		
Sargassum decipiens			
Sargassum heteromorphum			
Sargassum verruculosum			
Scaberia agardhii			
Scaevola crassifolia	Cushion Fanflower		
Scinaia tsinglanensis			
Seirococcus axillaris			
Senecio glossanthus (NC)	Annual Groundsel		
Senecio pinnatifolius (NC)	Variable Groundsel		
Senecio serratiformis ssp. serratiformis			
Siloxerus multiflorus	Small Wrinklewort		
Solanum simile	Kangaroo Apple		

Species	Common Name	Aus status	SA status
Spinifex hirsutus (NC)	Rolling Spinifex		
Sporobolus virginicus	Salt Couch		
Sporolithon durum			
Stackhousia aspericocca ssp. Cylindrical inflorescence (W.R.Barker 1418)	Bushy Candles		
Tetragonia implexicoma	Bower Spinach		
Thelymitra pauciflora (NC)	Slender Sun-orchid		
Threlkeldia diffusa	Coast Bonefruit		
Thysanotus patersonii	Twining Fringe-lily		
Trachymene pilosa	Dwarf Trachymene		
Triglochin centrocarpum (NC)	Dwarf Arrowgrass		
Veronica hillebrandii	Rigid Speedwell		
Vittadinia australasica var. subglabra	New Holland Daisy		
Westringia dampieri	Shore Westringia		
Westringia eremicola	Slender Westringia		
Wurmbea dioica ssp. brevifolia	Early Nancy		
Zygophyllum billardierei	Coast Twinleaf		

R: Rare, V: Vulnerable, E: Endangered
(note: includes some marine species)

Fauna

# of fauna in cell	93 recorded – 72 birds, 0 butterflies, 10 mammals, 12 reptiles, 0 amphibians (an additional 16 reptiles and 25 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	1 survey, 42 opportune sites
# of threatened fauna in cell	14
# of non-indigenous fauna	6 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Sturnus vulgaris	Common Starling	Aves	x
Turdus merula	Common Blackbird	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p
Felis catus	Cat (Feral Cat)	Mammalia	x
Mus musculus	House Mouse	Mammalia	x
Oryctolagus cuniculus	Rabbit (European Rabbit)	Mammalia	x
Vulpes vulpes	Fox (Red Fox)	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Pandion cristatus	Eastern Osprey	M	E
Stipiturus malachurus parimeda	Southern Emu-wren (Eyre Peninsula ssp)	V	E
Thinornis rubricollis	Hooded Plover		V
Ardenna carneipes	Flesh-footed Shearwater		R
Burhinus grallarius	Bush Stone-curlew		R

Species	Common Name	Aus status	SA status
Cereopsis novaehollandiae	Cape Barren Goose		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Neophema petrophila	Rock Parrot		R
Zosterops lateralis	Silvereye		
Vanellus miles	Masked Lapwing		
Tringa nebularia	Common Greenshank	M	
Thalasseus bergii	Crested Tern		
Strepera versicolor	Grey Currawong		ssp
Stipiturus malachurus	Southern Emu-wren	ssp	ssp
Smicrornis brevirostris	Weebill		
Sericornis frontalis	White-browed Scrubwren		
Rhipidura albiscapa	Grey Fantail		
Psophodes nigrogularis	Western Whipbird	ssp	ssp
Pomatostomus superciliosus	White-browed Babbler		
Phylidonyris novaehollandiae	New Holland Honeyeater		
Phaps elegans	Brush Bronzewing		
Phaps chalcoptera	Common Bronzewing		
Phalacrocorax varius	Pied Cormorant		
Phalacrocorax fuscescens	Black-faced Cormorant		
Petrochelidon nigricans	Tree Martin		
Petrochelidon ariel	Fairy Martin		
Pardalotus striatus	Striated Pardalote		
Pardalotus punctatus	Spotted Pardalote		
Morus serrator	Australasian Gannet		
Microcarbo melanoleucos	Little Pied Cormorant		
Melithreptus brevirostris	Brown-headed Honeyeater		
Megalurus gramineus	Little Grassbird		
Malurus pulcherrimus	Blue-breasted Fairy-wren		
Malurus cyaneus	Superb Fairy-wren		
Lichenostomus virescens	Singing Honeyeater		
Lichenostomus leucotis	White-eared Honeyeater		
Lichenostomus cratitius	Purple-gaped Honeyeater		ssp
Larus pacificus	Pacific Gull		
Hydroprogne caspia	Caspian Tern		
Hirundo neoxena	Welcome Swallow		
Glyciphila melanops	Tawny-crowned Honeyeater		
Glossopsitta porphyrocephala	Purple-crowned Lorikeet		
Falco cenchroides	Nankeen Kestrel		
Eopsaltria griseogularis	Western Yellow Robin		
Eolophus roseicapillus	Galah		
Elanus axillaris	Black-shouldered Kite		
Egretta novaehollandiae	White-faced Heron		
Drymodes brunneopygia	Southern Scrub-robin		
Dromaius novaehollandiae	Emu		
Cracticus tibicen	Australian Magpie		
Coturnix pectoralis	Stubble Quail		
Corvus mellori	Little Raven		
Corvus coronoides	Australian Raven		
Colluricincla harmonica	Grey Shrike-thrush		
Circus approximans	Swamp Harrier		
Chroicocephalus novaehollandiae	Silver Gull		
Charadrius ruficapillus	Red-capped Plover		

Species	Common Name	Aus status	SA status
Chalcites lucidus	Shining Bronze-Cuckoo		
Calidris ruficollis	Red-necked Stint	M	
Cacomantis flabelliformis	Fan-tailed Cuckoo		
Barnardius zonarius	Australian Ringneck, (Ring-necked Parrot)		
Artamus cyanopterus	Dusky Woodswallow		
Aquila audax	Wedge-tailed Eagle		
Apus pacificus	Fork-tailed Swift	M	
Anthochaera carunculata	Red Wattlebird		
Accipiter fasciatus	Brown Goshawk		
Accipiter cirrocephalus	Collared Sparrowhawk		
Acanthiza apicalis	Inland Thornbill		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Bettongia penicillata ogilbyi	Brush-tailed Bettong		R
Cercartetus concinnus	Western Pygmy-possum		
Chalinolobus morio	Chocolate Wattled Bat		
Macropus fuliginosus	Western Grey Kangaroo		

Species	Common Name	Aus status	SA status
Nyctophilus geoffroyi	Lesser Long-eared Bat		
Rattus fuscipes	Bush Rat		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Varanus rosenbergi	Heath Goanna		V	x
Bassiana trilineata	Western Three-lined Skink		R	x
Morelia spilota	Carpet Python		R	x
Pseudemoia baudini	Bight Coast Skink		R	c
Amphibolurus norrisi	Mallee Tree-dragon			x
Aprasia striolata	Lined Worm-lizard			c
Christinus marmoratus	Marbled Gecko			e
Ctenophorus fionni	Peninsula Dragon			x
Ctenophorus pictus	Painted Dragon			c
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			x
Delma butleri	Spinifex Snake-lizard			x
Diplodactylus calcicolus	South Coast Gecko			x
Drysdalia mastersii	Master's Snake			c
Egernia stokesii	Gidgee Skink			e
Gehyra variegata	Tree Dtella			e
Hemiergis peronii	Four-toed Earless Skink			x
Lampropholis delicata	Delicate Skink			c
Lerista bougainvillii	Bougainville's Skink			c
Lerista dorsalis	Southern Four-toed Slider			x
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			x
Liopholis multiscutata	Bull Skink			x
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			e
Nephrurus milii	Barking Gecko			c
Notechis scutatus	Eastern Tiger Snake	ssp		c
Tympanocryptis lineata	Five-lined Earless Dragon			c

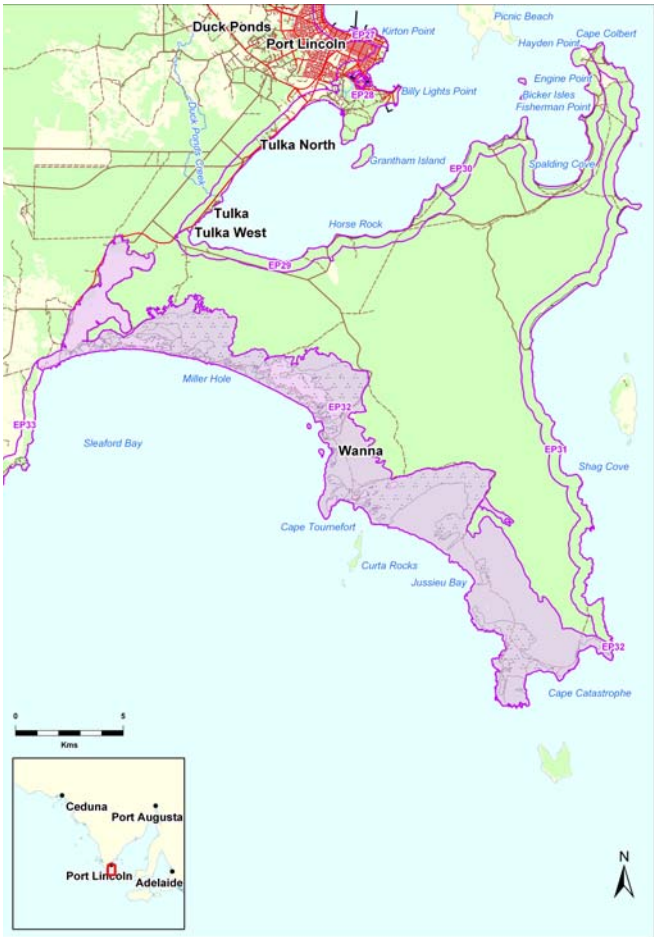
R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP32 West Point/ Sleaford Bay

Cell area is 8,389 ha. Shoreline length 55.93 km.



Landforms

This large cell includes the beaches and dunes of Sleaford Bay, as well as the headlands and cliffs of Memory Cove Wilderness Protection Area and the Jussieu Peninsula, as far as Cape Catastrophe.
In western half of the cell the slopes and shore have an open ocean aspect, and large quantities of Holocene sand have been driven ashore, and are overlying Pleistocene calcarenite; at Cape Tournefort sand is still being supplied to the dunes on the cliff by a sand ramp. Sleaford Bay has in its eastern half and western end a dissipative, fine sand, high wave energy beach, backed by a large area of stable and unstable transgressive dunes. The central section of Sleaford Bay has calcarenite cliffs and cliff-top Holocene dunes. Transgressive dunes are also found immediately east of Cape Tournefort. East of Wanna nearshore reefs and platforms increase and wave energy at the shore is much reduced. Shoreline description notes 'High calcarenite cliffs fronted by sporadic platforms and debris piles at the base, form the western end of Jussieu Bay". The calcarenite cliffs are highly indented with ravines, truncated by steep cliff erosion. The southern peninsula shoreline is in cliffs of variable height over metamorphic basement rocks - granodiorite, gneiss; here there are granite ramps with high calcarenite cliffs form West Point. Between the cliffs there are only small pocket beaches; these are low energy coarse sand reflective beaches, behind platforms and reefs.
At the north western end of the cell, Sleaford Mere is a hypersaline landlocked coastal lake (Short et al p.80) with algal tufa around the shore; higher level shoreline deposits suggest the lake level was more elevated in the past.

Biota

There is 6,978 ha of remnant vegetation, or 83.18% of the cell area. There are 27 flora and 5 fauna survey sites, 103 herbarium flora record sites, one threatened plant population record site, 63 opportunistic fauna sites and one fauna reserve database record site.
The extensive areas of vegetated dunes are in *Leucopogon parviflorus, Acacia longifolia ssp. sophorae, Olearia axillaris, +/-Myoporum insulare* tall shrubland over *Lepidosperma gladiatum, Pimelea serpyllifolia ssp. serpyllifolia, Isolepis nodosa* sedges over *Carpobrotus rossii, Clematis microphylla var. microphylla.*
The low calcarenite cliffs of central Sleaford Bay have *Melaleuca lanceolata, +/-Olearia axillaris, +/-Leucopogon parviflorus* tall open shrubland over *+/-Rhagodia candolleana ssp. candolleana, +/-Threlkeldia diffusa* low shrubs.

Parts of the Cape Tournefort headland have *Acrotriche patula* low open shrubland.

FIGURE 6.14 Cape Tournefort, Curta Rocks, looking beyond to Sleaford Bay. Photo: Coast Protection Board, 2002

Benthic Habitat

Bare sand offshore, with inshore limestone reefs south east from Wanna, and increasing in size towards the southern end of the Jussieu Peninsula.

Land Use/ Land Ownership

The south eastern portion of the cell (30%) is within the Memory Cove Wilderness Protection Area. Lincoln National Park covers the central area of the cell (61%). The north western area of the cell (7%) is within the Sleaford Mere Conservation Park, which is also a 'Wetland of National Importance'. Only 1.5% of the cell is not within the reserve system. West of Lincoln NP and Sleaford Mere CP privately owned land is fronted by a narrow (c.30-150m) coastal reserve. From the Lincoln NP boundary, to just west of the Sleaford Bay Road, the coastal reserve is unalloted Crown land, where it is then a Crown land Act reserve under the care, control and management of the District Council of Lower Eyre Peninsula to the western cell boundary.

Thorny Passage Marine Park offshore.

Uses (Field visits and local reports)

Recreation and tourism: fishing, surfing, ORV, whale watching, camping, nature observation, hiking, sight seeing
Conservation

Values (Field visits and local reports)

Stromatolites within Sleaford Mere CP

Threats (Field visits and local reports)

Feral plants and animals: particularly *Polygala myrtifolia*
Water runoff eroding coastal landforms at Lone Pine
Uncontrolled ORV usage
Wildfire
Development (privately owned land)

Opportunities (Field visits and local reports)

Ongoing implementation of Lincoln National Park Management Plan 2004, Memory Cove Wilderness Protection Area Management Plan, 2005 and the Conservation Parks of Lower Eyre Peninsula Management Plan, 2007 (which includes Sleaford Mere CP).
Friends of Southern Eyre Peninsula Parks

Conservation Analysis (GIS)

The total of means for all conservation layers is 147.98, the second highest in the region. The summarised detailed conservation layer shows large areas of very high totals on vegetated sand dunes.

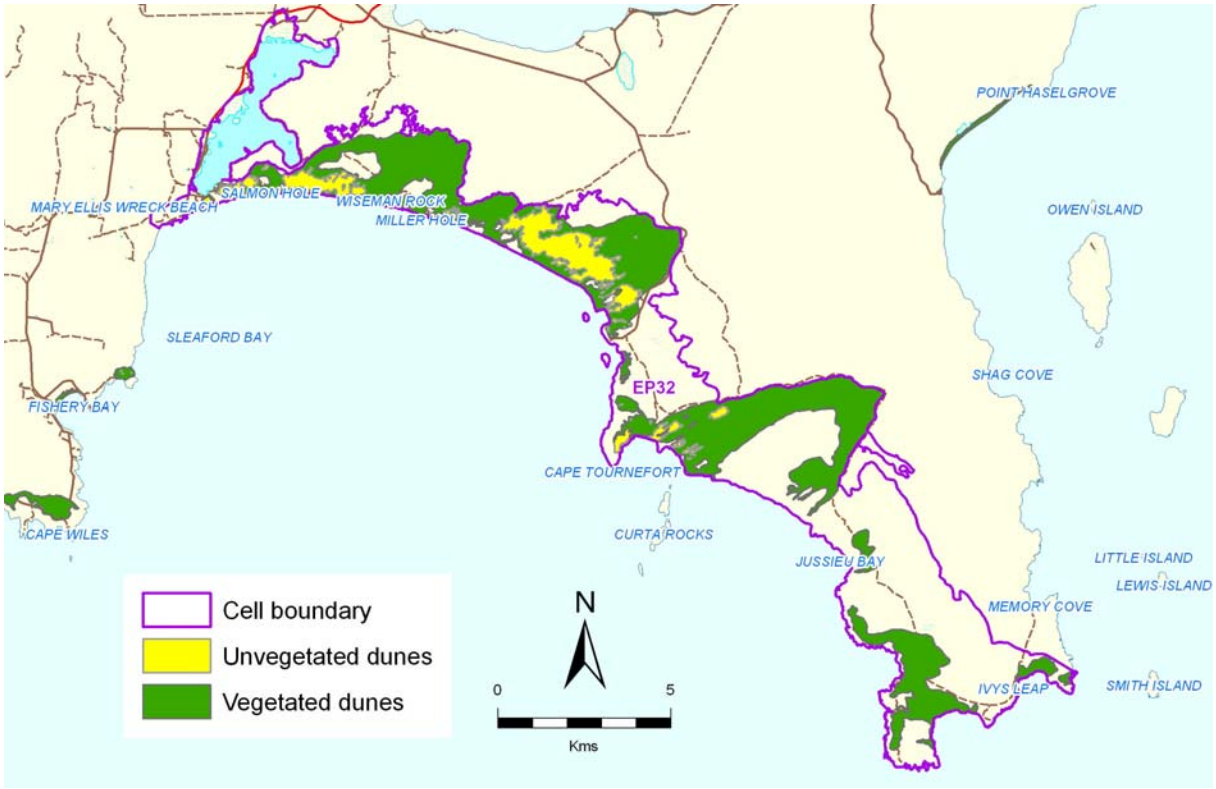


FIGURE 6.15 Vegetated and unvegetated dunes within EP32.

There are high to moderate totals over the entire remainder of the cell, with the exception of Sleaford Mere which has low to medium values. This very high total of priority values has accumulated because almost all conservation layers contribute, many with high values; only salt marsh and non-Indigenous heritage have zero totals in this cell. The endemic and threatened values within the dune vegetation make a major contribution to total scores. Several focal species have habitat and recorded sightings in the cell, including the Eastern Osprey, White-bellied Sea-Eagle and the Australian Pied Oystercatcher; butterfly habitat scores are high through the cell.

Sleaford Mere is different to the general pattern, having high scores for total number of species (mainly bird species), for flora threatened species and wetland value, but low values for almost all other layers.
Thirteen butterfly, 12 mammal, 23 reptile and 93 bird species have been recorded in this cell, including the state endangered Southern Emu-wren (EP ssp), Eastern Osprey, White-bellied Sea-Eagle and Fairy Tern; also the state vulnerable Heath Goanna, Banded Stilt, the Diamond Firetail and the Hooded Plover.

Threat Analysis (GIS)

The combined total of threat means is 29.33, a very low score for the region. The overall pattern is clear: low to very low threat totals predominate, only the de-vegetated dune areas (see above) show high to medium threat totals. The principal threats here appear to be ORV, viewscape, numbers of exotic species, the distribution of invasive weeds and dune instability; however, none of these threats are very high within this cell.
ORV impact appears strongly concentrated north of Curta Rocks; viewscape is widespread; invasive weeds are strongly concentrated in the dune area near Salmon Hole and Tinah Beach; unstable dunes are relatively widespread in this cell.

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, dune and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Marked beach recession and dune instability	Active management of dunes to reduce widespread transgression	
2070: +c.80cm	Further sea level rise leads to beach and foredune erosion and dune transgression landward, (except where shoreline recession is stopped by calcarenite outcrop).	Monitor beach and foredune change through the establishment of a profile in Sleaford Bay	
Storms: *Frequency* continues to show great variation on a decadal scale.	Storm tide flooding above highest known tides.		

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Intensity of large storms increases.			
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere. There will be an increased risk for species that are already vulnerable. Invasive species are likely to become more dominant.		Maintain connectivity of vegetation
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage, with invasion of grass species.	Active dune management, including weed control	Ensure dunes are included in regional fire plan
'Flashy' run off: Drier creeks, but larger rare floods	Potential for some localised effects, e.g. at Lone Pine	Active management based on current threats.	
Groundwater lowering; saline incursion:	There is a potential local impact on water tables, including any perched water tables within the dunes, and vegetation survival. Also potential impact on hydrological conditions of Sleaford Mere	Adaptive management of plant and evaporite assets, including water table monitoring.	
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintained. Possible changes in the refracted pattern of swell and the wave climate have the potential to modify the plan-shape of the embayments.	Monitor beaches, see above.	

TABLE 6.14 Recommended Actions and Priority for EP32 West Point/ Sleaford Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	The National Park, Wilderness Protection Area and Conservation Park have high conservation values.	Ongoing implementation of the Management Plans to protect threatened species and minimise impacts and threats to flora and fauna.	High (cons)	DENR

Component	Issue	Proposed Action	Priority of Action	Key Players
	Climate change and sea level rise is having multiple effects within the cell.	Ensure the establishment and maintenance of a time series of aerial photographs at an appropriate resolution. Establish new DENR profile (see above), to accurately track beach and dune recession. Seek to improve the resilience of plant and animal habitats by taking opportunities to improve connectivity between vegetation blocks.	Medium (cons)	DENR, EP NRM, community
	Potential impact on breeding habitat of the endangered Eastern Osprey, particularly during the breeding season.	Develop site management and monitoring strategy, including consideration to closure, relocation or seasonal closures of roads/walking tracks/car parks in the near vicinity. Ensure park management works/programs are not undertaken near breeding site during the breeding season. Community education	High (cons)	DENR
	Informal camping occurs throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of informal camping. Review locations and impact. Close, rehabilitate, sign and maintain areas inappropriate for camping. Formalise, manage & maintain areas where camping and car parks are permitted.	Medium (cons/ threat)	DENR
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, private land owners, community groups, EP NRM
Lone Pine	Coastal erosion at Lone Pine.	Monitor and develop plan for site management remediation including surface flow management, gully erosion remediation, revegetation. ORV restriction and hazard signage.	Medium	DC of Lower Eyre Peninsula, DENR, EP NRM, private land owners

Component	Issue	Proposed Action	Priority of Action	Key Players
Beaches and dunes	Weed (boxthorn, bridal creeper and beach daisy) is concentrated in dunes and foredunes of the NW corner of the cell, threatening valuable dune habitat.	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Due to the concentration of this threat, eradication works should be a priority. Undertake education program on impact of garden escape plants and weed control program.	High (cons/ threat)	EP NRM, DENR, private land owners, DC of Lower Eyre Peninsula, community groups.
All dunes	Stress through climate change: including sea level rise, storm tides and increasing aridity, leading to foredune recession and whole dune recession, also increased opportunity for invasion by grassy weeds.	Maintain monitoring record of change to this unstable landform/ habitat. Manage dune strategically to slow recession of dunes not protected by calcarenite outcrops.	High (cons/ threat)	DENR, EP NRM, community groups
North western half of cell	Unrestricted access, multiple vehicle tracks and informal car parks around the coast, with impact on coastal dune and cliff top vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species.	Develop access/traffic management plan – including review of existing access with a view to rationalise unnecessary tracks and car parks. Block access (eg. fencing/rocks) to tracks and car parks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks or car parks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	Med (cons/ threat)	DENR, DC of Lower Eyre Peninsula, private land owners, EP NRM, Tourism SA, community
Cliffs	Numerous informal tracks and informal car parks close to potentially unstable cliff edge; safety hazard and impact from soil compaction, vegetation damage, weed introduction, fauna disturbance, soil stability and water runoff erosion.	Review with a view to close or reroute tracks and car parks that are too close to cliff edge.	High (hazard/ cons/ threat)	DENR, DC of Lower Eyre Peninsula, EP NRM, community

Component	Issue	Proposed Action	Priority of Action	Key Players
Cape Catastrophe	Significant geological feature present – GSA reference E2.2 (see section 3.4.1)	Interpretive signage	Low (threat)	GSA SA branch, DENR, EP NRM
West of Mary Ellis Wreck Beach	Existing and future development with potential impact on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc).	Work with private land owners to minimise impact from existing development, including education and restoration where appropriate. Ensure future development is not located in areas of high conservation value or high sensitivity. Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs and cats, etc.	Medium (cons/ threat)	EP NRM, DC of Lower Eyre Peninsula, DENR, DPLG, private land owners, community groups
	Invasive weed *Polygala myrtifolia*	Undertake control to contain this plant and stop spread into the NP	High (cons/ threat)	DENR, EP NRM, private land owners, DC of Lower Eyre Peninsula, community groups (eg. Friends of Southern Eyre Peninsula)

BIOTA

Flora

Remnant vegetation area (ha)	6,977.98 ha, 83.18% of cell area
# flora surveys / records	26 surveys, 103 herbarium record sites, 1 threatened plant population record site
# flora in cell	494 (note: includes some marine species)
# conservation rated flora in cell	13
# non-indigenous flora in cell	63
Significant CDCS floristic community	*Eucalyptus diversifolia* / *Clematis microphylla* mallee – 81% of SA records in EP *Leucophyta brownie* shrubland– 56% of SA records in EP *Leucopogon parviflorus* / *Acrotriche patula* shrubland – <20 (13) sites recorded along SA coast, 100% of these in EP
Protected area	99.1% of vegetation protected within Lincoln NP, Memory Cove WA and Sleaford Mere CP

Weeds

Species	Common Name	Status	Study rating
Arctotheca populifolia	Beach Daisy	RA	7
Dipogon lignosus	Lavatory Creeper	RA	4
Euphorbia paralias	Sea Spurge	RA	5
Juncus acutus	Sharp Rush	RA	4
Juncus capitatus	Dwarf Rush	RA	4
Limonium companyonis	Sea-lavender	RA	7
Mesembryanthemum crystallinum	Common Iceplant	RA	4
Polygala myrtifolia	Myrtle-leaf Milkwort	RA	9
Asparagus asparagoides (NC)	Bridal Creeper	D, RA	9
Lycium ferocissimum	African Boxthorn	D, RA	8
Pinus halepensis	Aleppo Pine	D, RA	5
Asphodelus fistulosus	Onion Weed	D	3
Carduus tenuiflorus	Slender Thistle	D	2
Echium plantagineum	Salvation Jane	D	2
Aira caryophyllea	Silvery Hair-grass		0
Aira cupaniana	Small Hair-grass		0
Anagallis arvensis	Pimpernel		2
Arctotheca calendula	Cape Weed		1
Avellinia michelii	Avellinia		0
Avena barbata	Bearded Oat		2
Briza minor	Lesser Quaking-grass		2
Bromus diandrus	Great Brome		2
Bromus madritensis	Compact Brome		2
Bromus rubens	Red Brome		2
Bupleurum semicompositum	Hare's Ear		0
Cakile maritima ssp. maritima	Two-horned Sea Rocket		1
Carex pumila (NC)	Strand Sedge		0
Catapodium rigidum	Rigid Fescue		1
Centaurea melitensis	Malta Thistle		1
Centaurium erythraea	Common Centaury		1
Cerastium balearicum	Chickweed		1
Conium maculatum	Hemlock		0
Dittrichia graveolens	Stinkweed		1
Ehrharta longiflora	Annual Veldt Grass		3
Erodium botrys	Long Heron's-bill		0
Erodium cicutarium	Cut-leaf Heron's-bill		0
Galium murale	Small Bedstraw		0
Geranium molle var. molle	Soft Geranium		0
Hedypnois rhagadioloides ssp. rhagadioloides	Cretan Weed		0
Hornungia procumbens	Oval Purse		0
Hypochaeris glabra	Smooth Cat's Ear		2
Isolepis marginata	Little Club-rush		0
Lagurus ovatus	Hare's Tail Grass		2
Limonium binervosum	Dwarf Sea-lavender		3
Minuartia mediterranea	Slender Sandwort		0
Parapholis incurva	Curly Ryegrass		1
Parentucellia latifolia	Red Bartsia		0
Plantago coronopus ssp. commutata	Bucks-horn Plantain		2
Polypogon maritimus	Coast Beard-grass		0
Reichardia tingitana	False Sowthistle		3
Rostraria cristata	Annual Cat's-tail		2

Species	Common Name	Status	Study rating
Senecio pterophorus	African Daisy		2
Sherardia arvensis	Field Madder		0
Silene nocturna	Mediterranean Catchfly		1
Sonchus asper ssp. asper	Rough Sow-thistle		0
Sonchus oleraceus	Common Sow-thistle		0
Spergularia media (NC)	Coast Sand-spurrey		0
Stellaria media	Chickweed		0
Trifolium campestre	Hop Clover		2
Vulpia muralis	Wall Fescue		2
Vulpia myuros f.	Fescue		2
Vulpia myuros f. megalura	Fox-tail Fescue		2
Vulpia myuros f. myuros	Rat's-tail Fescue		2

D: Declared weed, RA: Red alert weed

Native flora*

Species	Common Name	Aus status	SA status
Prasophyllum goldsackii	Goldsack's Leek-orchid	E	E
Prasophyllum calcicola	Limestone Leek-orchid		V
Stackhousia annua	Annual Candles	V	V
Eucalyptus conglobata ssp. conglobata	Port Lincoln Mallee		R*
Acacia alcockii	Alcock's Wattle		R
Asplenium trichomanes	Common Spleenwort		R
Austrostipa echinata	Spiny Spear-grass		R
Caladenia bicalliata ssp. bicalliata	Western Daddy-long-legs		R
Isotoma scapigera	Salt Isotome		R
Orobanche cernua var. australiana	Australian Broomrape		R
Phyllanthus calycinus	Snowdrop Spurge		R
Prasophyllum occultans	Hidden Leek-orchid		R
Pteris tremula	Tender Brake		R
Acacia cupularis	Cup Wattle		
Acacia leiophylla	Coast Golden Wattle		
Acacia ligulata	Umbrella Bush		
Acacia longifolia ssp. sophorae	Coastal Wattle		
Acacia myrtifolia var. myrtifolia (NC)	Myrtle Wattle		
Acacia nematophylla	Coast Wallowa		
Acacia notabilis	Notable Wattle		
Acacia paradoxa	Kangaroo Thorn		
Acacia rupicola	Rock Wattle		
Acacia spinescens	Spiny Wattle		
Acacia triquetra	Mallee Wreath Wattle		
Acaena novae-zelandiae	Biddy-biddy		
Acrocarpia paniculata			
Acrotriche cordata	Blunt-leaf Ground-berry		
Acrotriche patula	Prickly Ground-berry		
Acrotylus australis			
Actites megalocarpa	Coast Sow-thistle		
Adriana klotzschii (NC)	Coast Bitter-bush		
Adriana quadripartita	Coast Bitter-bush		
Agrostis avenacea var. avenacea (NC)	Common Blown-grass		
Allocasuarina verticillata	Drooping Sheoak		
Alyogyne huegelii	Native Hibiscus		

Species	Common Name	Aus status	SA status
Alyxia buxifolia	Sea Box		
Amoenothamnion planktonicum			
Angianthus preissianus	Salt Angianthus		
Anotrichium elongatum			
Antithamnion hanovioides			
Aphanes australiana	Australian Piert		
Apium annuum	Annual Celery		
Apium prostratum var. prostratum	Native Celery		
Apodasmia brownii	Coarse Twine-rush		
Arthropodium minus	Small Vanilla-lily		
Asteridea athrixioides f. athrixioides	Wirewort		
Astroloma humifusum	Cranberry Heath		
Atriplex cinerea	Coast Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Audouinella caespitosa			
Audouinella microscopica			
Audouinella polyidis			
Audouinella porphyrae			
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrodanthonia setacea	Small-flower Wallaby-grass		
Austrostipa elegantissima	Feather Spear-grass		
Austrostipa exilis	Heath Spear-grass		
Austrostipa flavescens	Coast Spear-grass		
Austrostipa scabra ssp. falcata	Slender Spear-grass		
Austrostipa sp.	Spear-grass		
Austrostipa stipoides	Coast Spear-grass		
Ballia callitricha			
Banksia marginata	Silver Banksia		
Baumea arthrophylla	Swamp Twig-rush		
Baumea juncea	Bare Twig-rush		
Beyeria lechenaultii	Pale Turpentine Bush		
Beyeria opaca	Dark Turpentine Bush		
Brachyscome cuneifolia	Wedge-leaf Daisy		
Brachyscome exilis	Slender Daisy		
Bromus arenarius	Sand Brome		
Brongniartella australis			
Bulbine semibarbata	Small Leek-lily		
Bursaria spinosa ssp. spinosa	Sweet Bursaria		
Caladenia capillata	Wispy Spider-orchid		
Caladenia cardiochila	Heart-lip Spider-orchid		
Caladenia latifolia	Pink Caladenia		
Caladenia sp.	Spider-orchid		
Calandrinia eremaea	Dryland Purslane		
Callistemon rugulosus	Scarlet Bottlebrush		
Callistemon rugulosus var. (NC)	Scarlet Bottlebrush		
Callophyllis lambertii			
Callophyllis rangiferina			
Calytrix tetragona	Common Fringe-myrtle		
Carpobrotus rossii	Native Pigface		
Carpobrotus rossii (NC)	Native Pigface		
Carpoglossum confluens			
Cassytha glabella f. dispar	Slender Dodder-laurel		
Cassytha melantha	Coarse Dodder-laurel		

Species	Common Name	Aus status	SA status
Cassytha peninsularis	Peninsula Dodder-laurel		
Cassytha pubescens	Downy Dodder-laurel		
Caulerpa brownii			
Caulerpa flexilis			
Caulerpa longifolia f. crispata			
Caulerpa obscura			
Caulerpa scalpelliformis			
Caulerpa simpliciuscula			
Caulocystis uvifera			
Centella asiatica	Asian Centella		
Centella cordifolia	Native Centella		
Centroceras clavulatum			
Centrolepis aristata	Pointed Centrolepis		
Centrolepis polygyna	Wiry Centrolepis		
Ceramium filiculum			
Ceramium pusillum			
Champia affinis			
Chlanidophora microphylla			
Chondria curdieana			
Chondrophycus tumidus			
Choretrum glomeratum var. glomeratum	White Sour-bush		
Chrysocephalum apiculatum	Common Everlasting		
Chrysocephalum baxteri	White Everlasting		
Cladophora aegagropiloidea			
Cladophora coelothrix			
Cladophora feredayi			
Cladophora valonioides			
Clematis microphylla			
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Codium galeatum			
Codium pomoides			
Comesperma volubile	Love Creeper		
Convolvulus erubescens (NC)	Australian Bindweed		
Corallina officinalis			
Correa pulchella	Salmon Correa		
Corybas despectans	Coast Helmet-orchid		
Corybas sp.	Helmet-orchid		
Corynophlaea cystophorae			
Cotula vulgaris var. australasica	Slender Cotula		
Craspedia glauca (NC)	Billy-buttons		
Crassilingua marginifera			
Crassula colorata var. acuminata	Dense Crassula		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Crouania mucosa			
Cynoglossum australe	Australian Hound's-tongue		
Cystophora brownii			
Cystophora gracilis			
Cystophora intermedia			
Cystophora monilifera			
Cystophora moniliformis			
Cystophora platylobium			
Cystophora siliquosa			
Cystoseira trinodis			

Species	Common Name	Aus status	SA status
Danthonia pilosa var. paleacea (NC)	Velvet Wallaby-grass		
Danthonia sp. (NC)	Wallaby-grass		
Dasya clavigera			
Dasyclonium incisum			
Dasyphila preissii			
Dasyphloea insignis			
Daucus glochidiatus	Native Carrot		
Daviesia asperula ssp. obliqua	Eyre Peninsula Bitter-pea		
Delisea hypneoides			
Delisea pulchra			
Dianella brevicaulis	Short-stem Flax-lily		
Dianella brevicaulis/revoluta var.	Black-anther Flax-lily		
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Dichelachne crinita	Long-hair Plume-grass		
Dicranema revolutum			
Dilophus gunnianus			
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Dodonaea humilis	Dwarf Hop-bush		
Drosera peltata	Pale Sundew		
Drosera pygmaea	Tiny Sundew		
Ectocarpus siliculosus			
Elisiella arbuscula			
Elymus scaber var. scaber	Native Wheat-grass		
Elymus scaber var. scaber (NC)	Native Wheat-grass		
Epilobium billardierianum ssp. billardierianum	Robust Willow-herb		
Episporium centroceratis			
Erythrostachys strobilifera			
Eucalyptus albopurpurea	Purple-flowered Mallee Box		
Eucalyptus angulosa	Coast Ridge-fruited Mallee		
Eucalyptus diversifolia (NC)	Coastal White Mallee		
Eucalyptus diversifolia ssp. diversifolia	Coastal White Mallee		
Eucalyptus oleosa ssp. ampliata	Red Mallee		
Eucalyptus rugosa	Coastal White Mallee		
Euchiton sphaericus	Annual Cudweed		
Euphrasia collina ssp. tetragona	Coast Eyebright		
Euptilota articulata			
Eutaxia microphylla	Common Eutaxia		
Eutaxia sp.	Eutaxia		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos cupressiformis	Native Cherry		
Exocarpos sparteus	Slender Cherry		
Exocarpos syrticola	Coast Cherry		
Ficinia nodosa	Knobby Club-rush		
Frankenia pauciflora var.	Southern Sea-heath		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Gahnia deusta	Limestone Saw-sedge		
Gahnia filum	Thatching Grass		
Gahnia lanigera	Black Grass Saw-sedge		
Gahnia trifida	Cutting Grass		
Galium gaudichaudii (NC)	Rough Bedstraw		
Galium leptogonium	Reflexed Bedstraw		
Galium migrans (NC)	Loose Bedstraw		

Species	Common Name	Aus status	SA status
Gelidium australe			
Geranium solanderi var. solanderi	Austral Geranium		
Geranium sp.	Geranium		
Gigartina densa			
Gigartina disticha			
Gigartina pinnata			
Gloiosaccion brownii			
Glossophora nigricans			
Gnaphalium indutum ssp. indutum	Tiny Cudweed		
Gonocarpus mezianus	Broad-leaf Raspwort		
Goodenia blackiana	Native Primrose		
Goodenia geniculata	Bent Goodenia		
Goodenia varia	Sticky Goodenia		
Gracilaria cliftonii			
Gramineae sp.	Grass Family		
Grevillea pauciflora ssp. pauciflora	Few-flower Grevillea		
Griffithsia pulvinata			
Gyrostemon thesioides	Broom Wheel-fruit		
Hakea vittata	Limestone Needlebush		
Haliptilon roseum			
Haloragis acutangula f.	Smooth Raspwort		
Haplodasya tomentosa			
Haplodasya urceolata			
Hardenbergia violacea	Native Lilac		
Helichrysum leucopsideum	Satin Everlasting		
Helminthora australis			
Heterocladia umbellifera			
Heterodoxia denticulata			
Heterosiphonia gunniana			
Heterosiphonia muelleri			
Hibbertia cinerea	Port Lincoln Guinea-flower		
Hibbertia platyphylla ssp. platyphylla			
Hibbertia sp. Glabriuscula (D.J.Whibley 9012)	Smooth Guinea-flower		
Hibbertia stricta var. (NC)	Stalked Guinea-flower		
Hibbertia virgata	Twiggy Guinea-flower		
Hincksia mitchelliae			
Homoeostrichus sinclairii			
Homoranthus homoranthoides	Port Lincoln Ground-myrtle		
Hormosira banksii f. sieberi			
Hydrocotyle capillaris	Thread Pennywort		
Hymenena curdieana			
Hymenocladia chondricola			
Hypnea ramentacea			
Hypolaena fastigiata	Tassel Rope-rush		
Hypoxis glabella var. glabella	Tiny Star		
Isoetopsis graminifolia	Grass Cushion		
Ixodia achillaeoides ssp. achillaeoides	Coast Ixodia		
Jafneadelphus ferrugineus			
Juncus bufonius	Toad Rush		
Juncus kraussii	Sea Rush		
Kallymenia cribrosa			
Kennedia prostrata	Scarlet Runner		

Species	Common Name	Aus status	SA status
Kuetzingia canaliculata			
Lachnagrostis billardierei ssp. billardierei	Coast Blown-grass		
Lasiopetalum baueri	Slender Velvet-bush		
Lasiopetalum discolor	Coast Velvet-bush		
Lawrencia spicata	Salt Lawrencia		
Leiocarpa supina	Coast Plover-daisy		
Lejolisia aegagropila			
Lenormandia marginata			
Lenormandia spectabilis			
Lepidosperma canescens	Hoary Rapier-sedge		
Lepidosperma concavum	Spreading Sword-sedge		
Lepidosperma congestum			
Lepidosperma congestum (NC)	Clustered Sword-sedge		
Lepidosperma gladiatum	Coast Sword-sedge		
Lepidosperma sp.	Sword-sedge/Rapier-sedge		
Lepidosperma viscidum	Sticky Sword-sedge		
Leptorhynchos squamatus ssp. squamatus	Scaly Buttons		
Leptorhynchos waitzia	Button Immortelle		
Leucophyta brownii	Coast Cushion Bush		
Leucopogon cordifolius	Heart-leaf Beard-heath		
Leucopogon parviflorus	Coast Beard-heath		
Liagora harveyana			
Lichen sp.			
Linum marginale	Native Flax		
Lobelia anceps	Angled Lobelia		
Lobelia gibbosa	Tall Lobelia		
Lomandra collina	Sand Mat-rush		
Lomandra effusa	Scented Mat-rush		
Lomandra micrantha ssp. micrantha	Small-flower Mat-rush		
Lotus australis	Austral Trefoil		
Macrothamnion pellucidum			
Maireana oppositifolia	Salt Bluebush		
Melaleuca brevifolia	Short-leaf Honey-myrtle		
Melaleuca decussata	Totem-poles		
Melaleuca halmaturorum	Swamp Paper-bark		
Melaleuca lanceolata	Dryland Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Melanthalia abscissa			
Melanthalia concinna			
Metagoniolithon radiatum			
Microcybe pauciflora ssp. pauciflora	Yellow Microcybe		
Microseris lanceolata	Yam Daisy		
Microtis arenaria	Notched Onion-orchid		
Microtis sp.	Onion-orchid		
Millotia major			
Millotia muelleri	Common Bow-flower		
Millotia myosotidifolia	Broad-leaf Millotia		
Minuria leptophylla	Minnie Daisy		
Mitrasacme paradoxa (NC)	Wiry Mitrewort		
Moss sp.			
Muehlenbeckia adpressa	Climbing Lignum		
Muehlenbeckia gunnii	Coastal Climbing Lignum		
Mychodea disticha			

Species	Common Name	Aus status	SA status
Mychodea marginifera			
Mychodea ramulosa			
Myoporum brevipes	Warty Boobialla		
Myoporum insulare	Common Boobialla		
Myosotis australis	Austral Forget-me-not		
Myriactula caespitosa			
Myriodesma calophyllum			
Myriodesma harveyanum			
Myriogloea sciurus			
Nicotiana maritima	Coast Tobacco		
Nitospinosa pristoidea			
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Olearia ramulosa	Twiggy Daisy-bush		
Opercularia scabrida	Stalked Stinkweed		
Opercularia turpis	Twiggy Stinkweed		
Opercularia varia	Variable Stinkweed		
Ophidocladus simpliciusculus			
Oxalis perennans (NC)	Native Sorrel		
Pachydictyon paniculatum			
Parietaria australis	Smooth-nettle		
Parietaria cardiostegia	Mallee Smooth-nettle		
Parietaria debilis (NC)	Smooth-nettle		
Pelargonium littorale	Native Pelargonium		
Peyssonnelia splendens			
Phacelocarpus apodus			
Phitymophora amansioides			
Phyllangium divergens	Wiry Mitrewort		
Pimelea glauca	Smooth Riceflower		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pittosporum angustifolium	Native Apricot		
Plantago hispida	Hairy Plantain		
Plantago sp. B (R.Bates 44765)	Little Plantain		
Platyclinia stipitata			
Plocamium mertensii			
Poa labillardieri var. labillardieri	Common Tussock-grass		
Poa poiformis var. poiformis	Coast Tussock-grass		
Podolepis rugata var. littoralis	Coast Copper-wire Daisy		
Podotheca angustifolia	Sticky Long-heads		
Pogonolepis muelleriana	Stiff Cup-flower		
Polysiphonia australiensis			
Polysiphonia decipiens			
Polysiphonia infestans			
Polysiphonia isogona			
Pomaderris flabellaris	Fan Pomaderris		
Pomaderris obcordata	Wedge-leaf Pomaderris		
Pomaderris paniculosa ssp. paniculosa	Mallee Pomaderris		
Pomaderris paniculosa ssp. paralia	Coast Pomaderris		
Poranthera triandra	Three-petal Poranthera		
Porphyra columbina			
Pterocladia lucida			
Pterostylis longifolia (NC)	Tall Greenhood		
Pterostylis robusta	Large Shell-orchid		

Species	Common Name	Aus status	SA status
Pterostylis sp.	Greenhood		
Ptilocladia pulchra			
Pultenaea acerosa	Bristly Bush-pea		
Pultenaea rigida var.	Rigid Bush-pea		
Pultenaea rigida var. ovata	Rigid Bush-pea		
Pultenaea sp.	Bush-pea		
Pultenaea tenuifolia	Narrow-leaf Bush-pea		
Pultenaea vestita	Feather Bush-pea		
Pultenaea vestita (NC)	Feather Bush-pea		
Ranunculus sessiliflorus var. sessiliflorus	Annual Buttercup		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia parabolica	Mealy Saltbush		
Sagina maritima	Sea Pearlwort		
Samolus repens	Creeping Brookweed		
Santalum acuminatum	Quandong		
Sarcocornia blackiana	Thick-head Samphire		
Sarcocornia quinqueflora	Beaded Samphire		
Sarcomenia delesserioides			
Scaevola crassifolia	Cushion Fanflower		
Scaevola linearis ssp. linearis	Rough Fanflower		
Schoenus nanus	Little Bog-rush		
Schoenus nitens	Shiny Bog-rush		
Sclerolaena diacantha	Grey Bindyi		
Sclerolaena uniflora	Small-spine Bindyi		
Scytosiphon lomentaria			
Scytothalia dorycarpa			
Sebaea ovata	Yellow Sebaea		
Seirococcus axillaris			
Selliera radicans	Shiny Swamp-mat		
Senecio biserratus	Jagged Groundsel		
Senecio picridioides	Purple-leaf Groundsel		
Senecio pinnatifolius (NC)	Variable Groundsel		
Senecio pinnatifolius var. maritimus	Variable Groundsel		
Senecio spanomerus			
Solanum symonii	Symon's Kangaroo-apple		
Sonchus hydrophilus	Native Sow-thistle		
Sonderopelta coriacea			
Sphacelaria biradiata			
Sphacelaria carpoglossi			
Spinifex hirsutus	Rolling Spinifex		
Spongoclonium conspicuum			
Sporobolus virginicus	Salt Couch		
Spyridia dasyoides			
Spyridium phylicoides	Narrow-leaf Spyridium		
Stackhousia spathulata	Coast Candles		
Stenanthemum leucophractum	White Cryptandra		
Struvea plumosa			
Synarthrophyton patena			
Tecticornia halocnemoides ssp. halocnemoides	Grey Samphire		
Templetonia retusa	Cockies Tongue		
Threlkeldia diffusa	Coast Bonefruit		
Thuretia quercifolia			
Thysanotus baueri	Mallee Fringe-lily		

Species	Common Name	Aus status	SA status
Thysanotus patersonii	Twining Fringe-lily		
Trachymene pilosa	Dwarf Trachymene		
Tricoryne tenella	Tufted Yellow Rush-lily		
Triglochin centrocarpum (NC)	Dwarf Arrowgrass		
Triglochin mucronata	Prickly Arrowgrass		
Triglochin striata	Streaked Arrowgrass		
Trithamnion vulgare			
Tsengia feredayae			
Tylocolax microcarpus			
Ulva fasciata			
Ulva taeniata			
Veronica hillebrandii	Rigid Speedwell		
Vittadinia australasica var. australasica	Sticky New Holland Daisy		
Vittadinia cuneata var. cuneata f. cuneata	Fuzzy New Holland Daisy		
Vittadinia megacephala	Giant New Holland Daisy		
Wahlenbergia gracilenta	Annual Bluebell		
Wahlenbergia littoricola	Coast Bluebell		
Wahlenbergia stricta ssp. stricta	Tall Bluebell		
Webervanbossea kaliformis			
Wilsonia rotundifolia	Round-leaf Wilsonia		
Wrangelia velutina			
Wurmbea dioica ssp. dioica (NC)	Early Star-lily		
Xanthorrhoea semiplana ssp. semiplana	Yacca		
Zonaria spiralis			
Zygophyllum apiculatum	Pointed Twinleaf		
Zygophyllum billardierei	Coast Twinleaf		
Zygophyllum billardierei (NC)	Coast Twinleaf		

R: Rare, V: Vulnerable, E: Endangered
* note: includes some marine species

Fauna

# of fauna in cell	140 recorded – 93 birds, 13 butterflies, 12 mammals, 23 reptiles, 0 amphibians (an additional 7 reptiles and 13 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	5 surveys, 63 opportune sites, 1 reserve database record sites
# of threatened fauna in cell	19
# of non-indigenous fauna	8 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Alauda arvensis	Eurasian Skylark	Aves	x
Passer domesticus	House Sparrow	Aves	x
Sturnus vulgaris	Common Starling	Aves	x
Turdus merula	Common Blackbird	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p
Mus musculus	House Mouse	Mammalia	x
Oryctolagus cuniculus	Rabbit (European Rabbit)	Mammalia	x
Rattus rattus	Black Rat (Ship Rat, Roof Rat)	Mammalia	x

Species	Common Name	Class	Record
Vulpes vulpes	Fox (Red Fox)	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Pandion cristatus	Eastern Osprey	M	E
Sternula nereis	Fairy Tern		E
Stipiturus malachurus parimeda	Southern Emu-wren (Eyre Peninsula ssp)	V	E
Cladorhynchus leucocephalus	Banded Stilt		V
Stagonopleura guttata	Diamond Firetail		V
Thinornis rubricollis	Hooded Plover		V
Biziura lobata	Musk Duck		R
Burhinus grallarius	Bush Stone-curlew		R
Cereopsis novaehollandiae	Cape Barren Goose		R
Egretta sacra	Eastern Reef Egret		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Neophema petrophila	Rock Parrot		R
Podiceps cristatus	Great Crested Grebe		R
Acanthiza apicalis	Inland Thornbill		
Acanthiza chrysorrhoa	Yellow-rumped Thornbill		
Accipiter cirrocephalus	Collared Sparrowhawk		
Accipiter fasciatus	Brown Goshawk		
Anas castanea	Chestnut Teal		
Anas gracilis	Grey Teal		
Anas superciliosa	Pacific Black Duck		
Anthochaera carunculata	Red Wattlebird		
Anthus novaeseelandiae	Australasian Pipit		
Aquila audax	Wedge-tailed Eagle		
Ardenna tenuirostris	Short-tailed Shearwater		
Artamus cyanopterus	Dusky Woodswallow		
Barnardius zonarius	Australian Ringneck, (Ring-necked Parrot)		
Barnardius zonarius zonarius	Port Lincoln Parrot (Australian ringneck sub sp.)		
Cacomantis flabelliformis	Fan-tailed Cuckoo		
Cacomantis pallidus	Pallid Cuckoo		
Calamanthus campestris	Rufous Fieldwren		
Calidris acuminata	Sharp-tailed Sandpiper	M	
Chalcites basalis	Horsfield's Bronze-cuckoo		
Charadrius ruficapillus	Red-capped Plover		
Chlidonias hybrida	Whiskered Tern		
Chroicocephalus novaehollandiae	Silver Gull		
Circus approximans	Swamp Harrier		
Colluricincla harmonica	Grey Shrike-thrush		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Corvus coronoides	Australian Raven		
Corvus mellori	Little Raven		
Cracticus tibicen	Australian Magpie		
Cygnus atratus	Black Swan		
Dromaius novaehollandiae	Emu		

Species	Common Name	Aus status	SA status
Drymodes brunneopygia	Southern Scrub-robin		
Egretta novaehollandiae	White-faced Heron		
Elanus axillaris	Black-shouldered Kite		
Eolophus roseicapillus	Galah		
Eopsaltria griseogularis	Western Yellow Robin		
Eudyptula minor	Little Penguin		
Falco berigora	Brown Falcon		
Falco cenchroides	Nankeen Kestrel		
Gallinago hardwickii	Japanese Snipe (Latham's Snipe)	M	
Glossopsitta porphyrocephala	Purple-crowned Lorikeet		
Glyciphila melanops	Tawny-crowned Honeyeater		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Larus pacificus	Pacific Gull		
Lichenostomus cratitius	Purple-gaped Honeyeater		ssp
Lichenostomus virescens	Singing Honeyeater		
Malurus cyaneus	Superb Fairy-wren		
Malurus pulcherrimus	Blue-breasted Fairy-wren		
Megalurus gramineus	Little Grassbird		
Melithreptus brevirostris	Brown-headed Honeyeater		
Mirafra javanica	Horsfield's Bushlark		
Morus serrator	Australasian Gannet		
Pardalotus punctatus	Spotted Pardalote		
Pardalotus striatus	Striated Pardalote		
Petrochelidon ariel	Fairy Martin		
Phalacrocorax carbo	Great Cormorant		
Phalacrocorax fuscescens	Black-faced Cormorant		
Phalacrocorax sulcirostris	Little Black Cormorant		
Phalacrocorax varius	Pied Cormorant		
Phaps chalcoptera	Common Bronzewing		
Phaps elegans	Brush Bronzewing		
Phylidonyris novaehollandiae	New Holland Honeyeater		
Pomatostomus superciliosus	White-browed Babbler		
Psophodes nigrogularis	Western Whipbird	ssp	ssp
Rhipidura albiscapa	Grey Fantail		
Rhipidura leucophrys	Willie Wagtail		
Sericornis frontalis	White-browed Scrubwren		
Stipiturus malachurus	Southern Emu-wren	ssp	ssp
Strepera versicolor	Grey Currawong		ssp
Thalasseus bergii	Crested Tern		
Tringa nebularia	Common Greenshank	M	
Vanellus miles	Masked Lapwing		
Vanellus tricolor	Banded Lapwing		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	x
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p

Species	Common Name	Status*	Record
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	x
Danaus chrysippus petilia	Lesser Wanderer		x
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		x
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	x
Hesperilla donnysa diluta	Donnysa Sedge-skipper		x
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	x
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		x
Theclinesthes albocincta	Bitter-bush Blue		x
Theclinesthes miskini miskini	Wattle Blue	LU	x
Theclinesthes serpentata serpentata	Salt-bush Blue	LC	x
Vanessa itea	Australian Admiral	LU, Mi	x
Zizina labradus labradus	Common Grass-blue	LC	x

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Bettongia penicillata ogilbyi	Brush-tailed Bettong		R
Cercartetus concinnus	Western Pygmy-possum		
Chalinolobus morio	Chocolate Wattled Bat		
Macropus fuliginosus	Western Grey Kangaroo		
Nyctophilus geoffroyi	Lesser Long-eared Bat		
Phascolarctos cinereus	Koala		
Pseudomys bolami	Bolam's Mouse		
Rattus fuscipes	Bush Rat		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Varanus rosenbergi	Heath Goanna		V	x
Bassiana trilineata	Western Three-lined Skink		R	x
Morelia spilota	Carpet Python		R	x
Pseudemoia baudini	Bight Coast Skink		R	c
Amphibolurus norrisi	Mallee Tree-dragon			x
Aprasia striolata	Lined Worm-lizard			x
Christinus marmoratus	Marbled Gecko			x
Ctenophorus chapmani	Prickly Dragon			c
Ctenophorus fionni	Peninsula Dragon			x
Ctenophorus pictus	Painted Dragon			c

Species	Common Name	Aus status	SA status	Record
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			x
Delma butleri	Spinifex Snake-lizard			x
Diplodactylus calcicolus	South Coast Gecko			x
Drysdalia mastersii	Master's Snake			x
Egernia stokesii	Gidgee Skink			x
Gehyra variegata	Tree Dtella			e
Hemiergis peronii	Four-toed Earless Skink			x
Lampropholis delicata	Delicate Skink			c
Lerista bougainvillii	Bougainville's Skink			x
Lerista dorsalis	Southern Four-toed Slider			x
Lerista edwardsae	Myall Slider			x
Lerista terdigitata	Southern Three-toed Slider			x
Liopholis multiscutata	Bull Skink			x
Menetia greyii	Dwarf Skink			x
Morethia adelaidensis	Adelaide Snake-eye			x
Nephrurus milii	Barking Gecko			c
Notechis scutatus	Eastern Tiger Snake	ssp		x
Pseudonaja inframacula	Peninsula Brown Snake			x
Tympanocryptis lineata	Five-lined Earless Dragon			x

R: Rare, V: Vulnerable, E: Endangered

x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded.

Cells EP33 Fishery Bay & EP34 Whalers Way

Combined cell area 2,388 ha. Combined shoreline length 42.12 km.

Landforms

The cells' boundary encloses a coastal plain with an irregular calcarenite, dune and bedrock surface, and with a small low lying pocket adjacent to Sleaford Bay; most dunes no longer have a beach sand supply, but remain as cliff top dunes. Cliffs and bedrock ramps and platforms make up >80% of the shoreline; bedrock (Sleaford complex metamorphics) is mapped as outcropping in many parts of the cell. Small embayments hold fine, medium and coarse sand beaches, with small stable dunes. Cliffs are in Pleistocene calcarenite: 130m+ in the Cape Wiles area; c.50m from Cape Carnot to D'anville Bay. At Cape Wiles and adjacent areas active cliff recession is witnessed by undercutting, collapse features and stacks in high calcarenite cliffs over granite ramps.

Benthic Habitat/

Inshore granite reef <500m wide, with seagrass and sand patches, and then bare sand.

Biota

16 BDBSA flora survey sites and 3 fauna survey sites, as well as 57 opportune fauna sites, 1 opportune flora site, and 18 herbarium flora record sites are located in these cells. Over 80% of the combined cells remains in native vegetation.
On the coastal plateau above Cape Carnot, and along the shoreline cliffs on the west facing coast is found *Leucopogon parviflorus, +/-Olearia axillaris* mid open shrubland over *Rhagodia candolleana ssp. candolleana, Isolepis nodosa, Lepidosperma gladiatum, +/-Lasiopetalum discolor* low shrubs over *Carpobrotus rossii*. Areas with *Leucophyta brownie* are also found. Inland from the coastal shrubs, and making up the bulk of the eastern side of the combined cells is *Eucalyptus rugosa, +/-Eucalyptus diversifolia ssp. diversifolia, +/-Eucalyptus oleosa ssp. ampliata* mid mallee woodland over *Melaleuca lanceolata* shrubs over *Acacia retinodes var. uncifolia, Leucopogon parviflorus, Acacia longifolia ssp. sophorae, +/-Melaleuca acuminata ssp. acuminata, +/-Myoporum insulare over +/-Correa eburnea shrubs*

Land Use/ Land Ownership

A narrow (c.30-200m) coastal reserve of unalloted Crown land abuts the coast from the boundary of EP32 to Fishery Bay, backed by privately owned land except for the small headland east of Fishery Bay that has an area of perpetual Crown lease. A Heritage Agreement covers the vegetated area immediately north and east of Whaling Station Road at Fishery Bay. The coastal reserve on the south-western side of Fishery Bay is under the care, control and management of the District Council of Lower Eyre Peninsula, backed by privately owned land. To the south and

west of this, the coastal reserve is unalloted Crown land, backed by privately owned land that is held under a Heritage Agreement. Approximately 85% of these cells are within Heritage Agreements.

Thorny Passage Marine Park offshore.

FIGURE 6.16 Fishery Bay. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

Recreation and tourism – fishing, surfing, whale watching, boating, ORV, sightseeing
Windfarm in the north west of EP34

Threats (Field visits and local reports)

Informal camping – destruction of vegetation for firewood collection, encroachment into native vegetation, rubbish dumping
Eco-tourism / tourism ventures
Feral plant and animals
High visitation rate and ORV on Fishery Bay beach, disturbance to beach nesting birds
Uncontrolled ORV usage
Potential desalination plant site
Coastal erosion
Development

Opportunities (Field visits and local reports)

Conservation and improvement works on Vegetation Heritage Agreements and private property
EP NRM/ Birds Australia Shorebird breeding success monitoring
Lower Eyre Coastcare Polygala mapping

FIGURE 6.17 Red Banks Beach; granite platform in foreground. Photo: Coast Protection Board, 2007

Conservation Analysis (GIS)

These two cells have moderate totals of conservation means: 106.22 and 118.58. The highest areas for total scores are in the well vegetated clifftop dunes north of Cape Wiles, and at the Fishery Bay dunes; medium high values are found in the clifftop dunes immediately north from Cape Carnot almost to D'anville Bay. Elsewhere medium low to low totals are found.
The partially cleared land running north from Sleaford Bay to Mary Ellis Wreck Beach contains many high value sites for threatened fauna habitat; vegetation associations endemic to the Eyre Peninsula region score very highly, notably across the southern half of the cells – this same area scores moderately highly for total number of plant and animal species, as well as habitat for reptiles and butterflies. Focal raptor species score highly along the southern coasts; the Beach Slider and the Bight Coast Skink have high habitat scores in the sand dune areas.
Reported in these cells are the state endangered Southern Emu-wren (EP ssp), Eastern Osprey and Western Whipbird (Eastern subspecies); also the state vulnerable Diamond Firetail and Hooded Plover. A significant geological feature adds to the conservation total: Eyre Peninsula Geological Monument 10C Fishery Bay to Cape Carnot, Sleaford Complex metamorphics.

Threat Analysis (GIS)

Threat totals are high for Fishery Bay (49.99) and low for Whalers Way (34.16). The detailed sum of threats map illustrates the statistics clearly: totals are high and mixed at Fishery Bay, increasing northwards to very high at Mary Ellis Wreck beach; the rest of the combined cells is low, with complex patterns of medium scores.
Both parts of the combined cells show moderate to high values for viewshed and viewscape, for the proportion of exotic plants, and cliff stability; Sleaford Bay section shows in addition high values for the distribution of invasive weeds (strikingly concentrated as very high through much of the eastern half of the combined cells; with Bridal creeper and African boxthorn in the south, and Bridal creeper and Polygala along the east coast), and land ownership.

ORV activity is moderate throughout the cells, though with some concentration near Mary Ellis Wreck Beach.

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, dune and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Marked beach recession.		
2070: +c.80cm	Further sea level rise leads to beach and foredune erosion and loss of pocket beaches.		
Storms: *Frequency* continues to show great variation on a decadal scale.	Storm tide flooding above highest known tides.		
Intensity of large storms increases.	Loss of beaches, partial drowning of platform ramps and wave removal of debris from the base of calcarenite cliffs, leads to acceleration of cliff erosion.		
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere. There will be an increased risk for species that are already vulnerable. Invasive species are likely to become more dominant.		Maintain connectivity of vegetation blocks to increase resilience
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage, with invasion of grass species.	Active dune management, including weed control	Ensure dunes are included in regional fire plan

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	There is a potential local impact on water tables, including any perched water tables within the dunes, and vegetation survival.	Adaptive management of plant assets, including water table monitoring.	
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintained. Possible changes in the refracted pattern of swell and the wave climate have the potential to modify the plan-shape of the embayments.	Monitor beaches, see above.	

TABLE 6.15 Recommended Actions and Priority for EP33 Fishery Bay & EP34 Whalers Way

Component	Issue	Proposed Action	Priority of Action	Key Players
EP33 and EP34	The prevalence of invasive weeds in both remnant vegetation on private land and heritage areas of significant value.	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required) to protect valuable habitat. Use data from Polygala mapping to inform control plan. Undertake education program on impact of garden escape plants and weed control program.	High (cons/ threat)	EP NRM, private land owners, DC Lower Eyre Peninsula, DENR, community.
	Areas within cell identified as being important for numbers of threatened and sensitive flora and fauna species, with potential disturbance from recreational activities and land management practices.	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas, eg. restrict vehicles on beaches, dogs on leashes, track management, pest animal and plant control, restrict access to sensitive locations. Install interpretive/ educational signage. Community education programs.	Medium (cons/ threat)	DENR, private land owners, EP NRM, DC of Lower Eyre Peninsula, community groups

Component	Issue	Proposed Action	Priority of Action	Key Players
	Climate change and sea level rise is having multiple effects within the cell.	Ensure the establishment and maintenance of a time series of aerial photographs at an appropriate resolution. Seek to improve the resilience of plant and animal habitats by taking opportunities to improve connectivity between vegetation blocks.	Medium (cons)	DENR, EP NRM, DC of Lower Eyre Peninsula, private land owners, community
	Vegetation degradation	Support Vegetation Heritage agreement managers to improve management and increase protection to sensitive areas, including grazing management.	Medium	DENR, EP NRM, private landowners
	Numerous informal tracks and informal car parks very close to potentially unstable cliff edge; safety hazard and impact from soil compaction, vegetation damage, weed introduction, fauna disturbance, soil stability and water runoff erosion.	Review with a view to close or reroute tracks and car parks that are too close to cliff edge.	High (Hazard; cons/ threat)	Private land owners, DC of Lower Eyre Peninsula, EP NRM, DENR, community
EP34 Whole cell	Potential impact on breeding habitat of the endangered Eastern Osprey, particularly during the breeding season.	Develop site management and monitoring strategy, including consideration to closure, relocation or seasonal closures of roads/walking tracks/car parks in the near vicinity. Ensure management/works programs are not undertaken during the breeding season. Community education.	Medium (cons/ threat)	DENR, private land owner, EP NRM
EP33 Whole cell	Existing development impacting on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Work with private land owners to minimise impact from existing development, including education and restoration where appropriate. Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs and cats, ORV etc.	Medium (cons/ threat)	EP NRM, DC of Lower Eyre Peninsula, DENR, private land owners, community groups

Component	Issue	Proposed Action	Priority of Action	Key Players
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection, encroachment onto private property and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	Medium (cons/ threat)	DC of Lower Eyre Peninsula, DENR, EP NRM, community, private land owners
	Unrestricted access and multiple vehicle tracks around the coast impacting on the coastal dune and cliff top vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species.	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	Medium (threat)	Private land owners, DC of Lower Eyre Peninsula, DTEI, DENR, EP NRM, SA Tourism, community
	High visitation area, with soil erosion, instability and compaction, safety hazard, vegetation damage, weed introduction, uncontrolled vehicle and pedestrian access, fauna disturbance and water runoff erosion.	Develop plan for high visitor use areas, including actions to minimise visitor impacts, eg. barriers/ fencing to define formal vehicle and pedestrian access tracks and car parks, provision of appropriate amenities, weed management, maintenance of facilities/ infrastructure.	Medium	DC of Lower Eyre Peninsula, EP NRM, private land owners, SA Tourism
All dune areas	Increasing aridity and average temperatures make dunes increasingly vulnerable to threats, including the invasion of grassy weeds.	Maintain aerial photographic record and manage adaptively.	Medium (threat)	EP NRM, DENR, private land owners
Sleaford Bay	Registered non-Indigenous heritage site – former Fishery Bay Whaling Station - with potential impact from recreational activities	Ensure sites managed to protect from damage. Install interpretive educational signage where appropriate.	Medium (cons)	DENR, community, DC of Lower Eyre Peninsula

Component	Issue	Proposed Action	Priority of Action	Key Players
Fishery Bay	Vehicles and dogs on beaches a threat to meiofauna and shorebirds.	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	Medium (cons/ threat)	DC Lower Eyre Peninsula, EP NRM, DTEI, EP LGA, DENR, Tourism SA, Birds Australia, community,
Fishery Bay to Cape Carnot	Significant geological features present – GSA reference E2.3 and E8 (see section 3.4.1)	Interpretive signage	Low (threat)	GSA SA branch, DENR, EP NRM, private land owner, DC of Lower Eyre Peninsula, DPLG

BIOTA – EP33 & EP34 combined

Flora

Remnant vegetation area (ha)	2,154.27 ha, 90.22% of cell area
# flora surveys / records	16 surveys, 1 opportune sites, 18 herbarium record sites
# flora in cell	248 (note: includes some marine species)
# conservation rated flora in cell	1
# non-indigenous flora in cell	37
Significant CDCS floristic community	Nil
Protected area	85% of remnant vegetation within Heritage Agreement

Weeds

Species	Common Name	Status	Study rating
Euphorbia paralias	Sea Spurge	RA	5
Euphorbia peplus	Petty Spurge	RA	5

Species	Common Name	Status	Study rating
Polygala myrtifolia	Myrtle-leaf Milkwort	RA	9
Rhamnus alaternus	Blowfly Bush	RA	8
Asparagus asparagoides (NC)	Bridal Creeper	D, RA	9
Lycium ferocissimum	African Boxthorn	D, RA	8
Aira cupaniana	Small Hair-grass		0
Anagallis arvensis	Pimpernel		2
Arctotheca calendula	Cape Weed		1
Avellinia michelii	Avellinia		0
Briza minor	Lesser Quaking-grass		2
Bromus diandrus	Great Brome		2
Bromus madritensis	Compact Brome		2
Bromus rubens	Red Brome		2
Catapodium rigidum	Rigid Fescue		1
Cerastium balearicum	Chickweed		1
Cerastium pumilum	Chickweed		0
Cirsium vulgare	Spear Thistle		0
Ehrharta longiflora	Annual Veldt Grass		3
Erodium cicutarium	Cut-leaf Heron's-bill		0
Galium murale	Small Bedstraw		0
Geranium molle var. molle	Soft Geranium		0
Hornungia procumbens	Oval Purse		0
Hypochaeris glabra	Smooth Cat's Ear		2
Lagurus ovatus	Hare's Tail Grass		2
Minuartia mediterranea	Slender Sandwort		0
Parapholis incurva	Curly Ryegrass		1
Parentucellia latifolia	Red Bartsia		0
Poa annua (NC)	Winter Grass		0
Rostraria cristata	Annual Cat's-tail		2
Senecio pterophorus	African Daisy		2
Silene nocturna	Mediterranean Catchfly		1
Sonchus oleraceus (NC)	Common Sow-thistle		0
Stellaria media	Chickweed		0
Trifolium campestre	Hop Clover		2
Vulpia muralis	Wall Fescue		2
Vulpia myuros f. myuros	Rat's-tail Fescue		2

D: Declared weed, RA: Red alert weed

Native flora*

Species	Common Name	Aus status	SA status
Poa fax	Scaly Poa		R
Acacia anceps			
Acacia anceps (NC)	Angled Wattle		
Acacia cupularis	Cup Wattle		
Acacia longifolia ssp. sophorae	Coastal Wattle		
Acacia nematophylla	Coast Wallowa		
Acacia rupicola	Rock Wattle		
Acacia sp. Winged (C.R.Alcock 4936) X Acacia nematophylla	Hybrid Wattle		
Acacia spinescens	Spiny Wattle		
Acacia triquetra	Mallee Wreath Wattle		
Acaena echinata	Sheep's Burr		

Species	Common Name	Aus status	SA status
Acrotriche cordata	Blunt-leaf Ground-berry		
Acrotriche patula	Prickly Ground-berry		
Actites megalocarpa	Coast Sow-thistle		
Angianthus preissianus	Salt Angianthus		
Aphanes australiana	Australian Piert		
Aphanes australiana (NC)	Australian Piert		
Aphanes sp.	Piert		
Apium annuum	Annual Celery		
Argentipallium obtusifolium	Blunt Everlasting		
Arthropodium minus	Small Vanilla-lily		
Austrodanthonia setacea	Small-flower Wallaby-grass		
Austrostipa acrociliata	Graceful Spear-grass		
Austrostipa exilis	Heath Spear-grass		
Austrostipa flavescens	Coast Spear-grass		
Austrostipa mundula	Neat Spear-grass		
Austrostipa sp.	Spear-grass		
Beyeria lechenaultii	Pale Turpentine Bush		
Billardiera uniflora	One-flower Apple-berry		
Billardiera versicolor	Yellow-flower Apple-berry		
Brachyscome lineariloba	Hard-head Daisy		
Caladenia capillata	Wispy Spider-orchid		
Caladenia carnea	Pink Fingers		
Caladenia latifolia	Pink Caladenia		
Caladenia septuosa	Eyre Peninsula Spider-orchid		
Caladenia stricta	Upright Caladenia		
Calandrinia eremaea	Dryland Purslane		
Callistemon rugulosus var. (NC)	Scarlet Bottlebrush		
Callitris canescens	Scrubby Cypress Pine		
Calytrix tetragona	Common Fringe-myrtle		
Carpobrotus rossii	Native Pigface		
Carpobrotus rossii (NC)	Native Pigface		
Cassytha glabella f. dispar	Slender Dodder-laurel		
Cassytha melantha	Coarse Dodder-laurel		
Cassytha peninsularis	Peninsula Dodder-laurel		
Centrolepis polygyna	Wiry Centrolepis		
Choretrum glomeratum var.	Sour-bush		
Chrysocephalum apiculatum	Common Everlasting		
Cladophora valonioides			
Cladosiphon vermicularis			
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Comesperma volubile	Love Creeper		
Convolvulus erubescens complex			
Correa pulchella	Salmon Correa		
Correa reflexa (NC)	Common Correa		
Corybas despectans	Coast Helmet-orchid		
Cotula vulgaris var. australasica	Slender Cotula		
Craspedia glauca (NC)	Billy-buttons		
Crassula closiana	Stalked Crassula		
Crassula colligata ssp.			
Crassula colligata ssp. lamprosperma			
Crassula decumbens var. decumbens	Spreading Crassula		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Cyrtostylis robusta	Robust Gnat-orchid		

Species	Common Name	Aus status	SA status
Danthonia sp. (NC)	Wallaby-grass		
Daucus glochidiatus	Native Carrot		
Dianella brevicaulis	Short-stem Flax-lily		
Dichondra repens	Kidney Weed		
Dictyopteris nigricans			
Dodonaea humilis	Dwarf Hop-bush		
Drosera macrantha ssp. planchonii	Climbing Sundew		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eucalyptus angulosa	Coast Ridge-fruited Mallee		
Eucalyptus diversifolia (NC)	Coastal White Mallee		
Eucalyptus diversifolia ssp. diversifolia	Coastal White Mallee		
Eucalyptus oleosa (NC)	Red Mallee		
Eucalyptus oleosa ssp.			
Eucalyptus rugosa	Coastal White Mallee		
Euphrasia collina ssp. tetragona	Coast Eyebright		
Eutaxia microphylla	Common Eutaxia		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos syrticola	Coast Cherry		
Ficinia nodosa	Knobby Club-rush		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Gahnia deusta	Limestone Saw-sedge		
Gahnia lanigera	Black Grass Saw-sedge		
Galium gaudichaudii (NC)	Rough Bedstraw		
Geranium potentilloides var. potentilloides	Downy Geranium		
Geranium retrorsum	Grassland Geranium		
Geranium sp.	Geranium		
Gigartina disticha			
Gnaphalium indutum ssp. indutum	Tiny Cudweed		
Goodenia blackiana	Native Primrose		
Goodenia varia	Sticky Goodenia		
Grevillea pauciflora ssp. pauciflora	Few-flower Grevillea		
Hakea cycloptera	Elm-seed Hakea		
Haloragis acutangula f.	Smooth Raspwort		
Haloragis acutangula f. tetraptera	Smooth Raspwort		
Hardenbergia violacea	Native Lilac		
Helichrysum leucopsideum	Satin Everlasting		
Heterosiphonia muelleri			
Hibbertia australis	Stalked Guinea-flower		
Hibbertia platyphylla ssp. platyphylla			
Hibbertia sp.	Guinea-flower		
Hibbertia sp. Glabriuscula (D.J.Whibley 9012)	Smooth Guinea-flower		
Hibbertia virgata	Twiggy Guinea-flower		
Homoranthus homoranthoides	Port Lincoln Ground-myrtle		
Hydrocotyle capillaris	Thread Pennywort		
Hydrocotyle medicaginoides	Medic Pennywort		
Hypoxis glabella var. glabella	Tiny Star		
Ixodia achillaeoides ssp. achillaeoides	Coast Ixodia		
Kennedia prostrata	Scarlet Runner		
Lasiopetalum behrii	Pink Velvet-bush		
Lasiopetalum discolor	Coast Velvet-bush		
Leiocarpa supina	Coast Plover-daisy		
Lepidosperma congestum (NC)	Clustered Sword-sedge		
Lepidosperma gladiatum	Coast Sword-sedge		

Species	Common Name	Aus status	SA status
Lepidosperma sp.	Sword-sedge/Rapier-sedge		
Lepidosperma viscidum	Sticky Sword-sedge		
Leptorhynchos squamatus ssp. squamatus	Scaly Buttons		
Leptorhynchos waitzia	Button Immortelle		
Leucophyta brownii	Coast Cushion Bush		
Leucopogon parviflorus	Coast Beard-heath		
Leucopogon rufus	Ruddy Beard-heath		
Lichen sp.			
Liliaceae sp.	Lily Family		
Logania crassifolia	Coast Logania		
Logania ovata	Oval-leaf Logania		
Lomandra collina	Sand Mat-rush		
Lomandra effusa	Scented Mat-rush		
Lotus australis	Austral Trefoil		
Luzula densiflora	Dense Wood-rush		
Maireana oppositifolia	Salt Bluebush		
Melaleuca decussata	Totem-poles		
Melaleuca gibbosa	Slender Honey-myrtle		
Melaleuca lanceolata	Dryland Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Microcybe pauciflora ssp. pauciflora	Yellow Microcybe		
Microseris lanceolata	Yam Daisy		
Microtis arenaria	Notched Onion-orchid		
Microtis sp.	Onion-orchid		
Millotia major			
Mitrasacme paradoxa (NC)	Wiry Mitrewort		
Moss sp.			
Muehlenbeckia adpressa	Climbing Lignum		
Myoporum insulare	Common Boobialla		
Myosotis australis	Austral Forget-me-not		
Myriodesma harveyanum			
Olearia axillaris	Coast Daisy-bush		
Olearia ciliata var. ciliata	Fringed Daisy-bush		
Olearia minor	Heath Daisy-bush		
Opercularia turpis	Twiggy Stinkweed		
Oxalis perennans	Native Sorrel		
Parietaria debilis (NC)	Smooth-nettle		
Pelargonium australe	Austral Stork's-bill		
Pimelea glauca	Smooth Riceflower		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Plantago hispida	Hairy Plantain		
Plantago sp. B (R.Bates 44765)	Little Plantain		
Poa poiformis var. poiformis	Coast Tussock-grass		
Podolepis rugata var. littoralis	Coast Copper-wire Daisy		
Podotheca angustifolia	Sticky Long-heads		
Pogonolepis muelleriana	Stiff Cup-flower		
Pomaderris obcordata	Wedge-leaf Pomaderris		
Poranthera microphylla (NC)	Small Poranthera		
Poranthera triandra	Three-petal Poranthera		
Porphyra columbina			
Prostanthera serpyllifolia ssp. serpyllifolia	Thyme Mintbush		
Pseudognaphalium luteoalbum	Jersey Cudweed		
Pterostylis alata (NC)	Tall Shell-orchid		

Species	Common Name	Aus status	SA status
Pterostylis erythroconcha	Red Shell-orchid		
Pterostylis longifolia (NC)	Tall Greenhood		
Pterostylis nana	Dwarf Greenhood		
Pterostylis sanguinea	Blood Greenhood		
Pterostylis smaragdyna (NC)			
Pterostylis viriosa			
Pultenaea acerosa	Bristly Bush-pea		
Pultenaea rigida var. ovata	Rigid Bush-pea		
Pultenaea tenuifolia	Narrow-leaf Bush-pea		
Pultenaea vestita	Feather Bush-pea		
Pultenaea vestita (NC)	Feather Bush-pea		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Sagina maritima	Sea Pearlwort		
Samolus repens	Creeping Brookweed		
Scaevola angustata	Coast Fanflower		
Scaevola crassifolia	Cushion Fanflower		
Schoenus deformis	Small Bog-rush		
Sclerolaena uniflora	Small-spine Bindyi		
Sebaea ovata	Yellow Sebaea		
Senecio pinnatifolius (NC)	Variable Groundsel		
Spyridium phylicoides	Narrow-leaf Spyridium		
Stackhousia aspericocca ssp. Cylindrical inflorescence (W.R.Barker 1418)	Bushy Candles		
Stackhousia aspericocca ssp. One-sided inflorescence (W.R.Barker 697)	One-sided Candles		
Stackhousia spathulata	Coast Candles		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Thelymitra nuda	Scented Sun-orchid		
Threlkeldia diffusa	Coast Bonefruit		
Thysanotus baueri	Mallee Fringe-lily		
Thysanotus patersonii	Twining Fringe-lily		
Thysanotus sp.	Fringe-lily		
Trachymene pilosa	Dwarf Trachymene		
Trachymene sp.	Trachymene		
Triglochin centrocarpum (NC)	Dwarf Arrowgrass		
Triglochin mucronata	Prickly Arrowgrass		
Triglochin trichophora			
Veronica hillebrandii	Rigid Speedwell		
Vittadinia australasica var. australasica	Sticky New Holland Daisy		
Vittadinia cuneata var. cuneata f. cuneata	Fuzzy New Holland Daisy		
Zygophyllum ammophilum (NC)	Sand Twinleaf		
Zygophyllum billardierei	Coast Twinleaf		

R: Rare, V: Vulnerable, E: Endangered
* note: includes some marine species

Fauna

# of fauna in cell	86 recorded – 58 birds, 4 butterflies, 6 mammals, 18 reptiles, 2 amphibians (an additional 10 reptiles and 20 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	3 surveys, 57 opportune site

# of threatened fauna in cell	9
# of non-indigenous fauna	6 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Sturnus vulgaris	Common Starling	Aves	x
Turdus merula	Common Blackbird	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p
Felis catus	Cat (Feral Cat)	Mammalia	x
Mus musculus	House Mouse	Mammalia	x
Oryctolagus cuniculus	Rabbit (European Rabbit)	Mammalia	x
Vulpes vulpes	Fox (Red Fox)	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Pandion cristatus	Eastern Osprey	M	E
Psophodes nigrogularis leucogaster	Western Whipbird (Eastern subspecies)	V	E
Stipiturus malachurus parimeda	Southern Emu-wren (Eyre Peninsula ssp)	V	E
Stagonopleura guttata	Diamond Firetail		V
Thinornis rubricollis	Hooded Plover		V
Falco peregrinus	Peregrine Falcon		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Neophema petrophila	Rock Parrot		R
Turnix varius	Painted Button-quail		R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Acanthiza apicalis	Inland Thornbill		
Accipiter cirrocephalus	Collared Sparrowhawk		
Accipiter fasciatus	Brown Goshawk		
Anthochaera carunculata	Red Wattlebird		
Anthus novaeseelandiae	Australasian Pipit		
Aquila audax	Wedge-tailed Eagle		
Ardenna tenuirostris	Short-tailed Shearwater		
Artamus cyanopterus	Dusky Woodswallow		
Barnardius zonarius	Australian Ringneck, (Ring-necked Parrot)		
Calamanthus campestris	Rufous Fieldwren		
Chroicocephalus novaehollandiae	Silver Gull		
Circus approximans	Swamp Harrier		
Colluricincla harmonica	Grey Shrike-thrush		
Corvus coronoides	Australian Raven		
Cracticus tibicen	Australian Magpie		
Cracticus torquatus	Grey Butcherbird		
Dromaius novaehollandiae	Emu		
Drymodes brunneopygia	Southern Scrub-robin		
Eolophus roseicapillus	Galah		
Eopsaltria griseogularis	Western Yellow Robin		
Falco cenchroides	Nankeen Kestrel		
Glyciphila melanops	Tawny-crowned Honeyeater		
Hirundo neoxena	Welcome Swallow		
Larus pacificus	Pacific Gull		

Species	Common Name	Aus status	SA status
Lichenostomus cratitius	Purple-gaped Honeyeater		ssp
Lichenostomus virescens	Singing Honeyeater		
Malurus cyaneus	Superb Fairy-wren		
Malurus pulcherrimus	Blue-breasted Fairy-wren		
Melithreptus brevirostris	Brown-headed Honeyeater		
Morus serrator	Australasian Gannet		
Pardalotus punctatus	Spotted Pardalote		
Pardalotus striatus	Striated Pardalote		
Pardolotus xanthopygus	Yellow-tailed Pardalote		
Phaps chalcoptera	Common Bronzewing		
Phaps elegans	Brush Bronzewing		
Phylidonyris novaehollandiae	New Holland Honeyeater		
Pomatostomus superciliosus	White-browed Babbler		
Psophodes nigrogularis	Western Whipbird	ssp	ssp
Rhipidura albiscapa	Grey Fantail		
Rhipidura leucophrys	Willie Wagtail		
Sericornis frontalis	White-browed Scrubwren		
Stipiturus malachurus	Southern Emu-wren	ssp	ssp
Strepera versicolor	Grey Currawong		ssp
Tadorna tadornoides	Australian Shelduck		
Thalasseus bergii	Crested Tern		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		x
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	x
Vanessa itea	Australian Admiral	LU, Mi	x
Zizina labradus labradus	Common Grass-blue	LC	x

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom

x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Macropus fuliginosus	Western Grey Kangaroo		
Rattus fuscipes	Bush Rat		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Bassiana trilineata	Western Three-lined Skink		R	e
Amphibolurus norrisi	Mallee Tree-dragon			x
Aprasia striolata	Lined Worm-lizard			c
Christinus marmoratus	Marbled Gecko			x
Ctenophorus chapmani	Prickly Dragon			x
Ctenophorus fionni	Peninsula Dragon			c
Ctenophorus pictus	Painted Dragon			x
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Drysdalia mastersii	Master's Snake			c
Egernia stokesii	Gidgee Skink			e
Gehyra variegata	Tree Dtella			e
Hemiergis peronii	Four-toed Earless Skink			x
Lampropholis delicata	Delicate Skink			x
Lerista bougainvillii	Bougainville's Skink			x
Lerista dorsalis	Southern Four-toed Slider			x
Lerista edwardsae	Myall Slider			x
Lerista terdigitata	Southern Three-toed Slider			x
Liopholis multiscutata	Bull Skink			x
Menetia greyii	Dwarf Skink			x
Morethia adelaidensis	Adelaide Snake-eye			x
Nephrurus milii	Barking Gecko			c
Notechis scutatus	Eastern Tiger Snake	ssp		x
Pseudonaja inframacula	Peninsula Brown Snake			x
Tiliqua rugosa	Sleepy Lizard			x
Tympanocryptis lineata	Five-lined Earless Dragon			c

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

Species	Common Name	Aus status	SA status	Record
Neobatrachus pictus	Burrowing frog			x
Crinia signifera	Common Froglet			x

Cell EP36 Coffin Bay NP

Cell area 16,656 ha. Shoreline length 39.27 km.

Landforms

This is the largest cell in the region and the majority of the land surface is Holocene sands, nearly half of which is de-vegetated and unstable. At maximum the active dunes have transgressed up to 9 km inland, presumably intermittently, over the last 7,000 years (average 1.2m/yr). However, recent dune drift mapping found that the dunes had transgressed approximately 159 metres between 1979 and 2004, which is an annual rate of 6.4m per year. In the north east of the cell there is a low undulating plain of calcarenite.
Gunyah Beach is a long, fine to medium grade sand, high energy, dissipative beach with a 300m sandbar/surf zone. Short et al p.80 1986, note that Gunyah Beach has the highest wave energy on the Eyre Peninsula, as shown in the dissipative double barred beach. Huge amounts of marine sediment have been driven ashore here over time: firstly to form the Pleistocene calcarenite, and later in the Holocene sands, thus forming a massive barrier. The underlying calcarenite is exposed in places: often at the trailing edge of transgressive dunes; this is frequently apparent in the foredune area. At these locations the calcarenite may provide some stability in the current phase of shoreline recession. At the SE end of Gunyah Beach, the last 3.5 km to Shoal Point is low bluffs and medium cliffs of calcarenite; at this end of the beach the Holocene dunes are stable. Point Avoid is a calcarenite headland with 10 to 20 metre cliffs on two sides.

Benthic Habitat

Off Gunyah Beach there is bare sand. There is some inshore sand, with dense offshore seagrass, in Coffin Bay. These bare sand habitats are often rich in a diverse range of bivalves and other sand-dwelling invertebrates (Baker 2004).

Biota

There are 11 BDBSA flora and 1 fauna survey sites, but only in the north of the cell and clustered at Point Avoid; there are 49 opportunistic fauna sites, though none in the south of the cell, there are 62 herbarium record sites, which are also concentrated in the north of the cell. This is the largest total cell area of remnant vegetation in this project, at 12,184 ha (73%), with considerable variation in vegetation type. Mid mallee woodland of *Eucalyptus diversifolia ssp. diversifolia, +/- Allocasuarina verticillata* is found both on the dunes and the calcarenite surface. Mid open shrubland of *Leucopogon parviflorus, +/-Olearia axillaris* over *Rhagodia candolleana ssp. candolleana, Isolepis nodosa* occurs mainly on the inner dunes and calcarenite. Low woodland of *Allocasuarina*

verticillata over *Olearia axillaris, Leucopogon parviflorus, Melaleuca lanceolata* tall shrubs is found on the northern edge of the dunes; also there is a small area of *Acrotriche patula* low open shrubland within the dunes.

FIGURE 6.18 Gunyah Beach, Coffin Bay NP, Coffin Bay; Mt Dutton in background. Photo: Coast Protection Board, 2007

Land Use/ Land Ownership

The majority of this cell (78%) is within the Coffin Bay NP, however an area abutting the coast in the south of the cell near Shoal Point is privately owned. A small area in the east of the cell, landward of the large dune system is also in private ownership, part of which is under a Heritage Agreement (4.3% of the cell). The land immediately south of the Heritage agreement is a Crown Lands Act reserve under the care, control and management of the Minister for Government Enterprises.
Coffin Bay Coastal Wetland System is a 'Wetland of National Importance', SA008.

Thorny Passage Marine Park offshore.

Uses (Field visits and local reports)

Recreation and tourism – ORV, fishing, camping, sightseeing, diving, boating, walking, nature observation, surfing
Conservation
Boat launching – professional and recreational fisheries
Cockling

Values (Field visits and local reports)

This cell supports an internationally significant population of the focal species, Australian Pied Oystercatcher: Gunyah Beach, 15 km (max population 58, minimum 15 breeding pairs); Long

Beach provides feeding and roosting sites post breeding (maximum 167) (Cooper and Graham 2010).

Gunyah Beach regularly supports internationally significant populations of the migratory Sanderling *Calidris alba*. Sanderling flagged and banded in South Eastern Victoria and the South East of South Australia are regularly recorded on Gunyah Beach. Gunyah Beach also provides breeding habitat for Hooded Plover (max 34 Hooded Plover counted post breeding, min 10-12 breeding pairs).

Pipis *Donax deltoides* and *Paphes elongata*, worms and other rich invertebrate prey species for breeding Australian Pied Oystercatchers and post breeding juvenile Sooty Oystercatchers are present intermittently along the Gunyah/Almonta ocean beach.

This cell is included within the Coffin Bay Important Bird Area (important for Australian Pied Oystercatcher, Sooty Oystercatcher, Western Whipbird, Fairy Tern, Blue-breasted Fairy Wren and Rock Parrot) and is part of the Birds Australia Shorebirds 2020 Population Monitoring Program.

Threats (Field visits and local reports)

Feral animals (fox, cats, rabbits)
Illegal entry of dogs in NP
ORV – disturbance of resident and migratory shorebirds, dune vegetation destruction and erosion, samphire destruction
ORV in restricted vehicle access areas
Formal and Informal camping
Firewood collection
Over-extraction of pipis
Invasive environmental weeds, particular garden escapees where cell borders Coffin Bay township
Vehicles speeding in NP – death of fauna
Marine debris
Development (in privately owned land)
Eco-tourism / tourism ventures
Wildfire
PCASS

Opportunities (Field visits and local reports)

Marine debris survey Gunyah Beach and Avoid Bay
Restricted vehicle access southern end of Long Beach
Feral baiting program
Scoping the Shoreline Project 2006-2010, 4 survey sites; 4 visits per year for 5 years with additional full beach counts for Gunyah/Almonta Beach (Cooper & Graham 2010).
Coffin Bay vegetation management plan prepared by Lower Eyre Coastcare Association
Active volunteers (Lower Eyre Coastcare Assoc., Friends of Coffin Bay Parks, shore bird monitoring, marine debris surveys, coastal weeds booklet)
Coffin Bay National Park Management Plan.

Conservation Analysis (GIS)

The total of conservation means 146.54 is the fourth highest in the region. Within the large area of the cell only the unvegetated dune areas show total scores below average; there are large areas recording high totals.

The layer statistics show that many variables contribute to these totals, only the threatened status of vegetation communities, non-Indigenous heritage and geological heritage are absent. The presence of rare plant communities is almost uniformly high; threatened plant species is high to medium; presence of threatened fauna species varies, but is highest on, and around, foredune and bare sand areas; vegetated dunes show medium to high values for total number of threatened plant and animal species. Endemic plant communities detail high and medium high across the cell; endemic plant associations based on NVIS show a complex pattern of very high (*Leucopogon parviflorus* open shrubland) and very low values; species richness emerges as a complex pattern of medium to high values, with medium values on the de-vegetated dunes. Medium values for threatened bird habitat, but high for all bird species; habitat for threatened reptiles and all reptile species are high to medium on all dune areas; mammal habitat has generally medium and medium to high values; butterfly habitat scores are very high in all vegetated areas. Focal species raptor habitats, Beach slider and Bight Coast Skink habitats show values. Viewscape and vegetation patch metrics contribute high values.
Eleven mammal, 26 reptile and 116 bird species have been recorded in this cell, including the state endangered Western Whipbird (Eastern ssp.), Southern Emu-wren (EP ssp.), Eastern Osprey and White-bellied Sea-Eagle. The state vulnerable Heath Goanna, Diamond Firetail and the Hooded Plover are recorded within the cell.

Threat Analysis (GIS)

The total of threat summary layers is low, 29.64. The pattern of threat values shows medium high totals on the bare sand areas relatively near the shore (this mirrors the pattern of ORV threats), with patches of medium threat near Coffin Bay township and at Point Avoid.
The major contributors are dune instability (the largest proportional cell area in the region); ORV activity; numbers of exotic plant species and the distribution of significant weeds, also extensive high values for viewscape. Existing development at Point Avoid and near Coffin Bay township add further threats. Weed threats appear concentrated near Yangie Bay and Long Beach – Coffin Bay township.

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, dune and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Marked beach recession and dune instability	Active management of dunes to reduce widespread transgression	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
2070: +c.80cm	Further sea level rise leads to beach and foredune erosion and dune transgression landward, (but shoreline recession is stopped by calcarenite outcrop).	Monitor beach and foredune change through the establishment of a profile at Gunyah Beach	
Storms: *Frequency* continues to show great variation on a decadal scale.	Storm tide flooding above highest known tides.		
Intensity of large storms increases.			
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere. There will be an increased risk for species that are already vulnerable. Invasive species are likely to become more dominant.		Maintain connectivity of vegetation
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage, with invasion of grass species.	Active dune management, including weed control, to reduce instability.	Ensure dunes are included in regional fire plan
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	There is a potential local impact on water tables, mainly within the calcarenite in the north of the cell, but including any perched water tables within the dunes, and thus vegetation survival.	Adaptive management of plant assets, including water table monitoring.	
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintained. Possible changes in the refracted pattern of swell and the wave climate have the potential to modify the plan-shape of the embayments.	Monitor beaches, see above.	

TABLE 6.16 Recommended Actions and Priority for EP36 Coffin Bay NP

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	High	DENR, EP NRM
	Climate change and sea level rise is having multiple effects within the cell.	Ensure the establishment and maintenance of a time series of aerial photographs at an appropriate resolution. Establish new DENR profile, to accurately track beach and dune recession. Seek to improve the resilience of plant and animal habitats by taking opportunities to improve connectivity between vegetation blocks.	Medium (cons)	DENR, EP NRM, community groups
	Beach habitats will normally recede as sea level rises. Here beaches will be lost where recession reaches underlying calcarenite, raising the value of the remaining habitat.	Maintain a record of beach change, to manage habitat adaptively.	Medium (threat)	DENR, EP NRM
	Potential impact on breeding habitat of the endangered Eastern Osprey, particularly during the breeding season.	Develop site management and monitoring strategy, including consideration to closure, relocation or seasonal closures of roads/walking tracks/car parks in the near vicinity. Ensure management/works programs are not undertaken during the breeding season. Community education.	High (cons)	DENR, EP NRM
	Significant shorebird breeding/ feeding / habitat, with disturbance from people, vehicles, pest animals.	Develop and implement site management and monitoring strategies to protect these valuable habitats, eg. interpretive signage, fencing off nests, use of chick shelters, feral animal control programs, temporary signage in breeding territories, restricting vehicles during breeding/migratory season. Support ongoing shorebird monitoring programs. Community education and awareness programs, eg. "chicks on beach".	High (cons)	DENR, EP NRM, Tourism SA, Birds Australia, Friends of Coffin Bay Parks

Component	Issue	Proposed Action	Priority of Action	Key Players
	Informal camping occurs within the cell, with potential impact from soil compaction, vegetation damage, increased fire risk, dune instability, weed introduction.	Monitor impacts of camping. Review locations, management and need for camping in this location, with consideration to close and sign areas inappropriate for camping and/or formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping is to be allowed.	Medium (cons/ threat)	DENR
	Unrestricted access and multiple vehicle tracks around the coast impacting on the coastal dune and cliff top vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species.	Review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	Medium (cons/ threat)	DENR
	Potential impacts on Aboriginal heritage sites.	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, community groups, EP NRM
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals, eg. rabbits foxes, cats. Undertake control program as required.	Medium	DENR, EP NRM, private land owners, Friends of Coffin Bay Parks
	Vehicles on beaches with potential impact on meiofauna and shorebirds, particularly breeding habitat of the Hooded Plover and Australian Pied Oystercatcher.	Review locations with a view to rationalise and/or reduce areas. Monitor impacts. Enforce restrictions. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing.	High (cons)	DENR, EP NRM, Birds Australia, SA Tourism, community groups

Component	Issue	Proposed Action	Priority of Action	Key Players
Northern area of cell (from Coffin Bay township to EP37 boundary)	Invasive weed species identified.	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required).	High (cons/ threat)	DENR, EP NRM, Friends of Coffin Bay Parks
Gunyah Beach and de-vegetated foredunes	This area has the potential for further instability due to current on-going and accelerating sea level rise. Climate change is likely to threaten stressed plant species with replacement by grassy exotics. There is also the potential to de-stabilise further large volumes of sand and leading to further shoreline retreat.	Establish marker points and a photographic record of annual foredune change. Slow transgression through strategic dune management.	Medium	DENR, Friends of Coffin Bay Parks, EP NRM
	Cockling for pipis has increased significantly – with damage to upper beach and foredunes, reduced food source for shorebird species, disturbance/ damage to other flora and fauna species.	Initiate dialogue with PIRSA regarding a coordinated approach to protecting both the pipis and the breeding Hooded Plover and Australian Pied Oystercatchers.	High (cons/ threat)	DENR, PIRSA
	Marine debris with potential impact on native fauna species	Investigate opportunities for, and/or support, ongoing marine debris cleanup programs. Undertake education program targeting fishers, campers, aquaculture operators.	Medium (cons/ threat)	PIRSA, EP NRM, DENR, aquaculture operators, community, DC of Lower Eyre Peninsula
All salt marsh areas	All salt marsh areas have the potential for acid sulfate soil following disturbance; in turn this would potentially threaten life forms offshore.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Medium (threat)	DENR

Component	Issue	Proposed Action	Priority of Action	Key Players
Coffin Bay NP	The NP has very high conservation values.	Ongoing implementation of the Management Plan to protect threatened species and minimise impacts and threats to flora and fauna.	High (cons)	DENR
	Sand mining tenement occurs within the Park, with potential impact on sensitive areas and conservation values.	Ensure any mining activities avoid areas of high conservation significance. Investigate/ consider removal of tenements from high conservation areas.	High (cons/ threat)	PIRSA, DENR
Vegetated dunes near Coffin Bay township	This is an area with very high total conservation values (Low woodland of *Allocasuarina verticillata)*, but threatened with invasive weeds.	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	High (cons/ threat)	DENR, Friends of Coffin Bay Parks
	Existing development impacting on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc).	Work with private land owners to minimise impact from existing development, including education and restoration where appropriate. Continue support for community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs and cats, ORV, etc. Seek funding to undertake weed control program. Adopt recommendations in Coffin Bay vegetation management plan.	High (cons/ threat)	EP NRM, DC of Lower Eyre Peninsula, DENR, private land owners, community groups
Private land holdings	Vegetation protection and feral plant and animal control on heritage agreement areas	Assist heritage agreement landholders to maintain integrity of vegetation.	High (cons/ threat)	Private land holders, EP NRM, DENR
	Mining exploration licence, including on part of the Heritage Agreement, with potential impact on sensitive areas and conservation values.	Ensure any mining activities avoid areas of high conservation significance. Investigate/ consider removal of exploration licence from high conservation areas.	Medium (cons/ threat)	PIRSA, DENR, EP NRM, DC of Lower Eyre Peninsula

BIOTA

Flora

Remnant vegetation area (ha)	12,184.13 ha, 73.15% of cell area
# flora surveys / records	11 surveys, 62 herbarium record sites, 1 threatened plant population record site.
# flora in cell	341 (note: includes some marine species)
# conservation rated flora in cell	4
# non-indigenous flora in cell	49
Significant CDCS floristic community	*Eucalyptus diversifolia* / *Clematis microphylla* mallee – 81% of SA records in EP *Atriplex cinerea* shrublands – 20 sites recorded within SA, 60% of these in EP *Leucopogon parviflorus* / *Acrotriche patula* shrubland – <20 (13) sites recorded along SA coast, 100% of these in EP
Protected area	78% of remnant vegetation protected, mostly within Coffin Bay NP, but a small area within a Heritage Agreement

Weeds

Species	Common Name	Status	Study rating
Acacia cyclops	Western Coastal Wattle	RA	5
Arctotheca populifolia	Beach Daisy	RA	7
Argyranthemum frutescens ssp. foeniculaceum	Teneriffe Daisy	RA	4
Euphorbia paralias	Sea Spurge	RA	5
Euphorbia peplus	Petty Spurge	RA	5
Gazania rigens	Gazania	RA	6
Limonium companyonis	Sea-lavender	RA	7
Asparagus asparagoides (NC)	Bridal Creeper	D, RA	9
Euphorbia terracina	False Caper	D, RA	5
Lycium ferocissimum	African Boxthorn	D, RA	8
Oxalis pes-caprae	Soursob	D, RA	5
Pinus halepensis	Aleppo Pine	D, RA	5
Asphodelus fistulosus	Onion Weed	D	3
Diplotaxis tenuifolia	Lincoln Weed	D	3
Echium plantagineum	Salvation Jane	D	2
Ammophila arenaria	Marram Grass		2
Anagallis arvensis	Pimpernel		2
Avellinia michelii	Avellinia		0
Avena barbata	Bearded Oat		2
Bromus hordeaceus ssp. hordeaceus	Soft Brome		2
Bromus rubens	Red Brome		2
Buglossoides arvensis	Sheepweed		0
Cakile maritima ssp. maritima	Two-horned Sea Rocket		1
Catapodium rigidum	Rigid Fescue		1
Centaurea melitensis	Malta Thistle		1
Cerastium balearicum	Chickweed		1
Coleonema pulchellum	Diosma		3
Ehrharta longiflora	Annual Veldt Grass		3
Erodium cicutarium	Cut-leaf Heron's-bill		0
Galium murale	Small Bedstraw		0
Hornungia procumbens	Oval Purse		0
Hypochaeris glabra	Smooth Cat's Ear		2

Species	Common Name	Status	Study rating
Isolepis marginata	Little Club-rush		0
Lagurus ovatus	Hare's Tail Grass		2
Lolium rigidum	Wimmera Ryegrass		1
Parapholis incurva	Curly Ryegrass		1
Parentucellia latifolia	Red Bartsia		0
Polypogon maritimus	Coast Beard-grass		0
Reichardia tingitana	False Sowthistle		3
Rosmarinus officinalis	Rosemary		0
Rostraria cristata	Annual Cat's-tail		2
Scabiosa atropurpurea	Pincushion		3
Senecio pterophorus	African Daisy		2
Sherardia arvensis	Field Madder		0
Silene nocturna	Mediterranean Catchfly		1
Solanum nigrum	Black Nightshade		2
Sonchus oleraceus (NC)	Common Sow-thistle		0
Stellaria media	Chickweed		0
Trifolium angustifolium	Narrow-leaf Clover		2

D: Declared weed, RA: Red alert weed

Native flora*

Species	Common Name	Aus status	SA status
Pleuropappus phyllocalymmeus	Silver Candles	V	V
Grevillea halmaturina ssp. laevis	Prickly Grevillea		R
Poa fax	Scaly Poa		R
Thysanotus wangariensis	Eyre Peninsula Fringe-lily		R
Acacia calamifolia (NC)	Wallowa		
Acacia cupularis	Cup Wattle		
Acacia leiophylla	Coast Golden Wattle		
Acacia ligulata	Umbrella Bush		
Acacia longifolia ssp. sophorae	Coastal Wattle		
Acacia nematophylla	Coast Wallowa		
Acacia paradoxa	Kangaroo Thorn		
Acacia rupicola	Rock Wattle		
Acacia spinescens	Spiny Wattle		
Acacia triquetra	Mallee Wreath Wattle		
Acaena echinata	Sheep's Burr		
Acaena sp.	Sheep's Burr		
Acrotriche cordata	Blunt-leaf Ground-berry		
Acrotriche patula	Prickly Ground-berry		
Adenanthos terminalis	Yellow Gland-flower		
Adriana klotzschii (NC)	Coast Bitter-bush		
Adriana quadripartita	Coast Bitter-bush		
Alleynea bicornis			
Allocasuarina verticillata	Drooping Sheoak		
Anotrichium crinitum			
Anotrichium elongatum			
Antithamnion gracilentum			
Aphanes australiana	Australian Piert		
Apium annuum	Annual Celery		
Apium prostratum var. filiforme	Native Celery		
Arthropodium fimbriatum	Nodding Vanilla-lily		

Species	Common Name	Aus status	SA status
Atriplex cinerea	Coast Saltbush		
Audouinella bonnemaisoniae			
Audouinella humilis			
Audouinella liagorae			
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrodanthonia setacea	Small-flower Wallaby-grass		
Austrofestuca littoralis	Coast Fescue		
Austronereia australis			
Austrostipa eremophila	Rusty Spear-grass		
Austrostipa exilis	Heath Spear-grass		
Austrostipa flavescens	Coast Spear-grass		
Ballia callitricha			
Banksia marginata	Silver Banksia		
Baumea arthrophylla	Swamp Twig-rush		
Baumea juncea	Bare Twig-rush		
Beyeria lechenaultii	Pale Turpentine Bush		
Bulbine semibarbata	Small Leek-lily		
Bursaria spinosa ssp. spinosa	Sweet Bursaria		
Caladenia cardiochila	Heart-lip Spider-orchid		
Caladenia latifolia	Pink Caladenia		
Calandrinia eremaea	Dryland Purslane		
Calliblepharis planicaulis			
Camontagnea oxyclada			
Carpobrotus rossii	Native Pigface		
Carpobrotus rossii (NC)	Native Pigface		
Cassytha glabella f. dispar	Slender Dodder-laurel		
Cassytha peninsularis	Peninsula Dodder-laurel		
Cassytha pubescens	Downy Dodder-laurel		
Caulerpa brownii			
Caulerpa flexilis			
Caulerpa longifolia			
Caulerpa longifolia f. crispata			
Centrolepis polygyna	Wiry Centrolepis		
Ceramium pusillum			
Ceramium rubrum			
Champia affinis			
Chauviniella coriifolia			
Chlanidophora microphylla			
Chondria fusifolia			
Clematis microphylla			
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Comesperma volubile	Love Creeper		
Correa pulchella	Salmon Correa		
Corybas despectans	Coast Helmet-orchid		
Corynophlaea cystophorae			
Cotula vulgaris var. australasica	Slender Cotula		
Craspedia glauca (NC)	Billy-buttons		
Crassula decumbens var. decumbens	Spreading Crassula		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Cyrtostylis robusta	Robust Gnat-orchid		
Cystophora brownii			
Cystophora intermedia			
Cystophora moniliformis			

Species	Common Name	Aus status	SA status
Cystophora siliquosa			
Danthonia sp. (NC)	Wallaby-grass		
Dasya clavigera			
Dasya extensa			
Daucus glochidiatus	Native Carrot		
Delisea hypneoides			
Delisea pulchra			
Dianella brevicaulis	Short-stem Flax-lily		
Dianella brevicaulis/revoluta var.	Black-anther Flax-lily		
Dichelachne crinita	Long-hair Plume-grass		
Dictyota diemensis			
Dodonaea humilis	Dwarf Hop-bush		
Dodonaea viscosa ssp. spatulata	Sticky Hop-bush		
Doxodasya bolbochaete			
Drewiana nitella			
Drosera macrantha ssp. planchonii	Climbing Sundew		
Dudresnaya australis			
Ectocarpus siliculosus			
Encyothalia cliftonii			
Eucalyptus diversifolia (NC)	Coastal White Mallee		
Eucalyptus diversifolia ssp. diversifolia	Coastal White Mallee		
Eucalyptus gracilis	Yorrell		
Eucalyptus oleosa ssp. ampliata	Red Mallee		
Eucalyptus viminalis ssp. cygnetensis	Rough-bark Manna Gum		
Euphrasia collina ssp. tetragona	Coast Eyebright		
Euptilocladia villosa			
Eutaxia microphylla	Common Eutaxia		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos cupressiformis	Native Cherry		
Exocarpos sparteus	Slender Cherry		
Exocarpos syrticola	Coast Cherry		
Ficinia nodosa	Knobby Club-rush		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Gahnia deusta	Limestone Saw-sedge		
Gahnia lanigera	Black Grass Saw-sedge		
Gelidium australe			
Geranium solanderi var. solanderi	Austral Geranium		
Geranium sp.	Geranium		
Gigartina densa			
Glossophora nigricans			
Gnaphalium indutum ssp. indutum	Tiny Cudweed		
Goodenia blackiana	Native Primrose		
Goodenia varia	Sticky Goodenia		
Goodia medicaginea	Western Golden-tip		
Gracilaria cliftonii			
Grevillea dilatata	Holly-leaf Grevillea		
Griffithsia gunniana			
Griffithsia teges			
Gyrostemon thesioides	Broom Wheel-fruit		
Hakea rugosa	Dwarf Hakea		
Hakea vittata	Limestone Needlebush		
Haliptilon roseum			
Haloplegma preissii			

Species	Common Name	Aus status	SA status
Haloragis acutangula f. acutangula	Smooth Raspwort		
Hardenbergia violacea	Native Lilac		
Helichrysum leucopsideum	Satin Everlasting		
Helminthora australis			
Hemineura frondosa			
Heterodoxia denticulata			
Heterosiphonia gunniana			
Hibbertia platyphylla ssp. platyphylla			
Hibbertia riparia	Bristly Guinea-flower		
Hibbertia riparia (NC)	Guinea-flower		
Hibbertia sericea var. major (NC)	Large Guinea-flower		
Hincksia granulosa			
Hirsutithallia tincta			
Hormosira banksii f. sieberi			
Hydrocotyle callicarpa	Tiny Pennywort		
Hydrocotyle capillaris	Thread Pennywort		
Hymenena curdieana			
Hymenena multipartita			
Hymenocladia chondricola			
Hypnea charoides			
Hypnea ramentacea			
Hypoglossum dendroides			
Hypoxis glabella var. glabella	Tiny Star		
Ixodia achillaeoides ssp. achillaeoides	Coast Ixodia		
Jania micrarthrodia			
Kallymenia cribrosa			
Kennedia prostrata	Scarlet Runner		
Lachnagrostis filiformis	Common Blown-grass		
Lasiopetalum discolor	Coast Velvet-bush		
Lasiopetalum schulzenii	Drooping Velvet-bush		
Lenormandia latifolia			
Lenormandia spectabilis			
Lepidosperma congestum			
Lepidosperma congestum (NC)	Clustered Sword-sedge		
Lepidosperma gladiatum	Coast Sword-sedge		
Lepidosperma sp.	Sword-sedge/Rapier-sedge		
Lepidosperma viscidum	Sticky Sword-sedge		
Leptorhynchos waitzia	Button Immortelle		
Leptosomia rosea			
Leucopogon parviflorus	Coast Beard-heath		
Liagora harveyana			
Linum marginale	Native Flax		
Lissanthe strigosa ssp. subulata	Peach Heath		
Lobospira bicuspidata			
Logania crassifolia	Coast Logania		
Logania ovata	Oval-leaf Logania		
Lomandra effusa	Scented Mat-rush		
Lotus australis	Austral Trefoil		
Luzula sp.	Wood-rush		
Macrothamnion pellucidum			
Melaleuca brevifolia	Short-leaf Honey-myrtle		
Melaleuca decussata	Totem-poles		
Melaleuca halmaturorum	Swamp Paper-bark		

Species	Common Name	Aus status	SA status
Melaleuca lanceolata	Dryland Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Metagoniolithon radiatum			
Microcybe pauciflora ssp. pauciflora	Yellow Microcybe		
Microtis arenaria	Notched Onion-orchid		
Microtis sp.	Onion-orchid		
Millotia major			
Minuria leptophylla	Minnie Daisy		
Moss sp.			
Muehlenbeckia adpressa	Climbing Lignum		
Myosotis australis	Austral Forget-me-not		
Myriodesma calophyllum			
Myriophyllum muelleri	Hooded Milfoil		
Naccaria naccarioides			
Nicotiana sp.	Tobacco		
Nitospinosa pristoidea			
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Oxalis perennans	Native Sorrel		
Oxalis perennans (NC)	Native Sorrel		
Pachydictyon paniculatum			
Parietaria debilis	Smooth-nettle		
Parietaria debilis (NC)	Smooth-nettle		
Pelargonium australe	Austral Stork's-bill		
Pelargonium littorale	Native Pelargonium		
Phacelocarpus apodus			
Phitymophora amansioides			
Pimelea flava ssp. dichotoma	Diosma Riceflower		
Pimelea glauca	Smooth Riceflower		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pittosporum angustifolium	Native Apricot		
Platyclinia ramosa			
Platyclinia stipitata			
Platysiphonia victoriae			
Plocamium preissianum			
Poa labillardieri var. labillardieri	Common Tussock-grass		
Poa poiformis var. poiformis	Coast Tussock-grass		
Poa sp.	Meadow-grass/Tussock-grass		
Podolepis rugata var. littoralis	Coast Copper-wire Daisy		
Podolepis rugata var. rugata	Pleated Copper-wire Daisy		
Podotheca angustifolia	Sticky Long-heads		
Pollexfenia lobata			
Polycerea nigrescens			
Polycoelia laciniata			
Polysiphonia decipiens			
Pomaderris obcordata	Wedge-leaf Pomaderris		
Pomaderris paniculosa ssp. paniculosa	Mallee Pomaderris		
Pomaderris paniculosa ssp. paralia	Coast Pomaderris		
Poranthera triandra	Three-petal Poranthera		
Pottia scabrifolia			
Pultenaea tenuifolia	Narrow-leaf Bush-pea		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia parabolica	Mealy Saltbush		

Species	Common Name	Aus status	SA status
Riccia albida			
Rumex brownii	Slender Dock		
Sagina maritima	Sea Pearlwort		
Samolus repens	Creeping Brookweed		
Santalum acuminatum	Quandong		
Sarcomenia delesserioides			
Scaevola crassifolia	Cushion Fanflower		
Schoenus nitens	Shiny Bog-rush		
Scinaia tsinglanensis			
Scytothalia dorycarpa			
Sebaea albidiflora	White Sebaea		
Sebaea ovata	Yellow Sebaea		
Semnocarpa corynephora			
Senecio glomeratus ssp. longifructus	Swamp Groundsel		
Senecio pinnatifolius (NC)	Variable Groundsel		
Senecio spanomerus			
Solanum simile	Kangaroo Apple		
Sphacelaria biradiata			
Spinifex hirsutus (NC)	Rolling Spinifex		
Sporobolus virginicus	Salt Couch		
Sporochnus comosus			
Sporochnus radiciformis			
Spyridia dasyoides			
Spyridia filamentosa			
Spyridium phylicoides	Narrow-leaf Spyridium		
Stackhousia aspericocca ssp. Cylindrical inflorescence (W.R.Barker 1418)	Bushy Candles		
Stackhousia spathulata	Coast Candles		
Suringariella harveyana			
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Thryptomene micrantha	Ribbed Thryptomene		
Thuretia quercifolia			
Thysanotus patersonii	Twining Fringe-lily		
Trachymene pilosa	Dwarf Trachymene		
Tricoryne elatior	Yellow Rush-lily		
Triglochin centrocarpum (NC)	Dwarf Arrowgrass		
Triglochin trichophora			
Tsengia feredayae			
Tylocolax microcarpus			
Veronica hillebrandii	Rigid Speedwell		
Vittadinia australasica var. australasica	Sticky New Holland Daisy		
Vittadinia dissecta var. hirta	Dissected New Holland Daisy		
Vittadinia megacephala	Giant New Holland Daisy		
Wahlenbergia communis	Tufted Bluebell		
Wahlenbergia stricta ssp. stricta	Tall Bluebell		
Webervanbossea splachnoides			
Wurmbea dioica ssp. brevifolia	Early Nancy		
Wurmbea dioica ssp. dioica (NC)	Early Nancy		
Zygophyllum glaucum	Pale Twinleaf		

R: Rare, V: Vulnerable, E: Endangered
* note: includes some marine species

Fauna

# of fauna in cell	152 recorded – 116 birds, 0 butterflies, 11 mammals, 26 reptiles, 0 amphibians (an additional 6 reptiles and 24 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	1 survey, 49 opportune sites
# of threatened fauna in cell	21
# of non-indigenous fauna	10 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Carduelis carduelis	European Goldfinch	Aves	x
Passer domesticus	House Sparrow	Aves	x
Sturnus vulgaris	Common Starling	Aves	x
Turdus merula	Common Blackbird	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p
Bos taurus	Cattle (European Cattle)	Mammalia	x
Equus caballus	Horse (Brumby)	Mammalia	x
Felis catus	Cat (Feral Cat)	Mammalia	x
Mus musculus	House Mouse	Mammalia	x
Oryctolagus cuniculus	Rabbit (European Rabbit)	Mammalia	x
Vulpes vulpes	Fox (Red Fox)	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Pandion cristatus	Eastern Osprey	M	E
Psophodes nigrogularis leucogaster	Western Whipbird (Eastern subspecies)	V	E
Stipiturus malachurus parimeda	Southern Emu-wren (Eyre Peninsula ssp)	V	E
*Numenius madagascariensis***	Eastern Curlew**	M	V
Stagonopleura guttata	Diamond Firetail		V
Thinornis rubricollis	Hooded Plover		V
Actitis hypoleucos	Common Sandpiper	M	R
Anas rhynchotis	Australasian Shoveler		R
Calidris alba	Sanderling	M	R
Cereopsis novaehollandiae	Cape Barren Goose		R
Egretta sacra	Eastern Reef Egret		R
Falco peregrinus	Peregrine Falcon		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Neophema elegans	Elegant Parrot		R
Neophema petrophila	Rock Parrot		R
Tringa glareola	Wood Sandpiper	M	R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Acanthiza apicalis	Inland Thornbill		
Acanthiza chrysorrhoa	Yellow-rumped Thornbill		
Acanthiza pusilla	Brown Thornbill		
Accipiter cirrocephalus	Collared Sparrowhawk		
Accipiter fasciatus	Brown Goshawk		

Species	Common Name	Aus status	SA status
Anas castanea	Chestnut Teal		
Anas gracilis	Grey Teal		
Anthochaera carunculata	Red Wattlebird		
Anthus novaeseelandiae	Australasian Pipit		
Aphelocephala leucopsis	Southern Whiteface		
Aquila audax	Wedge-tailed Eagle		
Ardenna tenuirostris	Short-tailed Shearwater		
Artamus cyanopterus	Dusky Woodswallow		
Barnardius zonarius	Australian Ringneck, (Ring-necked Parrot)		
Cacomantis flabelliformis	Fan-tailed Cuckoo		
Cacomantis pallidus	Pallid Cuckoo		
Calidris acuminata	Sharp-tailed Sandpiper	M	
Calidris ruficollis	Red-necked Stint	M	
Chalcites basalis	Horsfield's Bronze-cuckoo		
Chalcites lucidus	Shining Bronze-Cuckoo		
Charadrius ruficapillus	Red-capped Plover		
Chroicocephalus novaehollandiae	Silver Gull		
Circus approximans	Swamp Harrier		
Circus assimilis	Spotted Harrier		
Colluricincla harmonica	Grey Shrike-thrush		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Corvus coronoides	Australian Raven		
Corvus mellori	Little Raven		
Coturnix pectoralis	Stubble Quail		
Cracticus nigrogularis	Pied Butcherbird		
Cracticus tibicen	Australian Magpie		
Cracticus torquatus	Grey Butcherbird		
Cygnus atratus	Black Swan		
Dacelo novaeguineae	Laughing Kookaburra		
Dromaius novaehollandiae	Emu		
Drymodes brunneopygia	Southern Scrub-robin		
Egretta novaehollandiae	White-faced Heron		
Elanus axillaris	Black-shouldered Kite		
Eolophus roseicapillus	Galah		
Epthianura albifrons	White-fronted Chat		
Eudyptula minor	Little Penguin		
Falco berigora	Brown Falcon		
Falco cenchroides	Nankeen Kestrel		
Gallinago hardwickii	Japanese Snipe (Latham's Snipe)	M	
Gallirallus philippensis	Buff-banded Rail		
Glossopsitta concinna	Musk Lorikeet		
Glyciphila melanops	Tawny-crowned Honeyeater		
Grallina cyanoleuca	Magpie-lark		
Hieraaetus morphnoides	Little Eagle		
Himantopus himantopus	Black-winged Stilt		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Larus pacificus	Pacific Gull		
Lichenostomus cratitius	Purple-gaped Honeyeater		ssp
Lichenostomus virescens	Singing Honeyeater		
Malurus cyaneus	Superb Fairy-wren		
Malurus pulcherrimus	Blue-breasted Fairy-wren		
Megalurus gramineus	Little Grassbird		

Species	Common Name	Aus status	SA status
Melithreptus brevirostris	Brown-headed Honeyeater		
Microcarbo melanoleucos	Little Pied Cormorant		
Morus serrator	Australasian Gannet		
Ninox novaeseelandiae	Southern Boobook		
Ocyphaps lophotes	Crested Pigeon		
Pardalotus striatus	Striated Pardalote		
Pelecanus conspicillatus	Australian Pelican		
Petrochelidon ariel	Fairy Martin		
Petroica goodenovii	Red-capped Robin		
Petroica multicolor	Scarlet Robin		
Phalacrocorax carbo	Great Cormorant		
Phalacrocorax sulcirostris	Little Black Cormorant		
Phalacrocorax varius	Pied Cormorant		
Phaps chalcoptera	Common Bronzewing		
Phaps elegans	Brush Bronzewing		
Phylidonyris novaehollandiae	New Holland Honeyeater		
Pluvialis squatarola	Grey Plover	M	
Podargus strigoides	Tawny Frogmouth		
Poliocephalus poliocephalus	Hoary-headed Grebe		
Pomatostomus superciliosus	White-browed Babbler		
Porzana fluminea	Australian Spotted Crake		
Psophodes nigrogularis	Western Whipbird	ssp	ssp
Purnella albifrons	White-fronted Honeyeater		
Rhipidura albiscapa	Grey Fantail		
Rhipidura leucophrys	Willie Wagtail		
Sericornis frontalis	White-browed Scrubwren		
Smicrornis brevirostris	Weebill		
Strepera graculina	Pied Currawong		
Strepera versicolor	Grey Currawong		ssp
Thalasseus bergii	Crested Tern		
Trichoglossus haematodus	Rainbow Lorikeet		
Tringa nebularia	Common Greenshank	M	
Turnix velox	Little Button-quail		
Vanellus miles	Masked Lapwing		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

** note: Eastern Curlew has been included, but is unlikely to occur here as this cell does not provide suitable habitat.

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p

Species	Common Name	Status*	Record
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Trichosurus vulpecula	Common Brushtail Possum		R
Cercartetus concinnus	Western Pygmy-possum		
Macropus fuliginosus	Western Grey Kangaroo		
Nyctophilus geoffroyi	Lesser Long-eared Bat		
Rattus fuscipes	Bush Rat		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Chelonia mydas	Green Turtle	V	V	x
Varanus rosenbergi	Heath Goanna		V	x
Bassiana trilineata	Western Three-lined Skink		R	e
Amphibolurus norrisi	Mallee Tree-dragon			x
Aprasia inaurita	Red-tailed Worm-lizard			x
Aprasia striolata	Lined Worm-lizard			x
Christinus marmoratus	Marbled Gecko			x
Ctenophorus chapmani	Prickly Dragon			c
Ctenophorus fionni	Peninsula Dragon			x
Ctenophorus pictus	Painted Dragon			x
Ctenotus orientalis	Spotted Ctenotus			x
Delma australis	Barred Snake-lizard			x
Diplodactylus calcicolus	South Coast Gecko			x
Drysdalia mastersii	Master's Snake			x
Egernia stokesii	Gidgee Skink			x
Gehyra variegata	Tree Dtella			x
Hemiergis peronii	Four-toed Earless Skink			x
Lampropholis delicata	Delicate Skink			c
Lerista bougainvillii	Bougainville's Skink			x
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			x
Lerista terdigitata	Southern Three-toed Slider			x

Species	Common Name	Aus status	SA status	Record
Liopholis multiscutata	Bull Skink			x
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			x
Nephrurus milii	Barking Gecko			c
Notechis scutatus	Eastern Tiger Snake	ssp		x
Pogona barbata	Eastern Bearded Dragon			x
Pseudechis australis	Mulga Snake			x
Pseudonaja inframacula	Peninsula Brown Snake			x
Tympanocryptis lineata	Five-lined Earless Dragon			x
Varanus gouldii	Sand Goanna			x

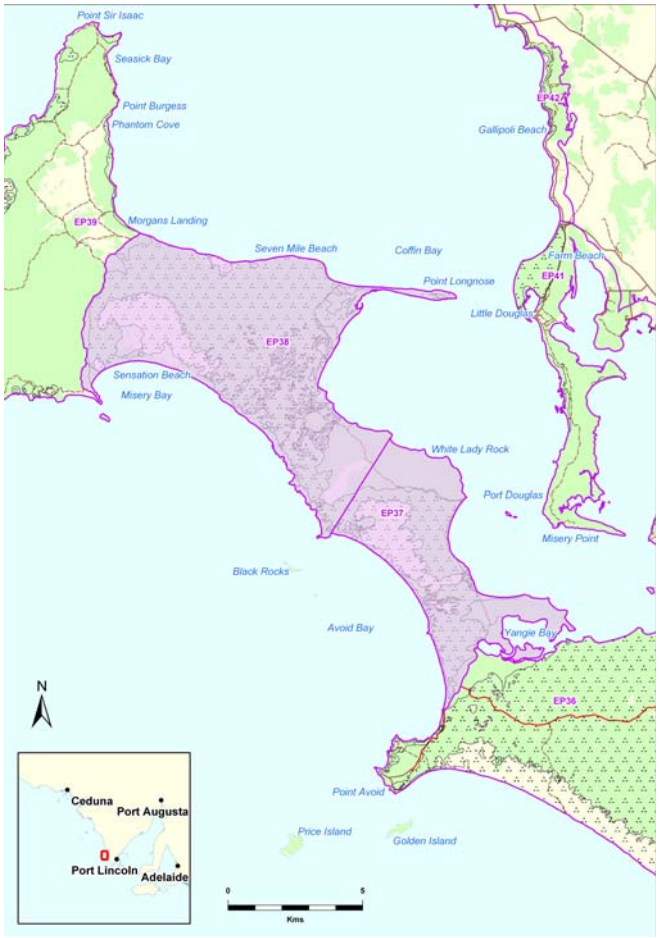
R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cells EP37 Avoid Bay & EP38 Dead Man Corner

Combined cell area 8,769 ha. Combined shoreline length 81.17 km.



Landforms

This cell is a central section of the stem of the Coffin Bay Peninsula; including Avoid Bay and Misery Bay on the SW ocean side, and a substantial section of the sheltered Coffin Bay shore, from Gate Waterhole to Yangie Bay. It is a composite Pleistocene and Holocene barrier over granite basement. Huge quantities of sand, brought ashore (in Holocene times) on the southern coast by the post-Glacial marine transgression, have moved across the peninsula, in places reaching the northern shore. The underlying lithified Pleistocene barrier forms an undulating plain that is exposed along the southern shore in cliffs and bluffs, and around playa Lake Damascus and broadly inland from White Lady Rock. The alignment of the southern coast of the peninsula appears to be determined by reefs and platforms of the basement granites of the Sleaford complex. The sheltered northern shore is narrow beaches, low dunes and bluffs; it is extending E in the 3.5km sand spit Point Longnose.
Extensive areas of transgressive Holocene dunes cover approximately three quarters of this cell; deflation of Holocene sands across the peninsula is causing sand loss from the ocean beaches (see Short et al 1986, p.80), and coastal retreat, exposing and eroding the Pleistocene calcarenite. The fine-medium grade sand, high energy, dissipative beaches of Avoid Bay and Sensation Beach are separated by low calcarenite cliffs running north from Black Rocks. On the Coffin Bay shoreline beaches are low energy, coarse sand and steep; backed by calcarenite bluffs and also some extensive sand patches.

Benthic Habitat

Coffin Bay waters recorded as patchy seagrass, except for a dense invertebrate community off White Lady Rock. The ocean shore is bare sand, with granite reef off headlands.

Biota

Approximately 80% of the composite cell is remnant vegetation: 6,971.09ha.
Included are complex patterns of Mid mallee woodland of *Eucalyptus diversifolia ssp. diversifolia, +/-Allocasuarina verticillata.* Mid open shrubland of *Leucopogon parviflorus, +/-Olearia axillaris* over *Rhagodia candolleana ssp. candolleana, Isolepis nodosa.* Low woodland of *Allocasuarina verticillata* over *Olearia axillaris, Leucopogon parviflorus, Melaleuca lanceolata* tall shrubs. Inland from Black Rocks there is emergent *Dodonaea viscosa ssp. spatulata* over *Westringia dampieri, Templetonia retusa, Eremophila glabra ssp., Correa reflexa var. scabridula* mid open shrubland over *Pelargonium australe, +/-Triodia irritans* low

forbs on thin sands over calcarenite next to Lake Damascus. There are also small areas of low emergent shrubland *Acacia sp. Winged (C.R.Alcock 4936*) near the shore of Misery Bay.
Within these 2 cells there are 15 BDBSA flora survey sites and 84 Herbarium record sites, 7 fauna survey sites and 67 opportunistic fauna sites.

FIGURE 6.19 Avoid Bay in foreground, looking towards Eely Point, Coffin Bay NP; Lake Damascus at left edge; Horse Peninsula in background. Photo: Coast Protection Board, 2007

Land Use/ Land Ownership

The whole of these two cells are protected within the Coffin Bay NP and Avoid Bay Islands CP.

Coffin Bay Coastal Wetland System is a 'Wetland of National Importance', SA008.

Thorny Passage Marine Park offshore.

Uses (Field visits and local reports)

Recreation and tourism – boating, fishing, diving, sightseeing, ORVs, camping, walking, nature observation, surfing
Professional and charter boat fishing
Cockling- professional and recreational
Offshore aquaculture
Ecotourism
Conservation

Values (Field visits and local reports)

Internationally significant Sanderling populations (Avoid Bay, Sensation Beach and Point Longnose sand flats) are listed here.

EP37 and EP38 support 15 migratory shorebird species listed under the EPBC Act. Listed migratory species are a matter of national significance.
These cells provide breeding habitat for Fairy Tern (AUS: V, SA: E) and Hooded Plover (SA: V).

Threats (Field visits and local reports)

Point Longnose is a prime area for cockling, which threatens the fauna species with disturbance and loss of food resources especially the internationally significant population of the Australian Pied Oystercatcher.

Oyster-farming and commercial cockle harvesting within Port Douglas contributes significantly to the reduction and degradation of nearshore and intertidal ecosystems that directly support critical shorebird feeding habitat. Rough weather and storm surges dislodge plastic baskets from oyster farms. Low tides expose large areas strewn with hundreds of baskets (Shorebirds 2020 surveys, Jane Cooper pers. comm.).

High tides, strong winds and storm surges have severely impacted the Seven Mile Beach foredunes. Increased coverage of Sea Spurge where the bare face of the dunes has been exposed. Seven Mile Beach is heavily impacted by continuous ORV usage. The beach is often narrow especially at high tide. Vehicles are forced to drive at the base of the foredune which is also critical breeding habitat for the Australian Pied Oystercatcher (Shorebirds 2020 surveys, J. Cooper pers. comm.).

Proximity to aquaculture – changes to sediment deposition and feral pacific oyster infestation
ORV- disturbance to beach nesting birds, dune vegetation destruction and erosion, degradation of samphire areas
Marine debris
Formal and Informal camping
Firewood collection
Over-extraction of pipis
Vehicles speeding in NP – death of fauna
Eco-tourism / tourism ventures
Wildfire
PCASS
Illegal entry of dogs in NP

Opportunities (Field visits and local reports)

EP NRM marine debris surveys
Potential marine park sanctuary zones
PIRSA Biosecurity /oyster growers pacific oyster removal
Active Friends of Coffin Bay Parks group
Introduction of vehicle exclusion zone on southern end of Long Beach
EP37: Scoping the Shoreline Project 2006-2010, 1 survey site; 4 visits per year for 5 years
EP38 : Scoping the Shoreline Project 2006-2010, 4 survey sites; 4 visits per year for 5 years
AWSG 1980s National summer count / Shorebirds 2020 Population Monitoring Program 2005-2011 Point Longnose, Seven Mile Beach and Sensation Beach 3 surveys per year.
Coffin Bay National Park Management Plan.

Conservation Analysis (GIS)

Within the region these cells have high total priority: EP38 has a total of 155.79, the highest in the region; EP37 is 145.95, the fifth highest total. The mapped pattern of total values is very high throughout; around Yangie Bay and White Lady Rocks on the northern shore there is slight

reduction to high to medium totals; the de-vegetated dune areas inland from Avoid Bay and Sensation Beach are slightly further reduced to medium to medium high totals.
As is the case with EP36, many variables contribute to these totals, only the threatened status of vegetation species, non-Indigenous heritage and geological heritage do not contribute.
The low ground immediately south of the stem of Point Longnose shows a concentration of values for threatened species; this is largely due to numbers of bird species including threatened species, although high values for threatened mammal habitat are also found widely, including this area. Species richness is medium high throughout the cells, with the exception of medium low values on the de-vegetated dunes and Lake Damascus. Status of threatened species, both flora and fauna, shows contrast between EP37 (low) and EP38 (high).
Eleven mammal and 27 reptile species have been recorded within these cells, including the state vulnerable Heath Goanna and the state rare (focal species) Beach Slider. A high number bird species have been recorded in these cells, EP37 has 109 recorded species and EP38 has 105 recorded species. These records include the state endangered Southern Emu-wren (EP ssp.), Fairy Tern, Eastern Osprey and White-bellied Sea-Eagle; state vulnerable Hooded Plover, Diamond Firetail, Banded Stilt and Eastern Curlew are listed here.

Threat Analysis (GIS)

Total threat values are very low: 26.93 and 26.73, these are amongst the lowest in the region. Viewshed, unstable dunes, and proportion of exotic species (vegetation block degradation) are the principal contributors overall; locally ORV and invasive weeds are significant. ORV activity along the Coffin Bay shore and at Point Avoid; invasive weeds are noted around Lake Damascus (African boxthorn), near Point Longnose (sea lavender) and near Yangie Bay (sea lavender, boxthorn, bridal creeper).

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, dune and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Marked beach recession and dune instability	Active management of dunes to reduce widespread transgression	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
	Sea level rise will increase the frequency and duration of tidal flooding of samphire and Melaleuca species at Point Longnose and Yangie Bay, leading to habitat change and species migration (where possible) to higher slopes.	Establish a profile adjacent to Point Longnose to monitor shoreline and salt marsh change in this in order to manage adaptively.	
2070: +c.80cm	Further sea level rise leads to beach and foredune erosion and dune transgression landward, (but shoreline recession is stopped where calcarenite outcrop is encountered). Where sand is landward of beaches they will recede maintaining profile form; where calcarenite (and other hard rock materials) are encountered by recession, open beaches will be lost and headlands with pocket beaches created.	Monitor beach and foredune change through the establishment of profiles at Seven Mile Beach and Avoid Bay. The total area of shorebird habitat is lost as shorelines recede, making the remainder in need of increased protection over time.	
Storms: *Frequency* continues to show great variation on a decadal scale.	Storm tide flooding above highest known tides.		
Intensity of large storms increases.	The combination of sea level rise and occasional large storms will lead to considerable sea floor sediment movement within Coffin Bay, which in turn will affect shoreline configuration. In general sand masses will be pushed further into embayments.	Maintain monitoring through aerial photographic time series.	
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere. There will be an increased risk for species that are already vulnerable. Invasive species are likely to become more dominant.		Maintain connectivity of vegetation

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but will recover more slowly from fire, disease and storm damage, with the invasion of grass species.	Active dune management, including weed control, to reduce instability.	Ensure dunes are included in regional fire plan
'Flashy' run off: Drier creeks, but larger rare floods	N/A (lack of surface drainage)		
Groundwater lowering; saline incursion:	There is a potential local impact on water tables, mainly within the calcarenite in the north of the cell, but including any perched water tables within the dunes, and thus vegetation survival.	Adaptive management of plant assets, including water table monitoring.	
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintained. Possible changes in the refracted pattern of swell and the wave climate have the potential to modify the plan-shape of the embayments on the south coast of the peninsula.	Monitor beaches, see above.	

TABLE 6.17 Recommended Actions and Priority for EP37 Avoid Bay & EP38 Dead Man Corner

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	The NP has very high conservation values.	Ongoing implementation of the Management Plan to protect threatened species and minimise impacts and threats to flora and fauna.	High (cons)	DENR
	Potential impact on breeding habitat of the endangered Eastern Osprey, particularly during the breeding season.	Develop site management and monitoring strategy, including consideration to seasonal closures of walking tracks in the near vicinity. Ensure park management works/programs are not undertaken near breeding sites during the breeding season. Community education	Medium (threat)	DENR

Component	Issue	Proposed Action	Priority of Action	Key Players
	Climate change and sea level rise is having multiple effects within the cell.	Ensure the establishment and maintenance of a time series of aerial photographs at an appropriate resolution to monitor change. Establish new DENR profiles (see above), to accurately track beach and dune recession and salt marsh change. Seek to improve the resilience of plant and animal habitats by taking opportunities to improve connectivity between vegetation blocks.	Medium (cons)	DENR, EP NRM, community groups
	Significant shorebird breeding/ feeding / habitat (including breeding habitat for Fairy Tern, Australian Pied Oystercatcher and Hooded Plover) with potential disturbance from people, vehicles, pest animals.	Develop and implement site management and monitoring strategies to protect these species, eg. interpretive signage, fencing of nests, use of chick shelters, temporary signage in breeding territories, restricting vehicles during breeding/migratory season. Undertake and/or support ongoing shorebird monitoring programs. Community education and awareness programs, eg. "chicks on beach".	High (cons/ threat)	DENR, EP NRM, Tourism SA, Birds Australia, Friends of Coffin Bay Parks
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	Medium	DENR
	Formal camping area with impact from multiple tracks, weeds, soil compaction, vegetation trampling and removal, local impact from visitors.	Ensure camp sites maintained to minimise visitor impacts, eg. barriers/fencing to prevent spread and informal tracks, signage, provision of appropriate amenities, weed management, maintenance of facilities/ infrastructure.	Medium	DENR

Component	Issue	Proposed Action	Priority of Action	Key Players
	Unrestricted access and multiple vehicle tracks around the coast impacting on the coastal dune and cliff top vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species.	Review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	Medium (cons/ threat)	DENR
	Potential impacts on Aboriginal heritage sites.	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, private land owners, community groups, EP NRM
	Weed species identified throughout cell.	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	Medium (cons/ threat)	DENR, EP NRM, Friends of Coffin Bay Parks
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Ongoing monitoring and control.	High (cons/ threat)	DENR, Friends of Coffin Bay Parks, EP NRM
Beaches at Avoid Bay	This area has the potential for instability due to current on-going and accelerating sea level rise. Storm damage to foredunes has the potential to de-stabilise further large volumes of sand leading to further shoreline retreat. Climate change stresses to dune vegetation is likely lead to vegetation loss, with some increase in grassy exotic weeds.	Establish marker points and a photographic record of annual foredune change. Maintain aerial photographic time series tracking shoreline and dune movement. Adopt management strategies to slow dune transgression.	Medium	DENR, Friends of Coffin Bay Parks, EP NRM

Component	Issue	Proposed Action	Priority of Action	Key Players
Point Longnose and sandflats to the south.	This is a significant bird habitat, threatened with: disturbance by cockling, debris from continued storm damage to oyster racks, potential threat to shorebird prey species with competition for food between native filter feeders and farmed oysters, direct damage to seagrass beds, biosecurity risk to native invertebrates from translocation practices between EP oyster farms.	Monitor mud cockle population distribution & size and collection. Investigate biomass required to support native shorebirds (including regularly 400 Australian Pied Oystercatchers). Monitor salt marsh and shoreline response to sea level rise (see above).	High (cons/ threat)	PIRSA, DENR
Yangie Bay to Long Beach	Significant bird habitat and samphire areas.	Ensure exclusion of ORVs from beach and samphire areas.	Medium	DENR
Salt marsh and low lying areas	All salt marsh areas show the potential for acid sulfate soil following disturbance; in turn this would potentially threaten life forms offshore within Coffin Bay.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Medium	DENR
Beaches	Marine debris with potential impact on native fauna species.	Support marine debris survey and collection to inform identification of sources of marine debris. Consider formalised recurrent collections. Undertake education program targeting fishers, campers, aquaculture operators.	High	Professional & recreational fisheries groups, Oyster growers, community, DENR, EP NRM. PIRSA
	Beach habitats will normally recede as sea level rises. Here beaches will be lost where recession reaches underlying calcarenite, raising the value of the remaining habitat.	Maintain a record of beach change, to manage habitat adaptively.	Medium (threat)	DENR, EP NRM

Component	Issue	Proposed Action	Priority of Action	Key Players
	Vehicles on beaches a threat to meiofauna and shorebirds.	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	Medium (cons/ threat)	DTEI, DENR, EP LGA, EP NRM, Tourism SA, Birds Australia, community

BIOTA – EP37 & EP38 combined

Flora

Remnant vegetation area (ha)	6971.09 ha, 79.5% of cell area
# flora surveys / records	15 surveys, 84 herbarium record sites
# flora in cell	235 (note: includes some marine species)
# conservation rated flora in cell	7
# non-indigenous flora in cell	51
Significant CDCS floristic community	EP37 – *Eucalyptus diversifolia* / *Clematis microphylla* mallee – 81% of SA records in EP *Melaleuca halmaturorum* shrubland – <20 (8) sites recorded along SA coast, 50% of these in EP *Olearia axillaris* /*Lasiopetalum discolour* shrubland – 52% of SA records in EP EP38 – *Leucopogon parviflorus* / *Acrotriche patula* shrubland – <20 (13) sites recorded along SA coast, 100% of these in EP
Protected area	100% of remnant vegetation protected within Coffin Bay NP

Weeds

Species	Common Name	Status	Study rating
Euphorbia paralias	Sea Spurge	RA	5
Limonium companyonis	Sea-lavender	RA	7
Asparagus asparagoides (NC)	Bridal Creeper	D, RA	9
Lycium ferocissimum	African Boxthorn	D, RA	8
Marrubium vulgare	Horehound	D, RA	5
Asphodelus fistulosus	Onion Weed	D	3

Species	Common Name	Status	Study rating
Carduus tenuiflorus	Slender Thistle	D	2
Echium plantagineum	Salvation Jane	D	2
Anagallis arvensis	Pimpernel		2
Avellinia michelii	Avellinia		0
Avena barbata	Bearded Oat		2
Briza minor	Lesser Quaking-grass		2
Bromus diandrus	Great Brome		2
Bromus hordeaceus ssp. hordeaceus	Soft Brome		2
Bromus madritensis	Compact Brome		2
Bupleurum semicompositum	Hare's Ear		0
Cakile edentula	American Sea Rocket		0
Catapodium rigidum	Rigid Fescue		1
Centaurium erythraea	Common Centaury		1
Centaurium tenuiflorum	Branched Centaury		1
Cerastium balearicum	Chickweed		1
Cerastium pumilum	Chickweed		0
Cerastium sp.	Chickweed		0
Ehrharta longiflora	Annual Veldt Grass		3
Erodium cicutarium	Cut-leaf Heron's-bill		0
Galium murale	Small Bedstraw		0
Geranium molle var. molle	Soft Geranium		0
Hornungia procumbens	Oval Purse		0
Hypochaeris glabra	Smooth Cat's Ear		2
Isolepis marginata	Little Club-rush		0
Lagurus ovatus	Hare's Tail Grass		2
Melaleuca armillaris ssp. armillaris	Bracelet Honey-myrtle		0
Melilotus indicus	King Island Melilot		1
Papaver somniferum ssp. setigerum (NC)	Small-flower Opium Poppy		0
Parentucellia latifolia	Red Bartsia		0
Polycarpon tetraphyllum	Four-leaf Allseed		0
Polypogon maritimus	Coast Beard-grass		0
Reseda luteola	Wild Mignonette		0
Rostraria cristata	Annual Cat's-tail		2
Senecio pterophorus	African Daisy		2
Silene nocturna	Mediterranean Catchfly		1
Solanum linnaeanum	Apple Of Sodom		2
Solanum nigrum	Black Nightshade		2
Sonchus oleraceus	Common Sow-thistle		0
Sonchus oleraceus (NC)	Common Sow-thistle		0
Spergularia marina (NC)	Salt Sand-spurrey		0
Spergularia media	Coast Sand-spurrey		0
Stellaria media	Chickweed		0
Trifolium campestre	Hop Clover		2
Vulpia myuros f. megalura	Fox-tail Fescue		2
Vulpia myuros f. myuros	Rat's-tail Fescue		2

D: Declared weed, RA: Red alert weed

Native flora*

Species	Common Name	Aus status	SA status
Pleuropappus phyllocalymmeus	Silver Candles	V	V
Acacia alcockii	Alcock's Wattle		R

Species	Common Name	Aus status	SA status
Caladenia bicalliata ssp. bicalliata	Western Daddy-long-legs		R
Crassula peduncularis	Purple Crassula		R
Phyllanthus calycinus	Snowdrop Spurge		R
Poa fax	Scaly Poa		R
Thysanotus wangariensis	Eyre Peninsula Fringe-lily		R
Acacia anceps (NC)	Angled Wattle		
Acacia cupularis	Cup Wattle		
Acacia leiophylla	Coast Golden Wattle		
Acacia ligulata	Umbrella Bush		
Acacia longifolia ssp. sophorae	Coastal Wattle		
Acacia nematophylla	Coast Wallowa		
Acacia spinescens	Spiny Wattle		
Acacia triquetra	Mallee Wreath Wattle		
Acrotriche cordata	Blunt-leaf Ground-berry		
Acrotriche patula	Prickly Ground-berry		
Adriana klotzschii (NC)	Coast Bitter-bush		
Adriana quadripartita	Coast Bitter-bush		
Allocasuarina verticillata	Drooping Sheoak		
Angianthus preissianus	Salt Angianthus		
Apalochlamys spectabilis	Showy Firebush		
Aphanes australiana (NC)	Australian Piert		
Apium annuum	Annual Celery		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrostipa drummondii	Cottony Spear-grass		
Austrostipa eremophila	Rusty Spear-grass		
Austrostipa exilis	Heath Spear-grass		
Austrostipa flavescens	Coast Spear-grass		
Austrostipa mundula	Neat Spear-grass		
Babingtonia behrii	Silver Broombush		
Barbula calycina			
Beyeria lechenaultii	Pale Turpentine Bush		
Brachyscome exilis	Slender Daisy		
Bromus sp.	Brome		
Bulbine semibarbata	Small Leek-lily		
Caladenia cardiochila	Heart-lip Spider-orchid		
Caladenia latifolia	Pink Caladenia		
Calandrinia brevipedata	Short-stalked Purslane		
Calandrinia corrigioloides	Strap Purslane		
Calandrinia eremaea	Dryland Purslane		
Carpobrotus rossii	Native Pigface		
Carpobrotus rossii (NC)	Native Pigface		
Cassytha peninsularis	Peninsula Dodder-laurel		
Caulerpa cactoides			
Caulerpa scalpelliformis			
Centrolepis polygyna	Wiry Centrolepis		
Cheiranthera alternifolia	Hand-flower		
Clematis microphylla			
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Comesperma volubile	Love Creeper		
Convolvulus angustissimus ssp. peninsularum	Grassland Bindweed		
Correa backhouseana var. coriacea	Thick-leaf Correa		
Correa pulchella	Salmon Correa		

Species	Common Name	Aus status	SA status
Corybas despectans	Coast Helmet-orchid		
Crassula colligata ssp. lamprosperma			
Crassula decumbens var. decumbens	Spreading Crassula		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Cynoglossum australe	Australian Hound's-tongue		
Cyrtostylis robusta	Robust Gnat-orchid		
Daucus glochidiatus	Native Carrot		
Dianella brevicaulis	Short-stem Flax-lily		
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Dichelachne crinita	Long-hair Plume-grass		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Dodonaea humilis	Dwarf Hop-bush		
Drosera glanduligera	Scarlet Sundew		
Elymus scaber var. scaber	Native Wheat-grass		
Elymus scaber var. scaber (NC)	Native Wheat-grass		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Epilobium billardierianum ssp. billardierianum	Robust Willow-herb		
Eucalyptus albopurpurea	Purple-flowered Mallee Box		
Eucalyptus cladocalyx	Sugar Gum		
Eucalyptus diversifolia (NC)	Coastal White Mallee		
Eucalyptus diversifolia ssp. diversifolia	Coastal White Mallee		
Euphrasia collina ssp. tetragona	Coast Eyebright		
Eutaxia microphylla	Common Eutaxia		
Exocarpos cupressiformis	Native Cherry		
Exocarpos syrticola	Coast Cherry		
Ficinia nodosa	Knobby Club-rush		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Gahnia deusta	Limestone Saw-sedge		
Gahnia filum	Thatching Grass		
Gahnia trifida	Cutting Grass		
Galium compactum	Compact Bedstraw		
Geranium retrorsum	Grassland Geranium		
Gnaphalium indutum ssp. indutum	Tiny Cudweed		
Goodenia blackiana	Native Primrose		
Goodenia pinnatifida	Cut-leaf Goodenia		
Goodenia varia	Sticky Goodenia		
Goodia lotifolia var. lotifolia (NC)	Golden-tip		
Goodia medicaginea	Western Golden-tip		
Hakea vittata	Limestone Needlebush		
Hardenbergia violacea	Native Lilac		
Hebeloma lamelliconfertum			
Helichrysum leucopsideum	Satin Everlasting		
Heliotropium europaeum	Common Heliotrope		
Hemichroa diandra	Mallee Hemichroa		
Hemichroa pentandra	Trailing Hemichroa		
Hibbertia platyphylla ssp. platyphylla			
Hydrocotyle callicarpa	Tiny Pennywort		
Hydrocotyle capillaris	Thread Pennywort		
Hydrocotyle medicaginoides	Medic Pennywort		
Hypoxis glabella var. glabella	Tiny Star		
Kennedia prostrata	Scarlet Runner		
Lasiopetalum discolor	Coast Velvet-bush		
Lepidosperma gladiatum	Coast Sword-sedge		

Species	Common Name	Aus status	SA status
Leptorhynchos waitzia	Button Immortelle		
Leucophyta brownii	Coast Cushion Bush		
Leucopogon parviflorus	Coast Beard-heath		
Leucopogon woodsii	Nodding Beard-heath		
Linum marginale	Native Flax		
Logania crassifolia	Coast Logania		
Lomandra effusa	Scented Mat-rush		
Melaleuca brevifolia	Short-leaf Honey-myrtle		
Melaleuca halmaturorum	Swamp Paper-bark		
Melaleuca lanceolata	Dryland Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Microseris lanceolata	Yam Daisy		
Microtis arenaria	Notched Onion-orchid		
Microtis sp.	Onion-orchid		
Microtis unifolia complex	Onion-orchid		
Millotia major			
Millotia myosotidifolia	Broad-leaf Millotia		
Mitrasacme paradoxa (NC)	Wiry Mitrewort		
Muehlenbeckia adpressa	Climbing Lignum		
Myosotis australis	Austral Forget-me-not		
Nicotiana goodspeedii	Small-flower Tobacco		
Nicotiana maritima	Coast Tobacco		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Oxalis perennans	Native Sorrel		
Oxalis perennans (NC)	Native Sorrel		
Parietaria australis	Smooth-nettle		
Parietaria cardiostegia	Mallee Smooth-nettle		
Parietaria debilis (NC)	Smooth-nettle		
Pelargonium australe	Austral Stork's-bill		
Pelargonium littorale	Native Pelargonium		
Pimelea flava ssp. dichotoma	Diosma Riceflower		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pittosporum angustifolium	Native Apricot		
Plantago sp. B (R.Bates 44765)	Little Plantain		
Poa labillardieri var. labillardieri	Common Tussock-grass		
Poa poiformis var. poiformis	Coast Tussock-grass		
Podolepis rugata var. littoralis	Coast Copper-wire Daisy		
Podotheca angustifolia	Sticky Long-heads		
Pomaderris obcordata	Wedge-leaf Pomaderris		
Pomaderris paniculosa ssp. paniculosa	Mallee Pomaderris		
Poranthera triandra	Three-petal Poranthera		
Prasophyllum odoratum	Scented Leek-orchid		
Pseudognaphalium luteoalbum	Jersey Cudweed		
Pultenaea tenuifolia	Narrow-leaf Bush-pea		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rosulabryum billardierei			
Sagina maritima	Sea Pearlwort		
Samolus repens	Creeping Brookweed		
Santalum acuminatum	Quandong		
Sarcocornia blackiana	Thick-head Samphire		
Sarcocornia quinqueflora	Beaded Samphire		
Scaevola angustata	Coast Fanflower		

Species	Common Name	Aus status	SA status
Scaevola crassifolia	Cushion Fanflower		
Sebaea ovata	Yellow Sebaea		
Senecio pinnatifolius (NC)	Variable Groundsel		
Solanum simile	Kangaroo Apple		
Suaeda australis	Austral Seablite		
Tecticornia halocnemoides ssp. halocnemoides	Grey Samphire		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Thuidiopsis sparsa			
Thysanotus patersonii	Twining Fringe-lily		
Tortula antarctica			
Trachymene pilosa	Dwarf Trachymene		
Triglochin centrocarpum (NC)	Dwarf Arrowgrass		
Triglochin mucronata	Prickly Arrowgrass		
Triglochin nana	Dwarf Arrowgrass		
Veronica hillebrandii	Rigid Speedwell		
Vittadinia australasica var. australasica	Sticky New Holland Daisy		
Wurmbea dioica ssp. brevifolia	Early Nancy		
Wurmbea dioica ssp. dioica (NC)	Early Star-lily		
Xanthoria ligulata			
Zygophyllum billardierei	Coast Twinleaf		
Zygophyllum billardierei (NC)	Coast Twinleaf		

R: Rare, V: Vulnerable, E: Endangered
* note: includes some marine species

Fauna

# of fauna in cell	162 recorded – 121 birds, 0 butterflies, 14 mammals, 27 reptiles, 0 amphibians (an additional 5 reptiles and 24 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	7 surveys, 67 opportune sites, 1 reserve database record site
# of threatened fauna in cell	27
# of non-indigenous fauna	12 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Carduelis carduelis	European Goldfinch	Aves	x
Passer domesticus	House Sparrow	Aves	x
Sturnus vulgaris	Common Starling	Aves	x
Turdus merula	Common Blackbird	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p
Bos taurus	Cattle (European Cattle)	Mammalia	x
Equus caballus	Horse (Brumby)	Mammalia	x
Felis catus	Cat (Feral Cat)	Mammalia	x
Mus musculus	House Mouse	Mammalia	x
Oryctolagus cuniculus	Rabbit (European Rabbit)	Mammalia	x
Ovis aries	Sheep (Feral Sheep)	Mammalia	x
Rattus rattus	Black Rat (Ship Rat, Roof Rat)	Mammalia	x

Species	Common Name	Class	Record
Vulpes vulpes	Fox (Red Fox)	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Pandion cristatus	Eastern Osprey	M	E
Sternula nereis	Fairy Tern		E
Stipiturus malachurus parimeda	Southern Emu-wren (Eyre Peninsula ssp)	V	E
Cladorhynchus leucocephalus	Banded Stilt		V
Numenius madagascariensis	Eastern Curlew	M	V
Stagonopleura guttata	Diamond Firetail		V
Thinornis rubricollis	Hooded Plover		V
Actitis hypoleucos	Common Sandpiper	M	R
Anas rhynchotis	Australasian Shoveler		R
Arenaria interpres	Ruddy Turnstone	M	R
Calidris alba	Sanderling	M	R
Calidris tenuirostris	Great Knot	M	R
Cereopsis novaehollandiae	Cape Barren Goose		R
Charadrius leschenaultii	Greater Sand Plover	M	R
Charadrius mongolus	Lesser Sand Plover	M	R
Egretta sacra	Eastern Reef Egret		R
Falco peregrinus	Peregrine Falcon		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Limosa lapponica	Bar-tailed Godwit	M	R
Neophema petrophila	Rock Parrot		R
Numenius phaeopus	Whimbrel	M	R
Pluvialis fulva	Pacific Golden Plover	M	R
Tringa glareola	Wood Sandpiper	M	R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Acanthiza apicalis	Inland Thornbill		
Acanthiza chrysorrhoa	Yellow-rumped Thornbill		
Acanthiza pusilla	Brown Thornbill		
Accipiter fasciatus	Brown Goshawk		
Anas castanea	Chestnut Teal		
Anas gracilis	Grey Teal		
Anthochaera carunculata	Red Wattlebird		
Anthus novaeseelandiae	Australasian Pipit		
Aquila audax	Wedge-tailed Eagle		
Ardea pacifica	White-necked Heron		
Ardenna tenuirostris	Short-tailed Shearwater		
Artamus cyanopterus	Dusky Woodswallow		
Artamus personatus	Masked Woodswallow		
Barnardius zonarius	Australian Ringneck, (Ring-necked Parrot)		
Cacomantis flabelliformis	Fan-tailed Cuckoo		
Cacomantis pallidus	Pallid Cuckoo		
Calidris acuminata	Sharp-tailed Sandpiper	M	
Calidris canutus	Red Knot	M	
Calidris ferruginea	Curlew Sandpiper	M	
Calidris ruficollis	Red-necked Stint	M	

Species	Common Name	Aus status	SA status
Chalcites basalis	Horsfield's Bronze-cuckoo		
Charadrius bicinctus	Double-banded Plover		
Charadrius ruficapillus	Red-capped Plover		
Chroicocephalus novaehollandiae	Silver Gull		
Circus approximans	Swamp Harrier		
Colluricincla harmonica	Grey Shrike-thrush		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Corvus coronoides	Australian Raven		
Corvus mellori	Little Raven		
Cracticus nigrogularis	Pied Butcherbird		
Cracticus tibicen	Australian Magpie		
Cracticus torquatus	Grey Butcherbird		
Cygnus atratus	Black Swan		
Dromaius novaehollandiae	Emu		
Drymodes brunneopygia	Southern Scrub-robin		
Egretta novaehollandiae	White-faced Heron		
Elanus axillaris	Black-shouldered Kite		
Eolophus roseicapillus	Galah		
Epthianura albifrons	White-fronted Chat		
Erythrogonys cinctus	Red-kneed Dotterel		
Eudyptula minor	Little Penguin		
Falco berigora	Brown Falcon		
Falco cenchroides	Nankeen Kestrel		
Falco longipennis	Australian Hobby		
Gallinago hardwickii	Japanese Snipe (Latham's Snipe)	M	
Gallirallus philippensis	Buff-banded Rail		
Glyciphila melanops	Tawny-crowned Honeyeater		
Grallina cyanoleuca	Magpie-lark		
Hieraaetus morphnoides	Little Eagle		
Himantopus himantopus	Black-winged Stilt		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Larus pacificus	Pacific Gull		
Lichenostomus leucotis	White-eared Honeyeater		
Lichenostomus virescens	Singing Honeyeater		
Malurus cyaneus	Superb Fairy-wren		
Malurus pulcherrimus	Blue-breasted Fairy-wren		
Megalurus gramineus	Little Grassbird		
Microcarbo melanoleucos	Little Pied Cormorant		
Ocyphaps lophotes	Crested Pigeon		
Pardalotus punctatus	Spotted Pardalote		
Pelecanus conspicillatus	Australian Pelican		
Petrochelidon ariel	Fairy Martin		
Petroica multicolor	Scarlet Robin		
Phalacrocorax carbo	Great Cormorant		
Phalacrocorax sulcirostris	Little Black Cormorant		
Phalacrocorax varius	Pied Cormorant		
Phaps chalcoptera	Common Bronzewing		
Phaps elegans	Brush Bronzewing		
Phylidonyris novaehollandiae	New Holland Honeyeater		
Pluvialis squatarola	Grey Plover	M	
Poliocephalus poliocephalus	Hoary-headed Grebe		
Pomatostomus superciliosus	White-browed Babbler		

Species	Common Name	Aus status	SA status
Porzana fluminea	Australian Spotted Crake		
Psophodes nigrogularis	Western Whipbird	ssp	ssp
Purnella albifrons	White-fronted Honeyeater		
Recurvirostra novaehollandiae	Red-necked Avocet		
Rhipidura albiscapa	Grey Fantail		
Rhipidura leucophrys	Willie Wagtail		
Sericornis frontalis	White-browed Scrubwren		
Smicrornis brevirostris	Weebill		
Strepera graculina	Pied Currawong		
Strepera versicolor	Grey Currawong		ssp
Tachybaptus novaehollandiae	Australasian Grebe, (Little Grebe)		
Thalasseus bergii	Crested Tern		
Tribonyx ventralis	Black-tailed Native-hen		
Tringa nebularia	Common Greenshank	M	
Tringa stagnatilis	Marsh Sandpiper	M	
Turnix velox	Little Button-quail		
Vanellus miles	Masked Lapwing		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Cercartetus concinnus	Western Pygmy-possum		
Chalinolobus morio	Chocolate Wattled Bat		
Macropus fuliginosus	Western Grey Kangaroo		
Notomys mitchellii	Mitchell's Hopping-mouse		
Nyctophilus geoffroyi	Lesser Long-eared Bat		
Rattus fuscipes	Bush Rat		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Varanus rosenbergi	Heath Goanna		V	x
Bassiana trilineata	Western Three-lined Skink		R	e
Lerista arenicola	Beach Slider		R	x
Amphibolurus norrisi	Mallee Tree-dragon			x
Aprasia inaurita	Red-tailed Worm-lizard			x
Aprasia striolata	Lined Worm-lizard			x
Christinus marmoratus	Marbled Gecko			x
Ctenophorus chapmani	Prickly Dragon			x
Ctenophorus fionni	Peninsula Dragon			x
Ctenophorus pictus	Painted Dragon			x
Ctenotus orientalis	Spotted Ctenotus			x
Delma australis	Barred Snake-lizard			x
Diplodactylus calcicolus	South Coast Gecko			x
Drysdalia mastersii	Master's Snake			x
Egernia stokesii	Gidgee Skink			x
Gehyra variegata	Tree Dtella			x
Hemiergis peronii	Four-toed Earless Skink			x
Lampropholis delicata	Delicate Skink			c
Lerista bougainvillii	Bougainville's Skink			x
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			x
Lerista terdigitata	Southern Three-toed Slider			x
Liopholis multiscutata	Bull Skink			x
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			x
Nephrurus milii	Barking Gecko			c
Notechis scutatus	Eastern Tiger Snake	ssp		x
Pogona barbata	Eastern Bearded Dragon			x
Pseudechis australis	Mulga Snake			x
Pseudonaja inframacula	Peninsula Brown Snake			x
Tympanocryptis lineata	Five-lined Earless Dragon			x
Varanus gouldii	Sand Goanna			x

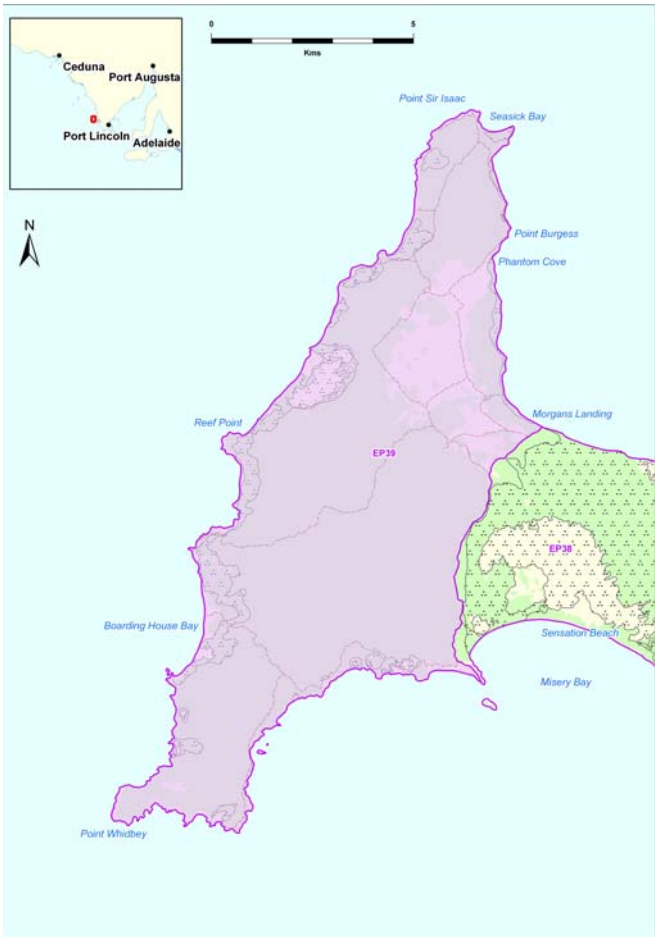
R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP39 Pt Whidbey/ Pt Sir Isaac

Cell area is 7,689 ha. Shoreline length is 52.55 km.



Landforms

This is a Pleistocene calcarenite undulating plain; some low lying parts of the calcarenite surface are below the water table. In places the calcarenite forms low cliffs, often over basement rocks. The plan form of the peninsula appears to be controlled by basement Dutton Suite of granites (Sleaford Complex). At the headlands the granites form sloping shore platforms or ramps; there are also bedrock reefs fronting many beaches. NW and SW exposed high energy coasts show dissipative, coarse sand beaches between medium to high cliffs and headlands. The west and south facing Southern Ocean beaches show variable energy conditions, and are partly sheltered by low and submerged reefs and platforms; mainly coarse to medium sands are found, with marked rhythmic features.
The sheltered east facing shore between Morgans Landing and Point Sir Isaac shows narrow, steep, coarse sand, low energy beaches, backed by low calcarenite cliffs and bluffs; nearshore there are shallow sandflats and patchy seagrass.
There are discrete, relatively small, areas of coastal dunes along the west coast of the peninsula; many of these are remnant cliff top dunes, now cut off from their Holocene beach sand supplies. North of Reef Point there is an area of unstable dune: transgression of this active small sand mass has left a deflated calcarenite zone between the dunes and the beach.

Benthic Habitat

State benthic mapping shows dense/ medium sea grass within Coffin Bay. Commonwealth mapping denotes sand on the open ocean shore, with some inshore limestone and granite reefs.

Biota

6,629ha (86%) of the cell is remnant vegetation. There are 10 BDBSA flora survey sites, one opportune flora site and 88 herbarium flora record sites. Two fauna survey sites and 43 opportune fauna sites are present within the cell.
The cell has varied shrubland and low woodland. Dunes on the west coast are mainly in *Leucopogon parviflorus* tall shrubland; the southern peninsula (near Point Whidbey) shows emergent low acacia shrubland; the calcarenite plateau has areas of mid-mallee *E. diversifolia* woodland and *Melaleuca lanceolata* tall shrubland; in the north of the peninsula *Allocasuarina verticillata* low woodland over *Olearia axillaris* tall shrubland is more common; north of Morgans Landing some

areas of samphire are found. De-vegetated areas are found on sheet limestone in the central north of the cell, possibly associated with clearing for grazing at an earlier time.

FIGURE 6.20 Pt Sir Isaac and Seasick Bay. Photo: Coast Protection Board, 2007

Land Use/ Land Ownership

The entire cell is protected within the Coffin Bay NP.

Coffin Bay Coastal Wetland System is a 'Wetland of National Importance', SA008.

Thorny Passage Marine Park offshore.

Uses (Field visits and local reports)

Recreation and tourism – fishing, camping, ORV, boating, sightseeing, nature observation, walking.
Professional fisheries
Conservation - Wilderness zone
Ecotourism
Offshore aquaculture

Threats (Field visits and local reports)

ORV
Marine debris
Feral animals (rabbits, foxes, cats)
Abundant native species (Kangaroos)
Areas of uncontrolled ORV usage
Formal and Informal camping
Firewood collection

Vehicles speeding in NP – death of fauna
Eco-tourism / tourism ventures
Wildfire
Proximity to aquaculture

Opportunities (Field visits and local reports)

Potential for marine park sanctuary zone to align with wilderness zone
Coffin Bay National Park Management Plan

Conservation Analysis (GIS)

The total of conservation means, 143.32, is the sixth highest in the region. High to medium high values are distributed throughout the cell; a number of small very high value areas are found on coastal dunes near the western and southern shoreline. De-vegetated areas in the centre of the peninsula, between Morgans Landing and Phantom Cove record low values.

The high total of conservation values is drawn widely across the conservation layers, including diversity, endemicity and threatened status of both plants and animals. Vegetation community threatened status and rarity, fauna species threatened status, and total number of threatened species all score highly, though with variable distribution across the cell. Endemic plant communities (widely distributed), endemic habitat (near coastline areas), and total number of species, all score highly. Reptile (high in dune areas for threatened reptiles), mammal, butterfly (very high throughout all the vegetated areas) and bird habitats (high in patches, medium high throughout) all score highly; also vegetation block metrics and indigenous heritage. Nine mammal, 28 reptile and 98 bird species are recorded within this cell, including the state endangered Southern Emu-wren (EP ssp.), Eastern Osprey and White-bellied Sea-Eagle, and the state vulnerable Heath Goanna, Hooded Plover, Diamond Firetail, Eastern Curlew and Banded Stilt. Habitat for the Beach Slider and the Bight Coast Skink is recorded in the sand dune areas.

Threat Analysis (GIS)

The total of threat summary layers is 23.93, the lowest in the region: the combined detailed threat layer show only very small isolated areas as having more than a very low threat. A substantial portion of this low threat total is viewshed and viewscape; off-road vehicle activity and weeds near Morgans Landing; weeds colonizing de-vegetated dunes north of Reef Point, and some moderate rabbit activity in the north of the cell, are the other contributors.

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, dune and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Marked beach recession and dune instability	Allow recession	
2070: +c.80cm	Further sea level rise leads to beach and foredune erosion and dune transgression landward. Beaches maintain form and recede landward until basement rock or calcarenite reached. Where rock is reached, total area of beach habitat is reduced.	Monitor beach and foredune change.	
Storms: *Frequency* continues to show great variation on a decadal scale.	Storm tide flooding above highest known tides.		
Intensity of large storms increases.			
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere. There will be an increased risk for species that are already vulnerable. Invasive species are likely to become more dominant.		Maintain connectivity of vegetation
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage, with invasion of grass species.	Active weed management	Ensure dunes are included in regional fire plan
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	There is a potential local impact on water tables, including any perched water tables within the dunes, and vegetation survival.	Adaptive management of plant assets, including water table monitoring.	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintained. Possible changes in the refracted pattern of swell and the wave climate have the potential to modify the plan-shape of embayments.	Monitor beach changes through aerial photographic time series, (see above).	

TABLE 6.18 Recommended Actions and Priority for EP39 Pt Whidbey/ Pt Sir Isaac

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	The NP has very high conservation values.	Ongoing implementation of the Management Plan to protect threatened species and minimise impacts and threats to flora and fauna.	High (cons)	DENR
	Climate change and sea level rise is having multiple effects within the cell.	Ensure the establishment and maintenance of a time series of aerial photographs at an appropriate resolution. Seek to improve the resilience of plant and animal habitats by taking opportunities to improve connectivity between vegetation blocks.	Medium (cons)	DENR, EP NRM, community groups
	Potential impact on breeding habitats of the endangered Eastern Osprey and White-bellied Sea-Eagle, particularly during the breeding season.	Develop site management and monitoring strategy, including consideration to closure, relocation or seasonal closures of roads/walking tracks/car parks in the near vicinity. Ensure park management works/programs are not undertaken near breeding sites during the breeding season. Community education	High (cons/ threat)	DENR
	Restoration of sheoak grassy woodland habitat cleared for farming.	Support vegetation restoration program.	High	DENR, Friends of Coffin Bay Parks

Component	Issue	Proposed Action	Priority of Action	Key Players
	Highly developed vegetation communities and current extremely low threat totals suggest the isolation of the area has proved to be valuable protection.	Maintain limited access to this area of high conservation value, including review and rationalisation of tracks.	High (cons)	DENR
	Registered European heritage site – former Coffin Bay Whaling Site - with potential impact from recreational activities.	Ensure sites managed to protect from damage. Install interpretive educational signage where appropriate.	Medium	DENR, community
	Potential impacts on Aboriginal heritage sites.	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, private land owners, community groups, EP NRM
	Introduced animals and over abundant native animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Support fox, rabbit, and cat removal program and kangaroo management program.	Medium	DENR, EP NRM, Friends of Coffin Bay Parks
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	Medium	DENR
	Formal camping area with impact from multiple tracks, weeds, soil compaction, vegetation trampling and removal, local impact from visitors.	Ensure camp sites maintained to minimise visitor impacts, eg. barriers/fencing to prevent spread and informal tracks, signage, provision of appropriate amenities, weed management, maintenance of facilities/ infrastructure.	Medium	DENR

Component	Issue	Proposed Action	Priority of Action	Key Players
	Unrestricted access and multiple vehicle tracks around the coast impacting on the coastal dune and cliff top vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	High (cons/ threat)	DENR
Cliff tops	Numerous informal tracks and informal car parks close to potentially unstable cliff edge; safety hazard and impact from soil compaction, vegetation damage, weed introduction, fauna disturbance, soil stability and water runoff erosion.	Review with a view to close or reroute tracks and car parks that are too close to cliff edge.	High (Hazard; cons/ threat)	DENR
All dune areas	Stress through climate change: including sea level rise, storm tides and increasing aridity, leading to foredune recession and whole dune recession, also increased opportunity for invasion by grassy weeds.	Maintain monitoring record of change to this unstable landform/ habitat. Manage dune strategically to slow recession of dunes not protected by calcarenite outcrops.	High (cons/ threat)	DENR, EP NRM, community groups
Beaches	Marine debris	Investigate opportunities for, and/or support, ongoing marine debris cleanup programs. Undertake education program targeting fishers, campers, aquaculture operators.	Medium	DENR, PIRSA, Wildcatch Fisheries, EP NRM, aquaculture operators, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Vehicles on beaches a threat to meiofauna and shorebirds.	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	Medium (cons/ threat)	DTEI, DENR, EP LGA, EP NRM, Tourism SA, Birds Australia, community

BIOTA

Flora

Remnant vegetation area (ha)	6,629.55 ha, 86.23% of cell area
# flora surveys / records	10 surveys, 1 opportune sites, 88 herbarium record sites
# flora in cell	208 (note: includes some marine species)
# conservation rated flora in cell	6
# non-indigenous flora in cell	54
Significant CDCS floristic community	*Eucalyptus diversifolia* / *Clematis microphylla* mallee – 81% of SA records in EP *Leucopogon parviflorus* / *Acrotriche patula* shrubland – <20 (13) sites recorded along SA coast, 100% of these in EP *Meleleuca brevifolia* / *Gahnia filum* – <20 (3) sites recorded along SA coast, 100% of these in EP
Protected area	100% within Coffin Bay NP

Weeds

Species	Common Name	Status	Study rating
Asphodelus fistulosus	Onion Weed	D	3
Carduus tenuiflorus	Slender Thistle	D	2
Marrubium vulgare	Horehound	D, RA	5
Arctotheca populifolia	Beach Daisy	RA	7
Euphorbia paralias	Sea Spurge	RA	5
Mesembryanthemum crystallinum	Common Iceplant	RA	4
Brassica tournefortii	Wild Turnip		3
Ehrharta longiflora	Annual Veldt Grass		3

Species	Common Name	Status	Study rating
Mesembryanthemum sp.	Iceplant		3
Reichardia tingitana	False Sowthistle		3
Anagallis arvensis	Pimpernel		2
Avena barbata	Bearded Oat		2
Briza minor	Lesser Quaking-grass		2
Bromus rubens	Red Brome		2
Hypochaeris glabra	Smooth Cat's Ear		2
Plantago coronopus ssp. coronopus	Bucks-horn Plantain		2
Rostraria cristata	Annual Cat's-tail		2
Senecio pterophorus	African Daisy		2
Solanum nigrum	Black Nightshade		2
Trifolium campestre	Hop Clover		2
Trifolium tomentosum	Woolly Clover		2
Vulpia myuros f. megalura	Fox-tail Fescue		2
Vulpia myuros f. myuros	Rat's-tail Fescue		2
Arctotheca calendula	Cape Weed		1
Cakile maritima ssp. maritima	Two-horned Sea Rocket		1
Catapodium rigidum	Rigid Fescue		1
Cerastium balearicum	Chickweed		1
Dittrichia graveolens	Stinkweed		1
Hordeum leporinum	Wall Barley-grass		1
Medicago praecox	Small-leaf Burr-medic		1
Melilotus indicus	King Island Melilot		1
Parapholis incurva	Curly Ryegrass		1
Silene nocturna	Mediterranean Catchfly		1
Aira cupaniana	Small Hair-grass		0
Allium ampeloprasum	Wild Leek		0
Buglossoides arvensis	Sheepweed		0
Bupleurum semicompositum	Hare's Ear		0
Cerastium sp.	Chickweed		0
Chenopodium glaucum	Glaucous Goosefoot		0
Chenopodium murale	Nettle-leaf Goosefoot		0
Dactylis glomerata	Cocksfoot		0
Erodium cicutarium	Cut-leaf Heron's-bill		0
Galium murale	Small Bedstraw		0
Geranium molle var. molle	Soft Geranium		0
Leontodon taraxacoides ssp. taraxacoides	Lesser Hawkbit		0
Lepidium africanum	Common Peppercress		0
Minuartia mediterranea	Slender Sandwort		0
Neatostema apulum	Hairy Sheepweed		0
Parentucellia latifolia	Red Bartsia		0
Polypogon maritimus	Coast Beard-grass		0
Rumex crispus	Curled Dock		0
Sherardia arvensis	Field Madder		0
Sonchus oleraceus	Common Sow-thistle		0
Vicia tetrasperma	Slender Vetch		0

D: Declared weed, RA: Red alert weed

Native flora*

Species	Common Name	Aus status	SA status
Acacia alcockii	Alcock's Wattle		R

Species	Common Name	Aus status	SA status
Isotoma scapigera	Salt Isotome		R
Myoporum parvifolium	Creeping Boobialla		R
Poa drummondiana	Knotted Poa		R
Tecticornia lepidosperma			R
Eucalyptus conglobata ssp. conglobata	Port Lincoln Mallee		R*
Acacia leiophylla	Coast Golden Wattle		
Acacia longifolia ssp. sophorae	Coastal Wattle		
Acacia nematophylla	Coast Wallowa		
Acacia rupicola	Rock Wattle		
Acacia sp. Winged (C.R.Alcock 4936)	Angled Wattle		
Acacia spinescens	Spiny Wattle		
Acacia triquetra	Mallee Wreath Wattle		
Acrotriche cordata	Blunt-leaf Ground-berry		
Acrotriche patula	Prickly Ground-berry		
Actites megalocarpa	Coast Sow-thistle		
Adriana quadripartita	Coast Bitter-bush		
Alyogyne huegelii	Native Hibiscus		
Angianthus preissianus	Salt Angianthus		
Apalochlamys spectabilis	Showy Firebush		
Apium annuum	Annual Celery		
Atriplex cinerea	Coast Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrodanthonia setacea	Small-flower Wallaby-grass		
Austrofestuca littoralis	Coast Fescue		
Austrostipa exilis	Heath Spear-grass		
Austrostipa flavescens	Coast Spear-grass		
Austrostipa mundula	Neat Spear-grass		
Austrostipa nitida	Balcarra Spear-grass		
Austrostipa nodosa	Tall Spear-grass		
Austrostipa scabra ssp. falcata	Slender Spear-grass		
Barbula calycina			
Beyeria lechenaultii	Pale Turpentine Bush		
Billardiera versicolor	Yellow-flower Apple-berry		
Brachyscome exilis	Slender Daisy		
Brachyscome lineariloba	Hard-head Daisy		
Bulbine semibarbata	Small Leek-lily		
Bursaria spinosa ssp. spinosa	Sweet Bursaria		
Caladenia capillata	Wispy Spider-orchid		
Calandrinia eremaea	Dryland Purslane		
Callistemon rugulosus	Scarlet Bottlebrush		
Callitris canescens	Scrubby Cypress Pine		
Cassytha glabella f. dispar	Slender Dodder-laurel		
Cassytha peninsularis	Peninsula Dodder-laurel		
Chrysocephalum apiculatum	Common Everlasting		
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Comesperma volubile	Love Creeper		
Convolvulus remotus	Grassy Bindweed		
Correa pulchella	Salmon Correa		
Cotula vulgaris var. australasica	Slender Cotula		
Crassula colligata ssp. lamprosperma			
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Cynoglossum australe	Australian Hound's-tongue		

Species	Common Name	Aus status	SA status
Daucus glochidiatus	Native Carrot		
Dianella brevicaulis	Short-stem Flax-lily		
Dichelachne crinita	Long-hair Plume-grass		
Dichondra repens	Kidney Weed		
Didymodon australasiae			
Diploschistes scruposus			
Eucalyptus brachycalyx	Gilja		
Eucalyptus diversifolia (NC)	Coastal White Mallee		
Eucalyptus diversifolia ssp. diversifolia	Coastal White Mallee		
Eucalyptus gracilis	Yorrell		
Eucalyptus phenax (NC)	Sessile-fruit White Mallee		
Eucalyptus porosa	Mallee Box		
Eucalyptus rugosa	Coastal White Mallee		
Eucalyptus yalatensis	Yalata Mallee		
Eutaxia microphylla	Common Eutaxia		
Eutaxia sp.	Eutaxia		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos syrticola	Coast Cherry		
Ficinia nodosa	Knobby Club-rush		
Frankenia pauciflora var. gunnii	Southern Sea-heath		
Fulgensia subbracteata			
Gahnia deusta	Limestone Saw-sedge		
Gahnia filum	Thatching Grass		
Gahnia lanigera	Black Grass Saw-sedge		
Galium leptogonium	Reflexed Bedstraw		
Galium migrans (NC)	Loose Bedstraw		
Geranium sp.	Geranium		
Goodenia blackiana	Native Primrose		
Halosarcia sp. (NC)	Samphire		
Hardenbergia violacea	Native Lilac		
Helichrysum leucopsideum	Satin Everlasting		
Hemichroa pentandra	Trailing Hemichroa		
Hibbertia riparia	Bristly Guinea-flower		
Hibbertia virgata	Twiggy Guinea-flower		
Hypoxis glabella var. glabella	Tiny Star		
Lasiopetalum baueri	Slender Velvet-bush		
Lasiopetalum discolor	Coast Velvet-bush		
Lawrencia spicata	Salt Lawrencia		
Lepidosperma concavum	Spreading Sword-sedge		
Lepidosperma congestum			
Lepidosperma congestum (NC)	Clustered Sword-sedge		
Lepidosperma gladiatum	Coast Sword-sedge		
Leptorhynchos waitzia	Button Immortelle		
Leucopogon parviflorus	Coast Beard-heath		
Linum marginale	Native Flax		
Lomandra effusa	Scented Mat-rush		
Lotus australis	Austral Trefoil		
Melaleuca acuminata ssp. acuminata	Mallee Honey-myrtle		
Melaleuca brevifolia	Short-leaf Honey-myrtle		
Melaleuca decussata	Totem-poles		
Melaleuca halmaturorum	Swamp Paper-bark		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Microcybe pauciflora ssp. pauciflora	Yellow Microcybe		

Species	Common Name	Aus status	SA status
Microtis arenaria	Notched Onion-orchid		
Minuria leptophylla	Minnie Daisy		
Mitrasacme paradoxa (NC)	Wiry Mitrewort		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Ophioglossum lusitanicum	Austral Adder's-tongue		
Oxalis perennans	Native Sorrel		
Oxalis perennans (NC)	Native Sorrel		
Parietaria debilis	Smooth-nettle		
Parietaria debilis (NC)	Smooth-nettle		
Pimelea flava ssp. dichotoma	Diosma Riceflower		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pittosporum angustifolium	Native Apricot		
Podotheca angustifolia	Sticky Long-heads		
Pogonolepis muelleriana	Stiff Cup-flower		
Pomaderris paniculosa ssp.			
Pomaderris paniculosa ssp. paniculosa	Mallee Pomaderris		
Psora decipiens			
Pterostylis erythroconcha	Red Shell-orchid		
Ptilotus spathulatus f. spathulatus	Pussy-tails		
Puccinellia stricta var. stricta	Australian Saltmarsh-grass		
Pultenaea rigida var. rigida	Rigid Bush-pea		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rumex brownii	Slender Dock		
Rumex brownii (NC)	Slender Dock		
Salsola tragus	Buckbush		
Samolus repens	Creeping Brookweed		
Sarcocornia blackiana	Thick-head Samphire		
Sarcocornia quinqueflora	Beaded Samphire		
Scaevola crassifolia	Cushion Fanflower		
Sebaea ovata	Yellow Sebaea		
Senecio glossanthus	Annual Groundsel		
Senecio pinnatifolius (NC)	Variable Groundsel		
Senecio tenuiflorus (NC)	Woodland Groundsel		
Siloxerus multiflorus	Small Wrinklewort		
Spinifex hirsutus	Rolling Spinifex		
Suaeda australis	Austral Seablite		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Trachymene pilosa	Dwarf Trachymene		
Vittadinia australasica var. australasica	Sticky New Holland Daisy		
Wahlenbergia luteola	Yellow-wash Bluebell		
Wahlenbergia stricta ssp. stricta	Tall Bluebell		
Weissia controversa			
Wilsonia humilis	Silky Wilsonia		
Wurmbea dioica ssp. dioica (NC)	Early Star-lily		

R: Rare, V: Vulnerable, E: Endangered

- note: includes some marine species

Fauna

# of fauna in cell	135 recorded – 98 birds, 0 butterflies, 9 mammals, 28 reptiles, 0 amphibians (an additional 5 reptiles and 24 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	2 survey, 43 opportune sites
# of threatened fauna in cell	20
# of non-indigenous fauna	10 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Carduelis carduelis	European Goldfinch	Aves	x
Passer domesticus	House Sparrow	Aves	x
Sturnus vulgaris	Common Starling	Aves	x
Turdus merula	Common Blackbird	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p
Bos taurus	Cattle (European Cattle)	Mammalia	x
Equus caballus	Horse (Brumby)	Mammalia	x
Felis catus	Cat (Feral Cat)	Mammalia	x
Mus musculus	House Mouse	Mammalia	x
Oryctolagus cuniculus	Rabbit (European Rabbit)	Mammalia	x
Vulpes vulpes	Fox (Red Fox)	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Pandion cristatus	Eastern Osprey	M	E
Stipiturus malachurus parimeda	Southern Emu-wren (Eyre Peninsula ssp)	V	E
Cladorhynchus leucocephalus	Banded Stilt		V
Numenius madagascariensis	Eastern Curlew	M	V
Stagonopleura guttata	Diamond Firetail		V
Thinornis rubricollis	Hooded Plover		V
Actitis hypoleucos	Common Sandpiper	M	R
Anas rhynchotis	Australasian Shoveler		R
Calidris alba	Sanderling	M	R
Cereopsis novaehollandiae	Cape Barren Goose		R
Egretta sacra	Eastern Reef Egret		R
Falco peregrinus	Peregrine Falcon		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Neophema petrophila	Rock Parrot		R
Tringa glareola	Wood Sandpiper	M	R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Acanthiza chrysorrhoa	Yellow-rumped Thornbill		
Acanthiza pusilla	Brown Thornbill		
Accipiter fasciatus	Brown Goshawk		
Anas castanea	Chestnut Teal		
Anas gracilis	Grey Teal		
Anthochaera carunculata	Red Wattlebird		

Species	Common Name	Aus status	SA status
Anthus novaeseelandiae	Australasian Pipit		
Aquila audax	Wedge-tailed Eagle		
Ardenna tenuirostris	Short-tailed Shearwater		
Artamus cyanopterus	Dusky Woodswallow		
Barnardius zonarius	Australian Ringneck, (Ring-necked Parrot)		
Cacomantis pallidus	Pallid Cuckoo		
Calidris acuminata	Sharp-tailed Sandpiper	M	
Calidris ruficollis	Red-necked Stint	M	
Chalcites basalis	Horsfield's Bronze-cuckoo		
Charadrius bicinctus	Double-banded Plover		
Charadrius ruficapillus	Red-capped Plover		
Chroicocephalus novaehollandiae	Silver Gull		
Circus approximans	Swamp Harrier		
Colluricincla harmonica	Grey Shrike-thrush		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Corvus coronoides	Australian Raven		
Corvus mellori	Little Raven		
Cracticus nigrogularis	Pied Butcherbird		
Cracticus tibicen	Australian Magpie		
Cracticus torquatus	Grey Butcherbird		
Cygnus atratus	Black Swan		
Dromaius novaehollandiae	Emu		
Drymodes brunneopygia	Southern Scrub-robin		
Egretta novaehollandiae	White-faced Heron		
Elanus axillaris	Black-shouldered Kite		
Eolophus roseicapillus	Galah		
Eopsaltria griseogularis	Western Yellow Robin		
Epthianura albifrons	White-fronted Chat		
Falco berigora	Brown Falcon		
Falco cenchroides	Nankeen Kestrel		
Fulmarus glacialoides	Southern Fulmar		
Gallinago hardwickii	Japanese Snipe (Latham's Snipe)	M	
Gallirallus philippensis	Buff-banded Rail		
Glyciphila melanops	Tawny-crowned Honeyeater		
Hieraaetus morphnoides	Little Eagle		
Himantopus himantopus	Black-winged Stilt		
Hirundo neoxena	Welcome Swallow		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Malurus cyaneus	Superb Fairy-wren		
Malurus pulcherrimus	Blue-breasted Fairy-wren		
Megalurus gramineus	Little Grassbird		
Microcarbo melanoleucos	Little Pied Cormorant		
Ocyphaps lophotes	Crested Pigeon		
Petrochelidon ariel	Fairy Martin		
Petroica multicolor	Scarlet Robin		
Phalacrocorax carbo	Great Cormorant		
Phalacrocorax sulcirostris	Little Black Cormorant		
Phalacrocorax varius	Pied Cormorant		
Phaps chalcoptera	Common Bronzewing		
Phaps elegans	Brush Bronzewing		
Phylidonyris novaehollandiae	New Holland Honeyeater		
Pluvialis squatarola	Grey Plover	M	

Species	Common Name	Aus status	SA status
Poliocephalus poliocephalus	Hoary-headed Grebe		
Pomatostomus superciliosus	White-browed Babbler		
Porzana fluminea	Australian Spotted Crake		
Psophodes nigrogularis	Western Whipbird	ssp	ssp
Purnella albifrons	White-fronted Honeyeater		
Recurvirostra novaehollandiae	Red-necked Avocet		
Rhipidura albiscapa	Grey Fantail		
Rhipidura leucophrys	Willie Wagtail		
Sericornis frontalis	White-browed Scrubwren		
Smicrornis brevirostris	Weebill		
Strepera graculina	Pied Currawong		
Strepera versicolor	Grey Currawong		ssp
Thalasseus bergii	Crested Tern		
Tringa nebularia	Common Greenshank	M	
Vanellus miles	Masked Lapwing		
Vanellus tricolor	Banded Lapwing		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Cercartetus concinnus	Western Pygmy-possum		
Macropus fuliginosus	Western Grey Kangaroo		
Rattus fuscipes	Bush Rat		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Chelonia mydas	Green Turtle	V	V	x
Varanus rosenbergi	Heath Goanna		V	x
Bassiana trilineata	Western Three-lined Skink		R	x
Lerista arenicola	Beach Slider		R	c
Amphibolurus norrisi	Mallee Tree-dragon			x
Aprasia inaurita	Red-tailed Worm-lizard			x
Aprasia striolata	Lined Worm-lizard			x
Christinus marmoratus	Marbled Gecko			x
Ctenophorus chapmani	Prickly Dragon			c
Ctenophorus fionni	Peninsula Dragon			x
Ctenophorus pictus	Painted Dragon			x
Ctenotus orientalis	Spotted Ctenotus			x
Delma australis	Barred Snake-lizard			x
Diplodactylus calcicolus	South Coast Gecko			x
Drysdalia mastersii	Master's Snake			x
Egernia stokesii	Gidgee Skink			x
Gehyra variegata	Tree Dtella			x
Hemiergis peronii	Four-toed Earless Skink			x
Lampropholis delicata	Delicate Skink			x
Lerista bougainvillii	Bougainville's Skink			x
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			x
Lerista terdigitata	Southern Three-toed Slider			x
Liopholis multiscutata	Bull Skink			x
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			x
Nephrurus milii	Barking Gecko			c
Notechis scutatus	Eastern Tiger Snake	ssp		x
Pogona barbata	Eastern Bearded Dragon			x
Pseudechis australis	Mulga Snake			x
Pseudonaja inframacula	Peninsula Brown Snake			x
Tympanocryptis lineata	Five-lined Earless Dragon			x
Varanus gouldii	Sand Goanna			x

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP40 Coffin Bay

Cell area 1,681 ha. Shoreline length 45.35km.

Landforms

The boundary follows the eastern shore of southern Mount Dutton Bay, and then the whole of Kellidie Bay; the 500m default boundary is extended only at the eastern side of Kellidie Bay by a small area of salt marsh. The dominant landform is a low undulating plain of Pleistocene calcarenite; the shore is mainly of low rocky cliffs, with patches of salt marsh and small beaches between low calcarenite cliffs; the small beaches are low energy, coarse sand grain, steep high tide beaches, fronted by narrow sand flats and sea grass. Salt marsh is located at the eastern end of Kellidie Bay, and near the mouth of Minninbbie Creek.

Benthic Habitat

Mainly dense/ continuous seagrass, in places to low tide, with some areas of macroalgae.

Biota

Note: salt marsh at eastern end of bay in intertidal melaleuca
There are extensive areas of *Melaleuca lanceolata* shrubland and *Eucalyptus diversifolia* open mallee woodland; there are small areas of *Allocasuarina verticillata* (south western edge of the cell) and *Tecticornia granulata* and Melaleuca salt marsh (eastern end of Kellidie Bay).
There are 14 BDBSA flora survey sites and 3 fauna survey sites within this cell, as well as 14 herbarium flora record sites, 1 threatened plant population record site and 11 opportune fauna record sites.

Land Use/ Land Ownership

A narrow (c.30-50m) coastal reserve of unalloted Crown land extends north and west along the coast from the south west boundary of the cell (boundary of Coffin Bay NP), until the Coffin Bay boat ramp. This coastal reserve is backed by privately owned land, much of which is Coffin Bay township. The coastal area surrounding the boat ramp and the slipway is under Crown land Act reserve, the boat ramp area is under the care, control and management of the DC of Lower Eyre Peninsula, the slipway area is under the care, control and management of the Minister for Transport. Between these areas, and to the south east of the slipway, the coastal reserve is unalloted Crown land, and surrounds the shacks, extending c.50-200m inland. The coastal reserve from Giles Road, Coffin Bay to the boundary of Kellidie Bay CP is largely part of the road reserve.
Much of the Kellidie Bay CP has a coastal reserve of unalloted Crown land on it's seaward boundary. North and north west of the park the coastal reserve is under a Crown lands Act reserve to the DC of Lower Eyre Peninsula, this coastal reserve (c. 15-200m) extends around

Kellidie Bay and Kellidie Peninsula to Seal Corner. The reserve is backed by privately owned land, except at the Kellidie Bay shack site, where numerous shacks are located on miscellaneous leases. North of the Seal Corner the coastal reserve (c.10-200m) is unalloted Crown land backed by privately owned land and extends to the cell boundary. A larger allotment of unalloted Crown land backs the coastal reserve at the cell boundary on the southern side of Tadpole Bay.

Rabbit Island and Goat Island of the Mount Dutton Bay CP are included within this cell.

Coffin Bay Coastal Wetland System is a 'Wetland of National Importance', SA008.

Thorny Passage Marine Park offshore.

Uses (Field visits and local reports)

Recreation and tourism- fishing, boating, sailing, walking, camping, ORV, sight seeing
Residential
Shack settlement
Land based aquaculture (yabbies and marron)
Offshore aquaculture – Oysters in bays
Boat launching – professional, charter and recreational
Conservation
Professional fishing
Industry
Agriculture

Threats (Field visits and local reports)

Spread of environmental weeds, particularly garden escapee plants.
ORV and pedestrian track proliferation – vegetation destruction and compaction
Development – subdivision
Stormwater impacts – coastal erosion, weed proliferation and source of marine pollution
Oil spills
Feral animals (foxes, rabbits, cats)
Pollution from catchment, including septic tanks, land based aquaculture and agriculture, road runoff particularly large paved surfaces at boat ramp car park)
Groundwater extraction
Illegal removal of native vegetation for sea views
High tourist visitation and increased boating activity (wave action) impacting on stability of shoreline around the boat ramp area
Spread of marine ferals (pacific oysters
Marine debris

Opportunities (Field visits and local reports)

Active volunteer groups (Lower Eyre Coastcare Assoc., Friends of Coffin Bay Parks, Coffin Bay Tourist Assoc.)
Eyre Peninsula coastal weeds book
Coffin Bay Foreshore Vegetation Management Plan prepared by Lower Eyre Coastcare Association for District Council of Lower Eyre Peninsula
State NRM funded "Landscape scale biodiversity protection Coffin, Kellidie and Dutton Bay"
EP NRM feral control program (foxes, rabbits, Allepo pines, feral olives, polygala, garden escapee plants.)
"Coffin Bay: Reducing stormwater impacts on coast and marine environments." DesignFlow 2010. Report prepared for the EP NRM Board

FIGURE 6.21 Kellidie Peninsula and Kellidie Bay. Photo: Coast Protection Board, 2007

Conservation Analysis (GIS)

Total of conservation means, 121.30, is high for the region. Extensive areas of coastal shrubland and mallee woodland show medium to high values; only salt marsh near the mouth of the Minninbbie Creek, and a tiny patch of dunes facing Bulldog Point on Mt Dutton Bay show high total values. Slopes on the northern side of Kellidie Bay have been cleared, and give low totals. Conservation totals for the whole cell are high for the following layers: vegetation community rarity in SA; threatened status of flora species; total number of threatened species; the endemicity of plant communities; the total number of species (high near the mouth of the Minninbbie Creek); habitat for threatened bird species and habitat for all bird species (high throughout, but notably around the shores of Kellidie Bay); habitat for threatened reptiles and habitat for threatened mammal species; habitat for butterflies (notably along the southern and eastern shore of Kellidie Bay); habitat for the Eastern Osprey (focal species); there are also values for vegetation metrics as well as indigenous heritage.
Ten mammal, 24 reptile, one amphibian and 114 bird species have been recorded in this cell, including the state endangered Southern Emu-wren (EP sp.), White-bellied Sea-Eagle, Eastern Osprey, and Fairy Tern; also the state vulnerable Eastern Curlew, Hooded Plover, Diamond Firetail and Heath Goanna.

Threat Analysis (GIS)

The total of threat means is 45.17, which is a medium level for the region. Threat totals are high near Coffin Bay township, and in small patches facing onto Mount Dutton Bay; much of the shores facing Kellidie Bay are medium to low, with low totals at the eastern end and within Kellidie Bay CP. Outside the park totals are low medium or higher, with considerable local variation within this range.
This pattern of summed threats has accumulated from ORV tracks (notably along the northern shore of Kelli die Bay, and near the Coffin Bay township); land ownership (almost all privately

owned outside the CP); and viewscape. Numbers of exotic species and invasive weeds are relatively high; records show that weeds are a potentially increasing threat within Kelli die Bay CP, with the presence of sea lavender, African boxthorn, polygala, Aleppo pine and bridal creeper recorded within the park.
Any disturbance of the high value area near the mouth of Meningie Creek has the potential for acid sulfate soil development.

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	**Impacts and implications (for this cell)**	**Protect and manage habitat threats**	**Address landscape issues: fire, connectivity, refuges, hydrology**
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Loss of small pocket beaches fronting low calcarenite cliffs. Erosion of calcarenite cliffs	Monitor change using high resolution aerial photograph time series.	
2070: +c.80cm.	Salt marsh at the E. end of Kellidie Bay threatened by tidal inundation, leading to habitat change.	Monitor species change in floodable areas; allow salt marsh retreat where feasible.	
	Further shoreline adjustment in Proper Bay as pocket beaches are lost; and calcarenite cliffs eroded	Monitor change as shown by aerial photographic record.	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Storm tide flooding above highest known tides.	Monitor species change in floodable areas.	
Intensity of large storms increases.			
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere. There will be an increased risk for species that are already vulnerable. Invasive species are likely to become more dominant.		Maintain connectivity of remnant vegetation blocks.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage, with invasion of grass species.	Active dune management, including weed control	Ensure dunes are included in regional fire plan
'Flashy' run off: Drier creeks, but larger rare floods	Storm drains' capacity tested by peak events; peaks also in pollution transport to bay.	Maintain watching brief on this situation	
Groundwater lowering; saline incursion:	There is a potential local impact on water tables within the calcarenite, and thus vegetation survival	Adaptive management of plant assets	
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains sediment movement. Local movement of large quantities of sand in Coffin Bay may be accelerated as sea levels rise.	Monitor beaches, see above.	

TABLE 6.19 Recommended Actions and Priority for EP40 Coffin Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Areas within cell identified as being important for rare and endemic plant communities and as habitat for threatened species, no protection and impact from agricultural activities, development zoning, uncontrolled access, weeds and pest animals	Review management and land management practices in these areas with a view to minimise damage and disturbance and increase protection. Investigate and implement actions to improve, protect and mitigate threats to these areas. Review development plan zoning to these areas to increase protection	High (cons/ threat)	DENR, private land owners, EP NRM, DPLG, DC of Lower Eyre Peninsula, community groups
	Feral pacific oyster with potential impact on native fauna species	On-going monitoring and removal.	Medium	PIRSA Biosecurity, oyster growers

Component	Issue	Proposed Action	Priority of Action	Key Players
	Climate change and sea level rise is having multiple effects within the cell	Ensure the establishment and maintenance of a time series of aerial photographs at an appropriate high resolution. Maintain connectivity between vegetation blocks to maximise resilience	Medium (cons)	DENR, EP NRM, community groups
	Existing and possible future development with impact on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, rubbish dumping, etc)	Work with private land owners to minimise impact from existing development, including education and restoration where appropriate. Ensure future development is not located in areas of high conservation value or high sensitivity. Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs and cats, etc	High (cons/ threat)	EP NRM, DC of Lower Eyre Peninsula, DENR, DPLG, EP LGA, private land owners, community groups
	Non-indigenous heritage site listed – Site of Oyster Town, including well, with potential impact from recreational activities	Ensure sites managed to protect from damage. Install interpretive educational signage where appropriate.	Medium	DENR, community, DC of Lower Eyre Peninsula
	Unrestricted pedestrian access in high visitation areas, (eg. surrounding Coffin Bay township, lower Kellidie Bay peninsula) with impact soil erosion, stability and compaction, safety hazard, vegetation damage, weed introduction, fauna disturbance and water runoff erosion	Formalise and maintain pedestrian access. Install directional / educational signage where required.	Medium	DC of Lower Eyre Peninsula, community groups, EP NRM
	Feral plants and animals identified throughout cell, with potential impact on vegetation degradation, competition with native species, etc.	Ensure ongoing support (financial and unground) to maintain feral control achievements of "Coffin, Kellidie, Dutton Bays project.	High (cons/ threat)	DENR, EP NRM private land holders, SA and Australian Government

Component	Issue	Proposed Action	Priority of Action	Key Players
	Potential impact on breeding habitat of the endangered Eastern Osprey, particularly during the breeding season.	Develop site management and monitoring strategy. Community education.	High (cons)	DENR, local community, EP NRM
	Uncontrolled access, multiple vehicle tracks and informal car parks around the coast, with impact on coastal vegetation, soil compaction and erosion, weed introduction, disturbance to native fauna species	Develop access/traffic management plan – including review of existing access with a view to rationalise unnecessary tracks and car parks. Block access (eg. fencing/rocks) to tracks and car parks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks or car parks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	Med (cons/ threat)	DC of Lower Eyre Peninsula, private land owners, DENR, EP NRM, community groups, SA Tourism
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, private land owners, community groups, EP NRM, DC of Lower Eyre Peninsula
	Maintenance of coastal access management infrastructure	Use the EP Coastal infrastructure audit to setup a maintenance program	Medium	DC Lower Eyre Peninsula, EP NRM, DENR, community groups
Beaches	Marine debris with potential impact on native fauna species	Investigate opportunities for, and/or support, ongoing marine debris cleanup programs. Undertake education program targeting fishers, campers, aquaculture operators	Medium	PIRSA, EP NRM, DENR, aquaculture operators, community, DC of Lower Eyre Peninsula

Component	Issue	Proposed Action	Priority of Action	Key Players
	Vehicles and dogs on beaches a threat to meiofauna and shorebirds	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	High (cons/ threat)	DC of Lower Eyre Peninsula, EP NRM, DTEI, EP LGA, DENR, Tourism SA, Birds Australia, community groups
Kellidie Bay CP	The CP has high conservation values with potential threat from recreational activities, weeds and pest plants, rubbish dumping, etc	Ongoing implementation of the Management Plan to protect threatened species and minimise impacts and threats to flora and fauna.	High (cons)	DENR
	Presence of invasive weeds, though not in high numbers; notably in the NE edge of the park.	Monitor and record weed species and distribution. Continue weed control programs.	High (cons/ threat)	DENR, EP NRM, Friends of Coffin Bay Parks
Coffin Bay township & foreshore	Stormwater impacts on coast and marine environment (eg. spread of weeds, erosion, pollution)	Implement actions from DesignFlow 2010 report	Medium	DC of Lower Eyre Peninsula, EP NRM, Stormwater Management Authority,
	Loss of native vegetation	Implement recommendations in Coffin Bay Foreshore Vegetation Management plan,	High	DC of Lower Eyre Peninsula, private land owners, community groups, DENR

Component	Issue	Proposed Action	Priority of Action	Key Players
	Spread of invasive environmental weeds, track proliferation	Implement recommendations in Coffin Bay Foreshore Vegetation Management plan.	High	EP NRM, DC LEP, Lower Eyre Coastcare Assoc., community
	Coastal erosion	Ongoing assessment of shoreline stability and undertake remediation actions as necessary. Maintain and enhance vegetation cover and rationalise coastal access tracks.	Medium	DC of Lower Eyre Peninsula, DENR, EP NRM, community groups
	Non-indigenous heritage site listed – Coffin Bay main jetty, including well, with potential impact from recreational activities	Ensure sites managed to protect from damage. Install interpretive educational signage where appropriate.	Low (threat)	DENR, community, EP NRM, DC of Lower Eyre Peninsula
Wetland at the mouth of Minninbbie Creek, NE corner of Kellidie Bay	This small wetland (Tecticornia and *Melaleuca halmaturorum* shrubland) is of very high total conservation value, notably for threatened bird habitat. It is threatened by land use, ownership and acid sulfate soil potential.	Review the management of this valuable area to actively protect bird habitat, with consideration to prepare a local management plan including possible heritage agreement, improved management, joint management or purchase and include in Kellidie Bay CP, etc.		Private land owner, DENR, EP NRM, Nature Foundation

BIOTA

Flora

Remnant vegetation area (ha)	1162.11 ha, 69.14% of the cell area
# flora surveys / records	7 surveys, 18 herbarium record sites, 1 threatened plant population record site.
# flora in cell	279 (note: includes some marine species)
# conservation rated flora in cell	5
# non-indigenous flora in cell	61
Significant CDCS floristic community	*Eucalyptus diversifolia* / *Clematis microphylla* mallee – 81% of SA records in EP *Gahnia trifida* sedgeland – only 2 sites in SA, 50% of these in EP *Leucopogon parviflorus* / *Acrotriche patula* shrubland – <20 (13) sites recorded along SA coast, 100% of these in EP
Protected area	31% of remnant vegetation protected within Kellidie Bay CP and Mount Dutton Bay CP

Weeds

Species	Common Name	Status	Study rating
Polygala myrtifolia	Myrtle-leaf Milkwort	RA	9
Freesia cultivar	Freesia	RA	7
Limonium companyonis	Sea-lavender	RA	7
Limonium sp.	Sea-lavender	RA	7
Gazania rigens	Gazania	RA	6
Avena fatua	Wild Oat	RA	5
Euphorbia paralias	Sea Spurge	RA	5
Carrichtera annua	Ward's Weed	RA	4
Dipogon lignosus	Lavatory Creeper	RA	4
Mesembryanthemum crystallinum	Common Iceplant	RA	4
Lycium ferocissimum	African Boxthorn	D, RA	8
Chrysanthemoides monilifera ssp. monilifera	Boneseed	D, RA	6
Marrubium vulgare	Horehound	D, RA	5
Olea europaea ssp.	Olive	D, RA	5
Oxalis pes-caprae	Soursob	D, RA	5
Pinus halepensis	Aleppo Pine	D, RA	5
Asparagus asparagoides (NC)	Bridal Creeper	D, RA	9
Asphodelus fistulosus	Onion Weed	D	3
Diplotaxis tenuifolia	Lincoln Weed	D	3
Echium plantagineum	Salvation Jane	D	2
Aeonium arboreum	Tree Aeonium		1
Aira cupaniana	Small Hair-grass		0
Anagallis arvensis	Pimpernel		2
Arctotheca calendula	Cape Weed		1
Avellinia michelii	Avellinia		0
Avena barbata	Bearded Oat		2
Briza minor	Lesser Quaking-grass		2
Bromus diandrus	Great Brome		2
Bromus madritensis	Compact Brome		2
Cakile maritima ssp. maritima	Two-horned Sea Rocket		1
Carthamus lanatus	Saffron Thistle		0
Catapodium rigidum	Rigid Fescue		1
Chenopodium album	Fat Hen		0
Coleonema pulchellum	Diosma		3
Cotoneaster simonsii	Cotoneaster		0
Crassula natans var. minus	Water Crassula		0
Dimorphotheca pluvialis	Cape Marigold		1
Dittrichia graveolens	Stinkweed		1
Ehrharta longiflora	Annual Veldt Grass		3
Eucalyptus gomphocephala	Tuart		3
Galium murale	Small Bedstraw		0
Hordeum glaucum	Blue Barley-grass		1
Hypochaeris glabra	Smooth Cat's Ear		2
Lagurus ovatus	Hare's Tail Grass		2
Limonium hyblaeum			3
Malva dendromorpha	Tree Mallow		3
Medicago arabica	Spotted Medic		0
Minuartia mediterranea	Slender Sandwort		0
Rostraria cristata	Annual Cat's-tail		2
Scabiosa atropurpurea	Pincushion		3
Senecio pterophorus	African Daisy		2

Species	Common Name	Status	Study rating
Silene nocturna	Mediterranean Catchfly		1
Sisymbrium orientale	Indian Hedge Mustard		0
Sonchus asper ssp. asper	Rough Sow-thistle		0
Sonchus asper ssp. glaucescens	Rough Sow-thistle		0
Sparaxis bulbifera	Sparaxis		3
Tribolium acutiflorum			0
Trifolium arvense var. arvense	Hare's-foot Clover		2
Trifolium campestre	Hop Clover		2
Vulpia myuros f.	Fescue		2
Vulpia myuros f. myuros	Rat's-tail Fescue		2

D: Declared weed, RA: Red alert weed

Native flora*

Species	Common Name	Aus status	SA status
Pleuropappus phyllocalymmeus	Silver Candles	V	V
Eucalyptus conglobata ssp. conglobata	Port Lincoln Mallee		R*
Acacia dodonaeifolia	Hop-bush Wattle		R
Caladenia bicalliata ssp. bicalliata	Western Daddy-long-legs		R
Isotoma scapigera	Salt Isotome		R
Acacia calamifolia (NC)	Wallowa		
Acacia cupularis	Cup Wattle		
Acacia farinosa	Mealy Wattle		
Acacia leiophylla	Coast Golden Wattle		
Acacia ligulata	Umbrella Bush		
Acacia longifolia ssp. sophorae	Coastal Wattle		
Acacia microcarpa	Manna Wattle		
Acacia myrtifolia var. myrtifolia (NC)	Myrtle Wattle		
Acacia nematophylla	Coast Wallowa		
Acacia paradoxa	Kangaroo Thorn		
Acacia pycnantha	Golden Wattle		
Acacia spinescens	Spiny Wattle		
Acacia triquetra	Mallee Wreath Wattle		
Acaena echinata	Sheep's Burr		
Acrotriche cordata	Blunt-leaf Ground-berry		
Acrotriche patula	Prickly Ground-berry		
Adenanthos terminalis	Yellow Gland-flower		
Adriana klotzschii (NC)	Coast Bitter-bush		
Adriana quadripartita	Coast Bitter-bush		
Allocasuarina verticillata	Drooping Sheoak		
Alyogyne huegelii	Native Hibiscus		
Alyxia buxifolia	Sea Box		
Apalochlamys spectabilis	Showy Firebush		
Apium prostratum var. prostratum	Native Celery		
Apodasmia brownii	Coarse Twine-rush		
Asteridea athrixioides f. athrixioides	Wirewort		
Astroloma conostephioides	Flame Heath		
Atriplex cinerea	Coast Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrostipa elegantissima	Feather Spear-grass		
Austrostipa exilis	Heath Spear-grass		

Species	Common Name	Aus status	SA status
Austrostipa flavescens	Coast Spear-grass		
Austrostipa nodosa	Tall Spear-grass		
Austrostipa scabra ssp. falcata	Slender Spear-grass		
Banksia marginata	Silver Banksia		
Baumea arthrophylla	Swamp Twig-rush		
Baumea juncea	Bare Twig-rush		
Beyeria lechenaultii	Pale Turpentine Bush		
Bulbine semibarbata	Small Leek-lily		
Bursaria spinosa ssp. spinosa	Sweet Bursaria		
Caladenia capillata	Wispy Spider-orchid		
Caladenia cardiochila	Heart-lip Spider-orchid		
Caladenia carnea	Pink Fingers		
Caladenia fuscata	Dusky Caladenia		
Caladenia latifolia	Pink Caladenia		
Caladenia stricta	Upright Caladenia		
Callistemon rugulosus var. (NC)	Scarlet Bottlebrush		
Callitris canescens	Scrubby Cypress Pine		
Carpobrotus rossii	Native Pigface		
Carpobrotus rossii (NC)	Native Pigface		
Cassytha glabella f. dispar	Slender Dodder-laurel		
Cassytha peninsularis	Peninsula Dodder-laurel		
Centella asiatica	Asian Centella		
Chaetomorpha indica			
Chrysocephalum apiculatum	Common Everlasting		
Cladophora albida			
Clematis microphylla			
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Comesperma volubile	Love Creeper		
Correa backhouseana var. coriacea	Thick-leaf Correa		
Correa pulchella	Salmon Correa		
Corybas incurvus	Slaty Helmet-orchid		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Cyrtostylis robusta	Robust Gnat-orchid		
Daucus glochidiatus	Native Carrot		
Dianella brevicaulis	Short-stem Flax-lily		
Dianella brevicaulis/revoluta var.	Black-anther Flax-lily		
Dianella revoluta var.			
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Dichelachne crinita	Long-hair Plume-grass		
Dodonaea hexandra	Horned Hop-bush		
Dodonaea viscosa ssp.	Sticky Hop-bush		
Drosera macrantha ssp. planchonii	Climbing Sundew		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Epilobium billardierianum ssp. billardierianum	Robust Willow-herb		
Eucalyptus albopurpurea	Purple-flowered Mallee Box		
Eucalyptus camaldulensis var. camaldulensis (NC)	River Red Gum		
Eucalyptus diversifolia (NC)	Coastal White Mallee		
Eucalyptus oleosa (NC)	Red Mallee		
Eucalyptus rugosa	Coastal White Mallee		
Eucalyptus viminalis ssp. cygnetensis	Rough-bark Manna Gum		
Exocarpos sparteus	Slender Cherry		
Exocarpos syrticola	Coast Cherry		
Ficinia nodosa	Knobby Club-rush		

Species	Common Name	Aus status	SA status
Frankenia cordata			
Gahnia deusta	Limestone Saw-sedge		
Gahnia filum	Thatching Grass		
Gahnia lanigera	Black Grass Saw-sedge		
Gahnia trifida	Cutting Grass		
Galium gaudichaudii (NC)	Rough Bedstraw		
Geranium retrorsum	Grassland Geranium		
Geranium solanderi var. solanderi	Austral Geranium		
Glossodia major	Purple Cockatoo		
Goodenia blackiana	Native Primrose		
Goodenia pinnatifida	Cut-leaf Goodenia		
Goodenia varia	Sticky Goodenia		
Goodia medicaginea	Western Golden-tip		
Grevillea aspera	Rough Grevillea		
Hakea vittata	Limestone Needlebush		
Haloragis acutangula f. acutangula	Smooth Raspwort		
Haloragis acutangula f. annulata	Smooth Raspwort		
Haloragis acutangula f. dentata	Smooth Raspwort		
Haloragis acutangula f. obturbinata	Smooth Raspwort		
Haloragis acutangula f. subacutangula	Smooth Raspwort		
Haloragis acutangula f. tetraptera	Smooth Raspwort		
Hardenbergia violacea	Native Lilac		
Helichrysum leucopsideum	Satin Everlasting		
Hibbertia platyphylla ssp. platyphylla			
Hibbertia riparia (NC)	Guinea-flower		
Hypoxis glabella var. glabella	Tiny Star		
Juncus kraussii	Sea Rush		
Kennedia prostrata	Scarlet Runner		
Lasiopetalum discolor	Coast Velvet-bush		
Lawrencia spicata	Salt Lawrencia		
Lawrencia squamata	Thorny Lawrencia		
Lepidosperma carphoides	Black Rapier-sedge		
Lepidosperma congestum (NC)	Clustered Sword-sedge		
Lepidosperma gladiatum	Coast Sword-sedge		
Leucopogon parviflorus	Coast Beard-heath		
Leucopogon rufus	Ruddy Beard-heath		
Lichen sp.			
Linum marginale	Native Flax		
Lissanthe strigosa ssp. subulata	Peach Heath		
Lobelia anceps	Angled Lobelia		
Logania crassifolia	Coast Logania		
Logania ovata	Oval-leaf Logania		
Lotus australis	Austral Trefoil		
Maireana oppositifolia	Salt Bluebush		
Malva preissiana	Australian Hollyhock		
Malvastrum americanum var. americanum	Malvastrum		
Melaleuca armillaris var. tenuifolia (NC)	Bracelet Honey-myrtle		
Melaleuca brevifolia	Short-leaf Honey-myrtle		
Melaleuca decussata	Totem-poles		
Melaleuca halmaturorum	Swamp Paper-bark		
Melaleuca lanceolata	Dryland Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Microtis arenaria	Notched Onion-orchid		

Species	Common Name	Aus status	SA status
Microtis unifolia complex	Onion-orchid		
Millotia myosotidifolia	Broad-leaf Millotia		
Mimulus repens	Creeping Monkey-flower		
Moss sp.			
Muehlenbeckia adpressa	Climbing Lignum		
Muehlenbeckia gunnii	Coastal Climbing Lignum		
Myoporum insulare	Common Boobialla		
Myosotis australis	Austral Forget-me-not		
Nicotiana maritima	Coast Tobacco		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Olearia ramulosa	Twiggy Daisy-bush		
Oxalis perennans	Native Sorrel		
Oxalis perennans (NC)	Native Sorrel		
Parietaria debilis	Smooth-nettle		
Parietaria debilis (NC)	Smooth-nettle		
Pelargonium littorale	Native Pelargonium		
Pheladenia deformis	Bluebeard Orchid		
Picris angustifolia ssp. angustifolia	Coast Picris		
Pimelea glauca	Smooth Riceflower		
Pimelea octophylla	Woolly Riceflower		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pittosporum angustifolium	Native Apricot		
Poa labillardieri var. labillardieri	Common Tussock-grass		
Poa poiformis var. poiformis	Coast Tussock-grass		
Pomaderris obcordata	Wedge-leaf Pomaderris		
Pomaderris paniculosa ssp.			
Pomaderris paniculosa ssp. paniculosa	Mallee Pomaderris		
Poranthera triandra	Three-petal Poranthera		
Prasophyllum occidentale	Plains Leek-orchid		
Prasophyllum odoratum (NC)	Scented Leek-orchid		
Pterostylis nana	Dwarf Greenhood		
Pterostylis plumosa	Bearded Greenhood		
Pterostylis robusta	Large Shell-orchid		
Ptilotus spathulatus f. spathulatus	Pussy-tails		
Pultenaea tenuifolia	Narrow-leaf Bush-pea		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia parabolica	Mealy Saltbush		
Rhagodia spinescens	Spiny Saltbush		
Rumex brownii	Slender Dock		
Sagina maritima	Sea Pearlwort		
Salsola tragus	Buckbush		
Samolus repens	Creeping Brookweed		
Sarcocornia blackiana	Thick-head Samphire		
Sarcocornia quinqueflora	Beaded Samphire		
Scaevola crassifolia	Cushion Fanflower		
Schoenus carsei	Wiry Bog-rush		
Sclerolaena uniflora	Small-spine Bindyi		
Sebaea ovata	Yellow Sebaea		
Selliera radicans	Shiny Swamp-mat		
Senecio glomeratus ssp. longifructus	Swamp Groundsel		
Senecio pinnatifolius (NC)	Variable Groundsel		
Senecio spanomerus			

Species	Common Name	Aus status	SA status
Sporobolus virginicus	Salt Couch		
Spyridium bifidum var. bifidum	Forked Spyridium		
Spyridium nitidum	Shining Spyridium		
Tecticornia tenuis	Slender Samphire		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Thelymitra nuda (NC)	Scented Sun-orchid		
Thelymitra rubra	Salmon Sun-orchid		
Thysanotus patersonii	Twining Fringe-lily		
Trachymene cyanopetala	Purple Trachymene		
Trachymene pilosa	Dwarf Trachymene		
Triodia irritans complex	Spinifex		
Urtica incisa	Scrub Nettle		
Velleia arguta	Toothed Velleia		
Veronica hillebrandii	Rigid Speedwell		
Vittadinia australasica var. australasica	Sticky New Holland Daisy		
Vittadinia dissecta var. hirta	Dissected New Holland Daisy		
Wahlenbergia preissii			
Wahlenbergia stricta ssp. stricta	Tall Bluebell		
Wurmbea dioica ssp. dioica (NC)	Early Star-lily		
Zygophyllum billardierei (NC)	Coast Twinleaf		
Zygophyllum confluens	Forked Twinleaf		

R: Rare, V: Vulnerable, E: Endangered
* note: includes some marine species

Fauna

# of fauna in cell	149 recorded – 114 birds, 0 butterflies, 10 mammals, 24 reptiles, 1 amphibians (an additional 7 reptiles and 24 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	2 surveys, 39 opportune sites, 1 reserve database record site
# of threatened fauna in cell	20 (recorded)
# of non-indigenous fauna	13 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Carduelis carduelis	European Goldfinch	Aves	x
Columba livia	Rock Dove	Aves	x
Passer domesticus	House Sparrow	Aves	x
Streptopelia chinensis	Spotted Dove	Aves	x
Sturnus vulgaris	Common Starling	Aves	x
Turdus merula	Common Blackbird	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p
Bos taurus	Cattle (European Cattle)	Mammalia	x
Equus caballus	Horse (Brumby)	Mammalia	x
Felis catus	Cat (Feral Cat)	Mammalia	x
Lepus capensis	Brown Hare (European Hare)	Mammalia	x
Mus musculus	House Mouse	Mammalia	x
Oryctolagus cuniculus	Rabbit (European Rabbit)	Mammalia	x

Species	Common Name	Class	Record
Vulpes vulpes	Fox (Red Fox)	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Pandion cristatus	Eastern Osprey	M	E
Sternula nereis	Fairy Tern		E
Stipiturus malachurus parimeda	Southern Emu-wren (Eyre Peninsula ssp)	V	E
Numenius madagascariensis	Eastern Curlew	M	V
Stagonopleura guttata	Diamond Firetail		V
Thinornis rubricollis	Hooded Plover		V
Actitis hypoleucos	Common Sandpiper	M	R
Anas rhynchotis	Australasian Shoveler		R
Biziura lobata	Musk Duck		R
Calidris alba	Sanderling	M	R
Cereopsis novaehollandiae	Cape Barren Goose		R
Egretta sacra	Eastern Reef Egret		R
Falco peregrinus	Peregrine Falcon		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Neophema petrophila	Rock Parrot		R
Tringa glareola	Wood Sandpiper	M	R
Turnix varius	Painted Button-quail		R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Acanthiza apicalis	Inland Thornbill		
Acanthiza chrysorrhoa	Yellow-rumped Thornbill		
Acanthiza pusilla	Brown Thornbill		
Accipiter fasciatus	Brown Goshawk		
Anas castanea	Chestnut Teal		
Anas gracilis	Grey Teal		
Anas superciliosa	Pacific Black Duck		
Anthochaera carunculata	Red Wattlebird		
Anthus novaeseelandiae	Australasian Pipit		
Aquila audax	Wedge-tailed Eagle		
Ardea modesta	Eastern Great Egret		
Ardenna tenuirostris	Short-tailed Shearwater		
Artamus cyanopterus	Dusky Woodswallow		
Barnardius zonarius	Australian Ringneck, (Ring-necked Parrot)		
Cacomantis flabelliformis	Fan-tailed Cuckoo		
Cacomantis pallidus	Pallid Cuckoo		
Calidris acuminata	Sharp-tailed Sandpiper	M	
Calidris ferruginea	Curlew Sandpiper	M	
Calidris ruficollis	Red-necked Stint	M	
Chalcites basalis	Horsfield's Bronze-cuckoo		
Charadrius ruficapillus	Red-capped Plover		
Chroicocephalus novaehollandiae	Silver Gull		
Circus approximans	Swamp Harrier		
Colluricincla harmonica	Grey Shrike-thrush		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Corvus coronoides	Australian Raven		

Species	Common Name	Aus status	SA status
Corvus mellori	Little Raven		
Cracticus nigrogularis	Pied Butcherbird		
Cracticus tibicen	Australian Magpie		
Cracticus torquatus	Grey Butcherbird		
Cygnus atratus	Black Swan		
Dromaius novaehollandiae	Emu		
Drymodes brunneopygia	Southern Scrub-robin		
Egretta novaehollandiae	White-faced Heron		
Elanus axillaris	Black-shouldered Kite		
Eolophus roseicapillus	Galah		
Eopsaltria griseogularis	Western Yellow Robin		
Epthianura albifrons	White-fronted Chat		
Eudyptula minor	Little Penguin		
Falco berigora	Brown Falcon		
Falco cenchroides	Nankeen Kestrel		
Gallinago hardwickii	Japanese Snipe (Latham's Snipe)	M	
Gallirallus philippensis	Buff-banded Rail		
Glyciphila melanops	Tawny-crowned Honeyeater		
Grallina cyanoleuca	Magpie-lark		
Hieraaetus morphnoides	Little Eagle		
Himantopus himantopus	Black-winged Stilt		
Hirundo neoxena	Welcome Swallow		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Malurus cyaneus	Superb Fairy-wren		
Malurus pulcherrimus	Blue-breasted Fairy-wren		
Megalurus gramineus	Little Grassbird		
Microcarbo melanoleucos	Little Pied Cormorant		
Nycticorax caledonicus	Nankeen Night Heron		
Ocyphaps lophotes	Crested Pigeon		
Onychoprion fuscata	Sooty Tern		
Pardalotus striatus	Striated Pardalote		
Pelecanus conspicillatus	Australian Pelican		
Petrochelidon ariel	Fairy Martin		
Petroica multicolor	Scarlet Robin		
Phalacrocorax carbo	Great Cormorant		
Phalacrocorax sulcirostris	Little Black Cormorant		
Phalacrocorax varius	Pied Cormorant		
Phaps chalcoptera	Common Bronzewing		
Phaps elegans	Brush Bronzewing		
Phylidonyris novaehollandiae	New Holland Honeyeater		
Pluvialis squatarola	Grey Plover	M	
Podargus strigoides	Tawny Frogmouth		
Poliocephalus poliocephalus	Hoary-headed Grebe		
Pomatostomus superciliosus	White-browed Babbler		
Porzana fluminea	Australian Spotted Crake		
Psophodes nigrogularis	Western Whipbird	ssp	ssp
Purnella albifrons	White-fronted Honeyeater		
Recurvirostra novaehollandiae	Red-necked Avocet		
Rhipidura albiscapa	Grey Fantail		
Rhipidura leucophrys	Willie Wagtail		
Sericornis frontalis	White-browed Scrubwren		
Smicrornis brevirostris	Weebill		

Species	Common Name	Aus status	SA status
Strepera graculina	Pied Currawong		
Strepera versicolor	Grey Currawong		ssp
Tachybaptus novaehollandiae	Australasian Grebe, (Little Grebe)		
Thalasseus bergii	Crested Tern		
Todiramphus sanctus	Sacred Kingfisher		
Trichoglossus haematodus	Rainbow Lorikeet		
Tringa nebularia	Common Greenshank	M	
Vanellus miles	Masked Lapwing		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Cercartetus concinnus	Western Pygmy-possum		
Macropus fuliginosus	Western Grey Kangaroo		
Rattus fuscipes	Bush Rat		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Varanus rosenbergi	Heath Goanna		V	x
Bassiana trilineata	Western Three-lined Skink		R	e
Lerista arenicola	Beach Slider		R	c
Amphibolurus norrisi	Mallee Tree-dragon			x
Aprasia inaurita	Red-tailed Worm-lizard			x
Aprasia striolata	Lined Worm-lizard			x
Christinus marmoratus	Marbled Gecko			x
Ctenophorus chapmani	Prickly Dragon			c
Ctenophorus fionni	Peninsula Dragon			x
Ctenophorus pictus	Painted Dragon			x
Ctenotus orientalis	Spotted Ctenotus			x
Delma australis	Barred Snake-lizard			x
Diplodactylus calcicolus	South Coast Gecko			x
Drysdalia mastersii	Master's Snake			x
Egernia stokesii	Gidgee Skink			x
Gehyra variegata	Tree Dtella			x
Hemiergis peronii	Four-toed Earless Skink			x
Lampropholis delicata	Delicate Skink			c
Lerista bougainvillii	Bougainville's Skink			x
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			x
Lerista terdigitata	Southern Three-toed Slider			x
Liopholis multiscutata	Bull Skink			x
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			x
Nephrurus milii	Barking Gecko			c
Notechis scutatus	Eastern Tiger Snake	ssp		x
Pogona barbata	Eastern Bearded Dragon			x
Pseudechis australis	Mulga Snake			x
Tympanocryptis lineata	Five-lined Earless Dragon			x
Varanus gouldii	Sand Goanna			x

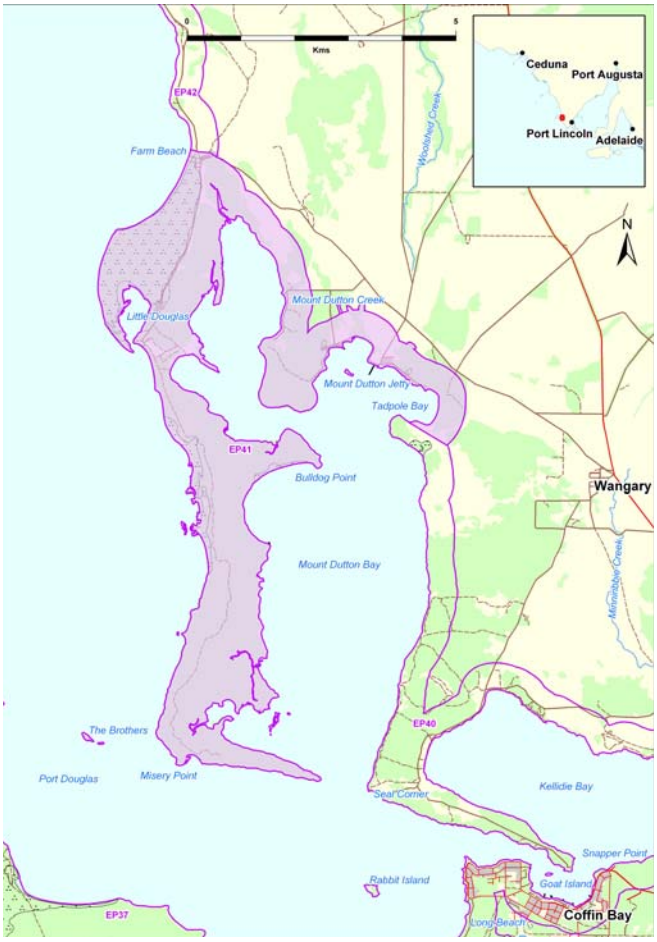
R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

Species	Common Name	Aus status	SA status	Record
Crinia signifera	Common Froglet			x

Cell EP41 Horse Peninsula

Cell area is 2,057 ha. Cell shoreline length is 64.88 km.



Landforms

This cell encompasses the Horse Peninsula and the northern shores of Mount Dutton Bay. The core of the peninsula, and associated small islets and reefs, is Bridgewater Formation calcarenite: its surface undulates gently near to sea level; and thus low lying parts are subject to storm surge flooding, showing salt marsh vegetation and sabkhas. Littoral drift appears to be moving sand slowly south along the western side of the Horse Peninsula; considerable storage of Holocene sands is found in the beach ridge system at Farm Beach, at the northern extremity of the cell. Immediately south a series of sand spits, witness the southerly drift into the bay. Beaches are narrow, steep, sheltered and of coarse sand grade, almost certainly derived from local granites. All around the peninsula beaches alternate with low rocky cliffs of calcarenite, and only at the southern end of the peninsula are cliffs over 10m found.

Benthic Habitat

Extensive intertidal seagrass and sand flats on both sides of the peninsula, and at the northern end of Mount Dutton Bay.

Biota

There is 1,813 ha native vegetation, or 88% of the cell. There are 14 BDBSA flora survey sites, 14 herbarium record sites, 3 fauna survey sites, and 11 opportune fauna sites within this cell.
From Farm Beach south, the peninsula is dominated by shrubland: along the eastern side these are *Leucopogon parviflorus*, +/-*Olearia axillaris* mid open shrubland over *Rhagodia candolleana ssp. candolleana*, *Isolepis nodosa*, *Lepidosperma gladiatum*, +/-*Lasiopetalum discolor* low shrubs over *Carpobrotus rossii* on the Holocene sands. On the calcarenite in the centre of the peninsula there is frequent *Melaleuca lanceolata*, +/-*Olearia axillaris*, +/-*Leucopogon parviflorus* tall open shrubland over +/-*Rhagodia candolleana ssp. candolleana*, +/-*Threlkeldia diffusa* low shrubs. In the south patches of *E. diversifolia* and *E. rugosa* open woodland occur; in the north and across to Tadpole Bay areas of *Allocasuarina verticillata* low woodland over *Olearia axillaris*, *Leucopogon parviflorus*, *Melaleuca lanceolata* tall shrubs over +/-*Lasiopetalum discolor* low shrubs are found. *Tecticornia* shrubland is found in low lying patches along the east coast of the peninsula.

FIGURE 6.22 Horse Peninsula looking north: salt marsh front left; *E. diversifolia/ Allocasuarina verticillata* mallee woodland mid photo. Photo: Coast Protection Board, 2007

Land Use/ Land Ownership

A narrow coastal reserve of unalloted crown land extends around the coast from the boundary of EP40 to the Mount Dutton Bay East foreshore surrounding the jetty which is under the care, control and management of the District Council of Lower Eyre Peninsula. The coastal reserve is backed by privately owned land, including the Mount Dutton Bay East settlement. West of Mount Dutton Bay East a coastal reserve of unalloted Crown land extends along the coast to just north of Bulldog Point. Most of this coastal reserve is very narrow (c.1-50m) except near Salt Creek and Mount Dutton Creek where it extends 300m to 1.1 km inland. The coastal reserve is backed by privately owned land and includes the Mount Dutton Bay West settlement and Shelley Beach Shack Site.

Most of Horse Peninsula below Little Douglas shack site (and a smaller area north of the shack site) is under Heritage Agreement (c. 44% of cell area) fronted by a narrow coastal reserve of unalloted Crown land. The coastal reserve from approximately 2km south of the Little Douglas shack site to approximately 900m south of the boundary with EP42 (the Farm Beach beach access) is Crown lands Act reserve under the care, control and management of the DC of Lower Eyre Peninsula, backed by privately owned land including the Little Douglas shack settlement. The northern 900m of coastal reserve, which extends up to 250m inland is unalloted Crown land, which at its northern extent is backed by a Crown lands Act reserve under the care, control and management of the DC of Lower Eyre Peninsula which is used as a caravan park / camping area.

The Brothers and the 6 unnamed islands of the Mount Dutton Bay CP are included within this cell.

Coffin Bay Coastal Wetland System is a 'Wetland of National Importance', SA008.

Thorny Passage Marine Park offshore.

Uses (Field visits and local reports)

Recreation and tourism- boating, fishing, formal and informal camping, ORV
Residential / shack settlements
Boat launching – aquaculture, recreational
Conservation – Vegetation Heritage Agreement areas
Formalised camp area
Jetty access
Oyster aquaculture in bays
Agriculture
Heritage site – Dutton Bay woolshed

Values (Field visits and local reports)

This cell provides feeding and breeding habitat for the focal species Australian Pied Oystercatcher which is regularly recorded on the intertidal mud flats and sand spits and in the salt marsh areas.

Threats (Field visits and local reports)

Feral animals (foxes, rabbits)
Marine debris
Spread of environmental weeds, particularly garden escapee plants.
ORV and pedestrian track proliferation – vegetation destruction and compaction
Garbage, firewood collection and toileting in bush associated with informal campsites
Development – subdivision
Boat launching (public safety, hydrocarbon spills)
Groundwater extraction
High tourist visitation and boating activity, particularly at Farm Beach
Over grazing by high kangaroo numbers
Spread of feral pacific oysters
PCASS
Oyster-farming and commercial cockle harvesting within Port Douglas and Mt Dutton Bay contributes to the reduction and degradation of nearshore and intertidal ecosystems that directly support critical shorebird feeding habitat.

Opportunities (Field visits and local reports)

Eyre Peninsula coastal weeds book
State NRM funded " Landscape scale biodiversity protection Coffin, Kellidie and Dutton Bay"
EP NRM feral control program for Coffin, Kellidie and Mount Dutton Bays (foxes, rabbits, Aleppo pines, feral olives), polygala, garden escapee plants.
Protection of the salt creek salt marsh area in a marine park sanctuary zone
Conservation and improvement works on Vegetation Heritage Agreements
Active volunteer Coastcare group has undertaken feral olive control and revegetation around the salt creak salt marsh area

Conservation Analysis (GIS)

The total of conservation means, 133.42, is high for the region. Most of this cell has been retained in native vegetation, and, as a result medium to high conservation values are widely distributed over the cell. Between Farm Beach and Little Douglas well vegetated sand dunes total

a high score; patches of salt marsh on the eastern side of the peninsula give high to medium totals.
Rarity and endemicity of vegetation communities give high values across the cell; sand dune areas on the west coast of the peninsula show high totals for reptile habitat (including habitat for the two focal species Beach Slider and Bight Coast Skink); salt marsh areas give high scores for threatened status of fauna, bird habitat, number of threatened species and as significant coastal wetland areas. Valuable habitat for butterflies is found across the cell, notably in the dunes and the Melaleuca tall shrubland. High priority is also found for viewshed and viewscape, vegetation metrics and indigenous heritage.
Ten mammal, 24 reptile and 94 bird species are recorded in this cell, including the state endangered Eastern Osprey, White-bellied Sea-Eagle (focal species), and Southern Emu-Wren (Eyre Peninsula ssp), also the state vulnerable Heath Goanna, Eastern Curlew, Diamond Firetail and Hooded Plover. Habitat for the focal species Australian Pied Oystercatcher is recorded within the sand spits and salt marsh areas.

Threat Analysis (GIS)

The total of threat summary layers is 41.13, a medium total for the region. Although this includes small values for a number of layers, the main contributors are land ownership, viewshed and viewscape, numbers of exotic plants and significant weeds. High threat areas are concentrated in the dunes south of Farm Beach (ownership, land use, viewscape, and weeds), Mount Dutton Bay West peninsula (ownership, land use, viewscape and weeds), and the Little Douglas shack area (camping, ORV activity, existing development and foredune instability); in contrast, the Horse Peninsula is a low threat area. The salt marsh areas all show high potential for the development of acid sulfate soils.

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Rise in frequency of tidal flooding of salt marsh, threatening intertidal salt marsh species, and leading to marsh recession	Monitor salt marsh flooding and salt marsh habitat through the establishment of a profile line survey. Ensure salt marsh retreat where possible	
	Dune instability will increase due to foredune damage	Monitor dune habitat conditions	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
	Beach currently shows rapid change during storm conditions; sea level rise will accelerate these dynamic shoreline changes.	Continue monitoring profile lines 325006 - 325008	
2070: +c.80cm.	Sandy coast has marked recession; indentations around calcrete. Some existing pocket beaches lost. Foredune blowouts.	Active management of dune blowouts	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides	Monitor salt marsh flooding and beach recession. Establish salt marsh retreat buffer zones.	
Intensity of large storms increases	2070: Frequent flooding, and to an increasing extent. Frequent damage to foredunes.	Ensure salt marsh retreat where possible. Active management of dune blowouts	
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing vegetation is found in warmer conditions elsewhere)		Maintain N-S connectivity of vegetation within the peninsula
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune and salt marsh habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage	Active weed control	Ensure dune vegetation is within the regional fire plan.
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains sediment movement towards the south along the west coast of the peninsula, leading to phases of erosion and accretion at beaches.	Monitor beaches, see above.	

TABLE 6.20 Recommended Actions and Priority for EP41 Horse Peninsula

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	Medium (cons)	DENR, EP NRM
	Climate change and sea level rise is having multiple effects within the cell	Ensure the establishment and maintenance of a time series of aerial photographs at an appropriate high resolution. Maintain connectivity between vegetation blocks to maximise resilience	Medium (cons)	DENR, EP NRM, community groups
	Areas within cell identified as being important for rare and endemic plant communities and as habitat for threatened species, with potential disturbance from agricultural activities, development zoning, recreational activities, land management practices, uncontrolled access, weeds and pest animals	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches, dogs on leashes, track management, pest animal and plant control, restrict access to sensitive locations. Install interpretive/ educational signage. Community education programs. Review development plan zoning to these areas to increase protection	High (cons/ threat)	DENR, private land owners, EP NRM, DPLG, DC of Lower Eyre Peninsula, community groups
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, private land owners, community groups, EP NRM, DC of Lower Eyre Peninsula
	Feral plants and animals identified throughout cell, with potential impact on vegetation degradation, competition with native species, etc	Ensure ongoing support (financial and unground) to maintain feral control achievements of "Coffin, Kellidie, Dutton Bays project.	High	DENR, EP NRM private landholders, SA and Australian Governments

Component	Issue	Proposed Action	Priority of Action	Key Players
	Existing development throughout cell (including individual dwellings, shacks and settlements) and possible future development with impact on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Work with private land owners to minimise impact from existing development, including education and restoration where appropriate. Ensure future development is not located in areas of high conservation value or high sensitivity. Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs and cats, etc	High (cons/ threat)	EP NRM, DC of Lower Eyre Peninsula, DENR, DPLG, private land owners, community groups
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	Medium (cons/ threat)	DC of Lower Eyre Peninsula, DENR, EP NRM, private land owners
	Uncontrolled vehicle and pedestrian access occurs around the coast, particularly in the vicinity of shack settlements, impacting on the coastal dune, saltmarsh and cliff top vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop vehicle and pedestrian access management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade and maintain any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	Medium	Private land owners, DC of Lower Eyre Peninsula, DTEI, DENR, EP NRM, SA Tourism
	Maintain integrity of remnant vegetation areas and fauna within Vegetation Heritage Agreements.	Support Vegetation Heritage Agreement land owners to improve management and protection of high conservation areas and mitigate threats	Medium	DENR, EP NRM, private landowners

Component	Issue	Proposed Action	Priority of Action	Key Players
	Commercial cockle and oyster harvesting with potential impact on native species particularly shorebirds, by disturbance to feeding/ breeding/ roosting habitats, removal of food resource, marine debris direct damage to seagrass beds, biosecurity risk to native invertebrates from translocation practices between EP oyster farms.	Monitor impacts to native species. Monitor mud cockle population distribution & size and collection. Investigate biomass required to support native species, particularly shorebirds	High (cons/ threat)	PIRSA, DENR, EP NRM,
	Feral pacific oyster with potential impact on native fauna species	On-going monitoring and removal.	Medium	PIRSA Biosecurity, oyster growers
	Maintenance of coastal access management infrastructure	Use the EP Coastal infrastructure audit to setup a maintenance program	Medium	DENR, DC Lower Eyre Peninsula, EP NRM, community groups
Sand dunes between Farm Beach and Little Douglas.	Acceleration of current sea level rise will lead to more frequent foredune storm damage beach and dune recession	Continue to monitor beaches and foredunes near Farm Beach and Little Douglas (DENR profiles 325006 – 8). Monitor vegetation changes within dunes; manage to reduce instability	High	DENR, EP NRM, private land owners, community
	While there are few ORV tracks in the dunes, high threat totals accumulate, notably from numbers of exotic plants (20%) and invasive weeds, including Annual Veldt Grass	Develop and implement weed management plan, including control works as required.	High (cons/ threat)	EP NRM, DC Lower Eyre Peninsula, DENR, private land owner(s)
Mt Dutton Bay West peninsula	Presence of Bridal Creeper, rhamnus, Aleppo pines, gazania and polygala in Eucalyptus diversifolia woodland	Develop and implement weed management plan, including control works as required. Undertake education program on impact of garden escapee plants and weed control program.	High (cons/ threat)	EP NRM, DC Lower Eyre Peninsula, private land owner, Dutton Bay Progress Association

Component	Issue	Proposed Action	Priority of Action	Key Players
Salt Creek salt marsh	This area has moderate/ high conservation values but are threatened by ORV activity and weeds	Support weed control, access management and revegetation initiatives	High	EP NRM, DENR, community groups (eg. LECCA), private land owners
Little Douglas shack area	Shack development and ORV activity degrading the area. Degradation appears to be much larger than the small 'Coastal (settlement)' zone. The adjacent sand ridge area immediately north is of high conservation value.	Review existing tracks with a view to rationalise unnecessary tracks. Implement actions to control and/or exclude off-road vehicle activity.	High (cons/ threat)	Private land owners, DC Lower Eyre Peninsula, EP NRM, DENR
	Garden plant escapees, particularly succulents	Develop and implement weed management plan, including monitoring and recording weed species and distribution, and control works as required.	High	EP NRM, DC Lower Eyre Peninsula, private land owner(s)
Calcarenite of central peninsula	Rising sea level will impact ground water quality	Monitor water table level and salinity.	High (cons/ threat)	Land owners, EP NRM
Mount Dutton Bay East settlement	Registered non-indigenous heritage site – Mt Dutton Bay jetty, woolshed, and local heritage listed - shearer's quarters, with potential impact from recreational activities	Ensure sites managed to protect from damage. Install interpretive educational signage where appropriate.	Medium	DC of Lower Eyre Peninsula, DENR, community groups
	Invasive environmental weeds, garden plant escapees.	Develop and implement weed management plan, including control works as required. Undertake education program on impact of garden escapee plants and weed control program.	High	EP NRM, DC Lower Eyre Peninsula, private land owners, Dutton Bay Progress Association
All salt marsh, sand flats and low lying areas	Salt marsh and low lying areas show the potential for acid sulfate soil following disturbance; in turn this would potentially threaten life forms within the bay.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Medium	DC of Lower Eyre Peninsula, DENR, developers, private land owners, EP NRM

Component	Issue	Proposed Action	Priority of Action	Key Players
	Important shorebird breeding/ feeding / resting habitat, with potential disturbance from people, vehicles, dogs, pest animals,	Develop and implement site management and monitoring strategies to protect these valuable, eg. interpretive signage, fencing off nests, use of chick shelters, temporary signage in breeding territories, restricting vehicles and off-leash dogs during breeding/migratory season. Undertake and/or support ongoing shorebird monitoring programs. Community education and awareness programs, eg. "chicks on beach".	High (cons/ threat)	DC of Lower Eyre Peninsula, EP NRM, DENR, Birds Australia, community groups
	Increased tidal and storm flooding as a result of on going and accelerating sea level rise, will alter samphire habitat	Establish profile survey line to monitor salt marsh vegetation change. Plan buffer zones for salt marsh retreat	High (cons/ threat)	Land owners, EP NRM, DENR, DPLG, DC of Lower Eyre Peninsula
Beaches	Vehicles & dogs on beaches and beach boat launching with potential impact on meiofauna, shorebirds and intertidal species and/or habitat.	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Review beach boat launching locations with a view to rationalise. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	Medium (cons/ threat)	DC of Lower Eyre Peninsula, EP NRM, DTEI, EP LGA, DENR, PIRSA, Tourism SA, Birds Australia, community groups

Component	Issue	Proposed Action	Priority of Action	Key Players
	Marine debris with potential impact on native fauna species	Investigate opportunities for, and/or support, ongoing marine debris cleanup programs. Undertake education program targeting fishers, campers, aquaculture operators	Medium	PIRSA, EP NRM, DC of Lower Eyre Peninsula, DENR, aquaculture operators, community groups
Farm Beach	Formal camping area with impact from weeds, soil compaction, vegetation trampling and removal, local impact from visitors	Ensure caravan park/ camping area maintained to minimise visitor impacts, eg. barriers/fencing to prevent spread and informal tracks, signage, provision of appropriate amenities, weed management, maintenance of facilities/ infrastructure.	Medium	DC of Lower Eyre Peninsula, EP NRM, DENR, SA Tourism

BIOTA

Flora

Remnant vegetation area (ha)	1813.42 ha, 88.15% of cell area
# flora surveys / records	14 surveys, 14 herbarium record sites, 1 threatened plant population record site.
# flora in cell	276 (note: includes a marine species)
# conservation rated flora in cell	5
# non-indigenous flora in cell	63
Significant CDCS floristic community	*Eucalyptus diversifolia* / *Clematis microphylla* mallee – 81% of SA records in EP *Halosarcia indica* ssp shrubland – <20 (6) sites recorded along SA coast, 83% (5) of these in EP *Leucopogon parviflorus* / *Acrotriche patula* shrubland – <20 (13) sites recorded along SA coast, 100% of these in EP
Protected area	49% of protected within Heritage Agreement

Weeds

Species	Common Name	Status	Study rating
Acacia cyclops	Western Coastal Wattle	RA	5
Avena fatua	Wild Oat	RA	5
Euphorbia paralias	Sea Spurge	RA	5
Leptospermum laevigatum	Coast Tea-tree	RA	5
Limonium companyonis	Sea-lavender	RA	7
Polygala myrtifolia	Myrtle-leaf Milkwort	RA	9
Rhamnus alaternus	Blowfly Bush	RA	8
Asparagus asparagoides (NC)	Bridal Creeper	D, RA	9
Lycium ferocissimum	African Boxthorn	D, RA	8
Marrubium vulgare	Horehound	D, RA	5

Species	Common Name	Status	Study rating
Olea europaea ssp.	Olive	D, RA	5
Pinus halepensis	Aleppo Pine	D, RA	5
Diplotaxis tenuifolia	Lincoln Weed	D	3
Aira cupaniana	Small Hair-grass		0
Anagallis arvensis	Pimpernel		2
Arctotheca calendula	Cape Weed		1
Arenaria leptoclados	Lesser Thyme-leaved Sandwort		0
Avellinia michelii	Avellinia		0
Avena barbata	Bearded Oat		2
Brassica tournefortii	Wild Turnip		3
Briza maxima	Large Quaking-grass		0
Briza minor	Lesser Quaking-grass		2
Bromus diandrus	Great Brome		2
Bromus hordeaceus ssp. hordeaceus	Soft Brome		2
Bromus madritensis	Compact Brome		2
Bromus rubens	Red Brome		2
Bupleurum semicompositum	Hare's Ear		0
Carthamus lanatus	Saffron Thistle		0
Catapodium rigidum	Rigid Fescue		1
Centaurea melitensis	Malta Thistle		1
Centaurium tenuiflorum	Branched Centaury		1
Cerastium balearicum	Chickweed		1
Chenopodium album	Fat Hen		0
Chenopodium murale	Nettle-leaf Goosefoot		0
Dittrichia graveolens	Stinkweed		1
Ehrharta longiflora	Annual Veldt Grass		3
Erodium cicutarium	Cut-leaf Heron's-bill		0
Galium murale	Small Bedstraw		0
Hordeum glaucum	Blue Barley-grass		1
Hypochaeris glabra	Smooth Cat's Ear		2
Lagurus ovatus	Hare's Tail Grass		2
Malva dendromorpha	Tree Mallow		3
Malva parviflora	Small-flower Marshmallow		0
Medicago polymorpha var. polymorpha	Burr-medic		1
Melilotus indicus	King Island Melilot		1
Minuartia mediterranea	Slender Sandwort		0
Parentucellia latifolia	Red Bartsia		0
Petrorhagia dubia	Velvet Pink		0
Polypogon monspeliensis	Annual Beard-grass		0
Rostraria cristata	Annual Cat's-tail		2
Scabiosa atropurpurea	Pincushion		3
Senecio pterophorus	African Daisy		2
Silene gallica var. gallica	French Catchfly		0
Silene nocturna	Mediterranean Catchfly		1
Solanum linnaeanum	Apple Of Sodom		2
Solanum nigrum	Black Nightshade		2
Sonchus asper ssp. asper	Rough Sow-thistle		0
Sonchus oleraceus	Common Sow-thistle		0
Spergularia sp.	Sand-spurrey		0
Trifolium campestre	Hop Clover		2
Trifolium glomeratum	Cluster Clover		2
Urospermum picroides	False Hawkbit		0
Vulpia myuros f. myuros	Rat's-tail Fescue		2

D: Declared weed, RA: Red alert weed

Native flora*

Species	Common Name	Aus status	SA status
Acacia alcockii	Alcock's Wattle		R
Acacia dodonaeifolia	Hop-bush Wattle		R
Acacia iteaphylla	Flinders Ranges Wattle		R
Caladenia bicalliata ssp. bicalliata	Western Daddy-long-legs		R
Poa fax	Scaly Poa		R
Acacia anceps			
Acacia anceps (NC)	Angled Wattle		
Acacia calamifolia (NC)	Wallowa		
Acacia cupularis	Cup Wattle		
Acacia cyclops	Western Coastal Wattle		
Acacia farinosa	Mealy Wattle		
Acacia leiophylla	Coast Golden Wattle		
Acacia ligulata	Umbrella Bush		
Acacia longifolia ssp.	Sallow Wattle		
Acacia longifolia ssp. sophorae	Coastal Wattle		
Acacia microcarpa	Manna Wattle		
Acacia myrtifolia var. myrtifolia (NC)	Myrtle Wattle		
Acacia nematophylla	Coast Wallowa		
Acacia paradoxa	Kangaroo Thorn		
Acacia pycnantha	Golden Wattle		
Acacia retinodes var. (NC)	Silver Wattle		
Acacia sp. Winged (C.R.Alcock 4936)	Angled Wattle		
Acacia spinescens	Spiny Wattle		
Acacia triquetra	Mallee Wreath Wattle		
Acaena echinata	Sheep's Burr		
Acaena echinata var. (NC)	Sheep's Burr		
Acrotriche patula	Prickly Ground-berry		
Adriana klotzschii (NC)	Coast Bitter-bush		
Allocasuarina verticillata	Drooping Sheoak		
Alyogyne huegelii	Native Hibiscus		
Apium annuum	Annual Celery		
Asteridea athrixioides f. athrixioides	Wirewort		
Atriplex paludosa ssp.	Marsh Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Atriplex suberecta	Lagoon Saltbush		
Atriplex vesicaria ssp.	Bladder Saltbush		
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrodanthonia setacea	Small-flower Wallaby-grass		
Austrostipa elegantissima	Feather Spear-grass		
Austrostipa exilis	Heath Spear-grass		
Austrostipa flavescens	Coast Spear-grass		
Austrostipa scabra group	Falcate-awn Spear-grass		
Austrostipa sp.	Spear-grass		
Beyeria lechenaultii	Pale Turpentine Bush		
Billardiera sericophora	Silky Apple-berry		
Billardiera sp.	Apple-berry		
Brachyscome exilis	Slender Daisy		
Bulbine semibarbata	Small Leek-lily		
Bursaria spinosa ssp. spinosa	Sweet Bursaria		

Species	Common Name	Aus status	SA status
Caladenia capillata	Wispy Spider-orchid		
Caladenia carnea	Pink Fingers		
Caladenia latifolia	Pink Caladenia		
Caladenia septuosa	Eyre Peninsula Spider-orchid		
Caladenia sp.	Spider-orchid		
Calandrinia eremaea	Dryland Purslane		
Callistemon rugulosus var. (NC)	Scarlet Bottlebrush		
Callitris gracilis	Southern Cypress Pine		
Carpobrotus rossii	Native Pigface		
Carpobrotus rossii (NC)	Native Pigface		
Cassytha glabella f. dispar	Slender Dodder-laurel		
Cassytha peninsularis	Peninsula Dodder-laurel		
Cheiranthera alternifolia	Hand-flower		
Chrysocephalum apiculatum	Common Everlasting		
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Comesperma volubile	Love Creeper		
Convolvulus remotus	Grassy Bindweed		
Correa pulchella	Salmon Correa		
Corybas incurvus	Slaty Helmet-orchid		
Craspedia glauca (NC)	Billy-buttons		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Daucus glochidiatus	Native Carrot		
Dianella brevicaulis	Short-stem Flax-lily		
Dianella brevicaulis/revoluta var.	Black-anther Flax-lily		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Distichlis distichophylla	Emu-grass		
Dodonaea hexandra	Horned Hop-bush		
Dodonaea viscosa ssp. angustissima	Narrow-leaf Hop-bush		
Dodonaea viscosa ssp. spatulata	Sticky Hop-bush		
Drosera macrantha ssp. planchonii	Climbing Sundew		
Elymus scaber var. scaber	Native Wheat-grass		
Elymus scaber var. scaber (NC)	Native Wheat-grass		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eremophila longifolia	Weeping Emubush		
Eucalyptus albopurpurea	Purple-flowered Mallee Box		
Eucalyptus brachycalyx	Gilja		
Eucalyptus camaldulensis var. camaldulensis (NC)	River Red Gum		
Eucalyptus diversifolia (NC)	Coastal White Mallee		
Eucalyptus dumosa	White Mallee		
Eucalyptus gracilis	Yorrell		
Eucalyptus leptophylla	Narrow-leaf Red Mallee		
Eucalyptus oleosa (NC)	Red Mallee		
Eucalyptus porosa	Mallee Box		
Eucalyptus rugosa	Coastal White Mallee		
Eucalyptus socialis (NC)	Beaked Red Mallee		
Eucalyptus viminalis ssp. cygnetensis	Rough-bark Manna Gum		
Euchiton sphaericus	Annual Cudweed		
Eutaxia sp.	Eutaxia		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos cupressiformis	Native Cherry		
Exocarpos syrticola	Coast Cherry		
Ficinia nodosa	Knobby Club-rush		

Species	Common Name	Aus status	SA status
Frankenia pauciflora var. gunnii	Southern Sea-heath		
Gahnia deusta	Limestone Saw-sedge		
Gahnia lanigera	Black Grass Saw-sedge		
Gahnia trifida	Cutting Grass		
Galium gaudichaudii (NC)	Rough Bedstraw		
Geranium retrorsum	Grassland Geranium		
Goodenia blackiana	Native Primrose		
Goodenia varia	Sticky Goodenia		
Goodenia willisiana	Silver Goodenia		
Goodia lotifolia var. lotifolia (NC)	Golden-tip		
Grevillea aspera	Rough Grevillea		
Hakea leucoptera ssp. leucoptera	Silver Needlewood		
Halophila australis	Paddle Weed		
Halosarcia sp. (NC)	Samphire		
Hardenbergia violacea	Native Lilac		
Helichrysum leucopsideum	Satin Everlasting		
Hibbertia platyphylla ssp. platyphylla			
Hibbertia riparia (NC)	Guinea-flower		
Hincksia sordida			
Juncus kraussii	Sea Rush		
Kennedia prostrata	Scarlet Runner		
Lagenophora huegelii	Coarse Bottle-daisy		
Lasiopetalum baueri	Slender Velvet-bush		
Lasiopetalum behrii	Pink Velvet-bush		
Lasiopetalum discolor	Coast Velvet-bush		
Lawrencia squamata	Thorny Lawrencia		
Lepidium foliosum	Leafy Peppercress		
Lepidosperma congestum (NC)	Clustered Sword-sedge		
Lepidosperma gladiatum	Coast Sword-sedge		
Lepidosperma viscidum	Sticky Sword-sedge		
Leptorhynchos waitzia	Button Immortelle		
Leucophyta brownii	Coast Cushion Bush		
Leucopogon parviflorus	Coast Beard-heath		
Linum marginale	Native Flax		
Lissanthe strigosa ssp. subulata	Peach Heath		
Lomandra effusa	Scented Mat-rush		
Lomandra micrantha ssp. micrantha	Small-flower Mat-rush		
Malva preissiana	Australian Hollyhock		
Malvastrum americanum var. americanum	Malvastrum		
Melaleuca decussata	Totem-poles		
Melaleuca halmaturorum	Swamp Paper-bark		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Microseris lanceolata	Yam Daisy		
Microtis arenaria	Notched Onion-orchid		
Microtis unifolia complex	Onion-orchid		
Millotia myosotidifolia	Broad-leaf Millotia		
Moss sp.			
Muehlenbeckia adpressa	Climbing Lignum		
Muehlenbeckia gunnii	Coastal Climbing Lignum		
Neurachne alopecuroidea	Fox-tail Mulga-grass		
Nicotiana maritima	Coast Tobacco		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		

Species	Common Name	Aus status	SA status
Olearia ramulosa	Twiggy Daisy-bush		
Olearia subspicata	Spiked Daisy-bush		
Opercularia scabrida	Stalked Stinkweed		
Oxalis perennans (NC)	Native Sorrel		
Parietaria debilis (NC)	Smooth-nettle		
Pelargonium littorale	Native Pelargonium		
Picris angustifolia ssp. angustifolia	Coast Picris		
Pimelea glauca	Smooth Riceflower		
Pimelea octophylla	Woolly Riceflower		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pittosporum angustifolium	Native Apricot		
Poa clelandii	Matted Tussock-grass		
Poa labillardieri var. labillardieri	Common Tussock-grass		
Poa poiformis var. poiformis	Coast Tussock-grass		
Podotheca angustifolia	Sticky Long-heads		
Pomaderris obcordata	Wedge-leaf Pomaderris		
Pomaderris paniculosa ssp.			
Pomaderris paniculosa ssp. paniculosa	Mallee Pomaderris		
Poranthera microphylla	Small Poranthera		
Poranthera microphylla (NC)	Small Poranthera		
Poranthera triandra	Three-petal Poranthera		
Posidonia denhartogii	Denhartog's Tapeweed		
Prasophyllum odoratum (NC)	Scented Leek-orchid		
Pterostylis nana	Dwarf Greenhood		
Pterostylis plumosa	Bearded Greenhood		
Ptilotus spathulatus f.	Pussy-tails		
Ptilotus spathulatus f. spathulatus	Pussy-tails		
Pultenaea sp.	Bush-pea		
Pultenaea tenuifolia	Narrow-leaf Bush-pea		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia crassifolia	Fleshy Saltbush		
Rhagodia spinescens	Spiny Saltbush		
Santalum acuminatum	Quandong		
Santalum murrayanum	Bitter Quandong		
Sarcocornia quinqueflora	Beaded Samphire		
Sarcocornia sp.	Samphire		
Scaevola aemula	Fairy Fanflower		
Senecio pinnatifolius (NC)	Variable Groundsel		
Spinifex hirsutus (NC)	Rolling Spinifex		
Stackhousia monogyna	Creamy Candles		
Suaeda australis	Austral Seablite		
Tecticornia arbuscula	Shrubby Samphire		
Tecticornia pterygosperma ssp. pterygosperma	Winged-seed Samphire		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Thelymitra nuda	Scented Sun-orchid		
Thelymitra nuda (NC)	Scented Sun-orchid		
Threlkeldia diffusa	Coast Bonefruit		
Thysanotus patersonii	Twining Fringe-lily		
Trachymene pilosa	Dwarf Trachymene		
Tricoryne tenella	Tufted Yellow Rush-lily		
Urtica incisa	Scrub Nettle		
Vittadinia australasica var. australasica	Sticky New Holland Daisy		

Species	Common Name	Aus status	SA status
Wahlenbergia sp.	Native Bluebell		
Wahlenbergia stricta ssp. stricta	Tall Bluebell		
Westringia rigida	Stiff Westringia		
Wilsonia humilis	Silky Wilsonia		
Zygophyllum billardierei	Coast Twinleaf		
Zygophyllum billardierei (NC)	Coast Twinleaf		

R: Rare, V: Vulnerable, E: Endangered
* note: includes a marine species

Fauna

# of fauna in cell	129 recorded - 94 birds, 0 butterflies, 10 mammals, 24 reptiles, 0 amphibians (an additional 7 reptiles and 24 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	3 surveys, 11 opportune sites
# of threatened fauna in cell	19
# of non-indigenous fauna	10 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Carduelis carduelis	European Goldfinch	Aves	x
Passer domesticus	House Sparrow	Aves	x
Sturnus vulgaris	Common Starling	Aves	x
Turdus merula	Common Blackbird	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p
Bos taurus	Cattle (European Cattle)	Mammalia	x
Equus caballus	Horse (Brumby)	Mammalia	x
Felis catus	Cat (Feral Cat)	Mammalia	x
Mus musculus	House Mouse	Mammalia	x
Oryctolagus cuniculus	Rabbit (European Rabbit)	Mammalia	x
Vulpes vulpes	Fox (Red Fox)	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Pandion cristatus	Eastern Osprey	M	E
Stipiturus malachurus parimeda	Southern Emu-wren (Eyre Peninsula ssp)	V	E
Numenius madagascariensis	Eastern Curlew	M	V
Stagonopleura guttata	Diamond Firetail		V
Thinornis rubricollis	Hooded Plover		V
Actitis hypoleucos	Common Sandpiper	M	R
Anas rhynchotis	Australasian Shoveler		R
Calidris alba	Sanderling	M	R
Cereopsis novaehollandiae	Cape Barren Goose		R
Egretta sacra	Eastern Reef Egret		R
Falco peregrinus	Peregrine Falcon		R

Species	Common Name	Aus status	SA status
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Neophema petrophila	Rock Parrot		R
Tringa glareola	Wood Sandpiper	M	R
Turnix varius	Painted Button-quail		R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Acanthiza chrysorrhoa	Yellow-rumped Thornbill		
Acanthiza pusilla	Brown Thornbill		
Accipiter fasciatus	Brown Goshawk		
Anas castanea	Chestnut Teal		
Anas gracilis	Grey Teal		
Anthochaera carunculata	Red Wattlebird		
Anthus novaeseelandiae	Australasian Pipit		
Aquila audax	Wedge-tailed Eagle		
Ardenna tenuirostris	Short-tailed Shearwater		
Artamus cyanopterus	Dusky Woodswallow		
Barnardius zonarius	Australian Ringneck, (Ring-necked Parrot)		
Cacomantis pallidus	Pallid Cuckoo		
Calidris acuminata	Sharp-tailed Sandpiper	M	
Calidris ruficollis	Red-necked Stint	M	
Chalcites basalis	Horsfield's Bronze-cuckoo		
Charadrius ruficapillus	Red-capped Plover		
Chroicocephalus novaehollandiae	Silver Gull		
Circus approximans	Swamp Harrier		
Colluricincla harmonica	Grey Shrike-thrush		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Corvus mellori	Little Raven		
Cracticus nigrogularis	Pied Butcherbird		
Cracticus tibicen	Australian Magpie		
Cracticus torquatus	Grey Butcherbird		
Cygnus atratus	Black Swan		
Dacelo novaeguineae	Laughing Kookaburra		
Dromaius novaehollandiae	Emu		
Drymodes brunneopygia	Southern Scrub-robin		
Egretta novaehollandiae	White-faced Heron		
Elanus axillaris	Black-shouldered Kite		
Eolophus roseicapillus	Galah		
Epthianura albifrons	White-fronted Chat		
Falco berigora	Brown Falcon		
Falco cenchroides	Nankeen Kestrel		
Gallinago hardwickii	Japanese Snipe (Latham's Snipe)	M	
Gallirallus philippensis	Buff-banded Rail		
Glyciphila melanops	Tawny-crowned Honeyeater		
Hieraaetus morphnoides	Little Eagle		
Himantopus himantopus	Black-winged Stilt		
Hirundo neoxena	Welcome Swallow		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Malurus cyaneus	Superb Fairy-wren		
Malurus pulcherrimus	Blue-breasted Fairy-wren		
Megalurus gramineus	Little Grassbird		
Microcarbo melanoleucos	Little Pied Cormorant		
Ocyphaps lophotes	Crested Pigeon		

Species	Common Name	Aus status	SA status
Pelecanus conspicillatus	Australian Pelican		
Petrochelidon ariel	Fairy Martin		
Petroica multicolor	Scarlet Robin		
Phalacrocorax carbo	Great Cormorant		
Phalacrocorax sulcirostris	Little Black Cormorant		
Phalacrocorax varius	Pied Cormorant		
Phaps chalcoptera	Common Bronzewing		
Phaps elegans	Brush Bronzewing		
Phylidonyris novaehollandiae	New Holland Honeyeater		
Pluvialis squatarola	Grey Plover	M	
Poliocephalus poliocephalus	Hoary-headed Grebe		
Porzana fluminea	Australian Spotted Crake		
Psephotus varius	Mulga Parrot		
Psophodes nigrogularis	Western Whipbird	ssp	ssp
Rhipidura albiscapa	Grey Fantail		
Rhipidura leucophrys	Willie Wagtail		
Sericornis frontalis	White-browed Scrubwren		
Smicrornis brevirostris	Weebill		
Strepera graculina	Pied Currawong		
Strepera versicolor	Grey Currawong		ssp
Thalasseus bergii	Crested Tern		
Todiramphus sanctus	Sacred Kingfisher		
Tringa nebularia	Common Greenshank	M	
Vanellus miles	Masked Lapwing		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Cercartetus concinnus	Western Pygmy-possum		
Macropus fuliginosus	Western Grey Kangaroo		
Rattus fuscipes	Bush Rat		
Tachyglossus aculeatus	Short-beaked Echidna		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Dermochelys coriacea	Leathery Turtle	V	V	x
Varanus rosenbergi	Heath Goanna		V	x
Bassiana trilineata	Western Three-lined Skink		R	e
Amphibolurus norrisi	Mallee Tree-dragon			x
Aprasia inaurita	Red-tailed Worm-lizard			x
Aprasia striolata	Lined Worm-lizard			x
Christinus marmoratus	Marbled Gecko			x
Ctenophorus chapmani	Prickly Dragon			c
Ctenophorus fionni	Peninsula Dragon			x
Ctenophorus pictus	Painted Dragon			x
Ctenotus orientalis	Spotted Ctenotus			x
Delma australis	Barred Snake-lizard			x
Diplodactylus calcicolus	South Coast Gecko			x
Drysdalia mastersii	Master's Snake			x
Egernia stokesii	Gidgee Skink			x
Gehyra variegata	Tree Dtella			x
Hemiergis peronii	Four-toed Earless Skink			c
Lampropholis delicata	Delicate Skink			c
Lerista bougainvillii	Bougainville's Skink			x
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			x
Lerista terdigitata	Southern Three-toed Slider			x
Liopholis multiscutata	Bull Skink			x
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			x
Nephrurus milii	Barking Gecko			c
Notechis scutatus	Eastern Tiger Snake	ssp		x
Pogona barbata	Eastern Bearded Dragon			x
Pseudechis australis	Mulga Snake			x
Pseudonaja inframacula	Peninsula Brown Snake			x
Tympanocryptis lineata	Five-lined Earless Dragon			x
Varanus gouldii	Sand Goanna			x

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cells EP42 Frenchman Bluff & EP43 Convention Beach

Combined cell area 1,970 ha. Combined shoreline length 33.80 km.

Landforms

This combined cell runs approximately 25km from Farm Beach to Convention Beach, with a default 500m boundary for almost its entire length. In the main there is an undulating calcarenite surface, forming medium to low cliffs, with areas of cliff top dunes, more extensive in the north. Although the coast maintains a north-south direction, there are many small shallow embayments, pocket beaches and small headlands, apparently controlled by basement rock outcrops. The shoreline is more exposed at the northern end, but is generally of moderate energy, the beach is fronted by numerous nearshore bars and reefs of basement rock. South of Coles Point beaches are medium to coarse sand, and steeply inclined; north of Coles Point beaches are of fine grained sand and flatter.

Benthic Habitat

Inshore granite reef at Coles Point; bare sand to Frenchmans Bluff; then low profile platform reef and some granite reef to Gallipoli Beach. Between Gallipoli and Farm Beach inshore granite, bare sand and medium density seagrass are also recorded. North of Coles Point there is offshore bare sand, with granite reef tight inshore.

Biota

1,349ha is remnant vegetation, c. 70% of the cell area. Much of the area is in various coastal shrubland, dominated by *Leucopogon parviflorus*, *Leucophyta brownii*, *Acacia sp. Winged (C.R.Alcock 4936)*, *Olearia axillaris*. Mallee woodland and forest is often slightly further from the shoreline, commonly with *Eucalyptus diversifolia* or *E. rugosa*. There are also small patches of *Lomandra* grassland, as well as Gahnia sedgeland. The combined cells contain 1 fauna and 10 flora BDBSA survey sites, 19 herbarium record sites and 22 opportune fauna sites.

Land Use/ Land Ownership

A coastal reserve approximately 30 – 350m wide of unalloted Crown land abuts the coast from Farm Beach to just south of Frenchman Bluff. North of this the coastal reserve (c. 50-900m wide) is a Crown land Act Reserve under the care, control and management of the District Council of Lower Eyre Peninsula to approximately 6km north of Coles Point. The remainder of the coastal reserve to the cell boundary at Convention Beach is unalloted Crown land (c.100-500m wide). The coastal reserve for the length of the two cells is backed by privately owned land and/or road reserves. Only 1.22 ha of the Heritage Agreement that covers Mount Greenly is within the study boundary.

Thorny Passage Marine Park offshore from southern boundary of EP42 to Frenchman Bluff

FIGURE 6.23 Frenchman Bluff, Frenchman Lookout, Coles Point, Mt Greenly (saline Lake Greenly). Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

Recreation and tourism – fishing, boating, surfing, jet skis, camping, sightseeing, nature observation, ORV
High use beach boat launching – Farm Beach
Agriculture

Threats (Field visits and local reports)

ORV track proliferation- particularly motorbikes between Gallipoli Beach and Frenchman Bluff
High visitor numbers to Farm Beach
Development – subdivisions, dwellings
Dog, fox and human disturbance to beach nesting shorebirds
Garbage, firewood collection and toileting in bush associated with informal campsites
Feral plants- particularly boxthorns, feral olives, *Acacia cyclops* and gazania
Marine debris

Opportunities (Field visits and local reports)

Lower Eyre Coastcare Association (volunteer group) has been active in this area, undertaking revegetation and feral olive control between Farm Beach and Gallipoli Beach, and around the Salt Creek salt marsh.
Much of the area between Farm Beach and Greenly Beach has had vehicle access management infrastructure.
EP NRM has undertaken a coastal infrastructure audit- campsites and access points
Feral animal surveys undertaken in vicinity

Hooded Plover breeding success monitoring

Conservation Analysis (GIS)

Both cells have moderate conservation totals of 102.24 and 108.17. Approximately a third of the area has been cleared for cultivation and these score low values: these areas are near the inland boundary, and the coastal area between Farm Beach and Gallipoli Beach; there are also some small areas of deflated dune without vegetation. The rest of the combined cells show moderate conservation totals; the moderate to high totals here appear to occur on the small areas of consolidated dunes, usually with *Leucopogon* tall shrublands, for example on the vegetated parts of the dunes behind Greenly Beach. There is one area of entirely moderate to high totals, on the uncleared slopes for some three km north of Gallipoli Beach, with higher values on the small areas of clifftop dunes.
Conservation totals are relatively high for the following layers: rarity of vegetation communities within the state; percentage of endemic plant communities (south of Coles Point); values for reptile habitat are found in the remnant dune areas, including the Beach Slider and the Bight Coast Skink (focal species); viewshed and viewscape values are moderate to high, as are vegetation metrics; a registered indigenous heritage site adds value to EP43.
There has been 6 mammal, 5 reptile and 47 bird species recorded within these combined cells, including the state vulnerable Hooded Plover (EP42).

Threat Analysis (GIS)

Cell EP42 has a high threat total, 52.94; EP43 a moderate total, 44.47. Moderate to high threat values are widely distributed: other than medium to low totals in the Crown land Act reserve for some 6 km north of Coles Point, totals are generally medium or above. Frenchman Bluff stands out as an area of high threat (largely ORV and camping activity), as does the coastal boundary immediately north of Farm Beach (clearance, including the Crown land).
The major contributors to the threat totals are in the privately owned and cleared land: zoning, land ownership, viewshed, viewscape, and land use. Threat scores for off road vehicles is moderate overall; however, there is a clear concentration in the Crown lands, with significant impact. There are numerous tracks and informal car parks throughout the coastal unalloted Crown land; a large informal camping site 1.5 km SE of Convention Beach; and a formal campsite SE of Frenchman Bluff.

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Pocket beaches reduced in size		

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
2070: +c.80cm.	Sandy coast has marked recession; indentations around calcrete. Some existing pocket beaches lost, with loss of Hooded Plover habitat. Increased erosion of calcrete cliffs		
Storms: *Frequency* continues to show great variation on a decadal scale.	Increased erosion of calcrete cliffs		
Intensity of large storms increases	Increased erosion of calcrete cliffs		
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing vegetation is found in warmer conditions elsewhere)		Maintain N-S connectivity of vegetation within the peninsula
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage	Active weed control	Ensure dune vegetation is within the regional fire plan.
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains sediment movement towards the south along the west coast of the peninsula, leading to phases of erosion and accretion at beaches.	Monitor beaches, see above.	

TABLE 6.21 Recommended Actions and Priority for EP42 Frenchman Bluff & EP43 Convention Beach

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Climate change and sea level rise is having multiple effects within the cell	Ensure the establishment and maintenance of a time series of aerial photographs at an appropriate high resolution. Maintain connectivity between vegetation blocks to maximise resilience	Medium (cons)	DENR, EP NRM, community groups
	Many small vegetation remnants on unalloted Crown land are becoming degraded by ORV activity and multiple vehicle tracks around the coast impacting on the coastal dune and cliff top vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Maintain previous access management infrastructure. Install directional /educational signage. Community education	High (cons/ threat)	DENR, DC Lower Eyre Peninsula, EP NRM, SA Tourism, DTEI, community
	Areas within cell identified as being important for rare and endemic plant communities and as habitat for threatened species, with potential disturbance from agricultural activities, development zoning, recreational activities, land management practices, uncontrolled access, weeds and pest animals	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. track management, pest animal and plant control, restrict access to sensitive locations. Install interpretive/ educational signage. Community education programs. Review development plan zoning to these areas to increase protection	Medium	DENR, private land owners, EP NRM, DPLG, DC of Lower Eyre Peninsula, community groups

Component	Issue	Proposed Action	Priority of Action	Key Players
	Shorebird habitat on pocket beaches threatened by on-going and accelerating sea level rise, as beaches backed by cliffs are unable to recede	Increased protection for remaining habitat declines in area	Medium	EP NRM, DENR, Birds Australia, DC of Lower Eyre Peninsula, community
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, waste (including human waste), increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	Medium (cons/ threat)	DC of Lower Eyre Peninsula, DENR, EP NRM, private land owners, community
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	Medium	EP NRM, private land owners, DENR, DC of Lower Eyre Peninsula, community
	Marine debris with potential impact on native fauna species	Investigate opportunities for, and/or support, ongoing marine debris cleanup programs. Undertake education program targeting fishers, campers, aquaculture operators	Medium	PIRSA, EP NRM, DC of Lower Eyre Peninsula, DENR, community
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg. rabbits foxes, cats. Undertake control program as required.	Medium	EP NRM, private land owners, DENR
	Maintenance of coastal access management infrastructure	Use the EP Coastal infrastructure audit to setup a maintenance program	Medium	DENR, DC Lower Eyre Peninsula, EP NRM, community groups

Component	Issue	Proposed Action	Priority of Action	Key Players
Coles Point South to Convention Beach	Disturbance of beach nesting shorebirds Significant beach nesting shorebird habitat, with potential disturbance from people, dogs and pest animals	Develop and implement site management and monitoring strategies to protect these valuable areas and enhance breeding success eg. interpretive signage, fencing off nests, use of chick shelters, temporary signage in breeding territories, restricting vehicles and off-leash dogs during breeding/migratory season. Undertake and/or support ongoing shorebird monitoring programs. Community education and awareness programs, eg. "chicks on beach".	High (cons/ threat)	EP NRM, DENR, Birds Australia, DC of Lower Eyre Peninsula, community
Convention Beach	ORV activity and loss of vegetation as a result of grazing has resulted in large dune blowouts	Prepare management plan for camping, access management and dune restoration of area.	Medium	DENR, DC Lower Eyre Peninsula, EP NRM, community groups (eg. LECCA)
All dune and clifftop dune areas	Stresses on these areas increased by increasing aridity	Active dune management to reduce instability and weed invasion	Medium	DENR, DC Lower Eyre Peninsula, EP NRM, community groups
Frenchman Bluff	Non-indigenous coastal heritage site identified – Frenchman Bluff whaling site - but not included on any statutory heritage register, with potential impact from recreational activities	Consider including onto heritage register eg. local heritage lists. Ensure sites managed to protect from damage. Install interpretive educational signage.	Medium	DC of Lower Eyre Peninsula, DENR, SA Heritage Council, community
EP43	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, DC of Lower Eyre Peninsula, private land owners, community groups, EP NRM

Component	Issue	Proposed Action	Priority of Action	Key Players
Cliff tops	Numerous informal tracks and informal car parks very close to potentially unstable cliff edge; safety hazard and impact from soil compaction, vegetation damage, weed introduction, fauna disturbance, soil stability and water runoff erosion	Review with a view to close or reroute tracks and car parks that are too close to cliff edge.	High (Hazard; cons/ threat)	DENR, DC of Lower Eyre Peninsula, EP NRM, community
Farm Beach to Coles Point	Parts of coastal reserve has been cleared, (e.g. Farm Beach to Gallipoli Beach; and north of Frenchman lookout), breaking the north-south coastal biodiversity corridor through these cells	Re-vegetate these areas, with a view to the re-establishment and maintenance of a coastal biodiversity corridor	High (cons/ threat)	EP NRM, DENR, DC Lower Eyre Peninsula, community

BIOTA – EP42 & EP43 combined

Flora

Remnant vegetation area (ha)	1349.98 ha, 68.54% of cell area
# flora surveys / records	10 surveys, 9 herbarium record sites
# flora in cell	181
# conservation rated flora in cell	4
# non-indigenous flora in cell	46
Significant CDCS floristic community	EP42 – *Leucopogon parviflorus* / *Acrotriche patula* shrubland – <20 (13) sites recorded along SA coast, 100% of these in EP EP43 – *Gahnia lanigera* / *Lepidosperma congestum* sedgeland – <20 (18) sites recorded along SA coast *Leucophyta brownie* shrubland– 56% of SA records in EP *Olearia axillaris* /*Lasiopetalum discolour* shrubland – 52% of SA records in EP
Protected area	0.1% of remnant vegetation within a Heritage Agreement

Weeds

Species	Common Name	Status	Study rating
Acacia cyclops	Western Coastal Wattle	RA	5
Asparagus asparagoides (NC)	Bridal Creeper	D, RA	9
Lycium ferocissimum	African Boxthorn	D, RA	8
Marrubium vulgare	Horehound	D, RA	5
Olea europaea ssp.	Olive	D, RA	5
Carduus tenuiflorus	Slender Thistle	D	2
Diplotaxis tenuifolia	Lincoln Weed	D	3
Tamarix aphylla	Athel Pine	D	3

Species	Common Name	Status	Study rating
Aira cupaniana	Small Hair-grass		0
Anagallis arvensis	Pimpernel		2
Avellinia michelii	Avellinia		0
Avena barbata	Bearded Oat		2
Brassica tournefortii	Wild Turnip		3
Bromus diandrus	Great Brome		2
Bromus madritensis	Compact Brome		2
Bromus rubens	Red Brome		2
Bupleurum semicompositum	Hare's Ear		0
Carthamus lanatus	Saffron Thistle		0
Catapodium rigidum	Rigid Fescue		1
Cerastium balearicum	Chickweed		1
Cerastium glomeratum	Common Mouse-ear Chickweed		1
Ehrharta longiflora	Annual Veldt Grass		3
Erodium cicutarium	Cut-leaf Heron's-bill		0
Galium murale	Small Bedstraw		0
Hordeum glaucum	Blue Barley-grass		1
Hordeum leporinum	Wall Barley-grass		1
Hypochaeris glabra	Smooth Cat's Ear		2
Lagurus ovatus	Hare's Tail Grass		2
Medicago minima var. minima	Little Medic		1
Medicago polymorpha var. polymorpha	Burr-medic		1
Melilotus indicus	King Island Melilot		1
Minuartia mediterranea	Slender Sandwort		0
Parapholis incurva	Curly Ryegrass		1
Polycarpon tetraphyllum	Four-leaf Allseed		0
Reichardia tingitana	False Sowthistle		3
Rostraria cristata	Annual Cat's-tail		2
Scabiosa atropurpurea	Pincushion		3
Senecio pterophorus	African Daisy		2
Silene nocturna	Mediterranean Catchfly		1
Silene sp.	Catchfly		0
Solanum linnaeanum	Apple Of Sodom		2
Sonchus oleraceus (NC)	Common Sow-thistle		0
Stellaria media	Chickweed		0
Vulpia muralis	Wall Fescue		2
Vulpia myuros f. myuros	Rat's-tail Fescue		2
Vulpia sp.	Fescue		2

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Podolepis muelleri	Button Podolepis		V
Acacia alcockii	Alcock's Wattle		R
Caladenia bicalliata ssp. bicalliata	Western Daddy-long-legs		R
Poa drummondiana	Knotted Poa		R
Acacia anceps			
Acacia anceps (NC)	Angled Wattle		
Acacia cupularis	Cup Wattle		
Acacia longifolia ssp. sophorae	Coastal Wattle		
Acacia rupicola	Rock Wattle		

Species	Common Name	Aus status	SA status
Acacia sp. Winged (C.R.Alcock 4936)	Angled Wattle		
Acacia spinescens	Spiny Wattle		
Acacia triquetra	Mallee Wreath Wattle		
Acaena sp.	Sheep's Burr		
Acrotriche patula	Prickly Ground-berry		
Apium annuum	Annual Celery		
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrodanthonia setacea	Small-flower Wallaby-grass		
Austrostipa drummondii	Cottony Spear-grass		
Austrostipa elegantissima	Feather Spear-grass		
Austrostipa exilis	Heath Spear-grass		
Austrostipa flavescens	Coast Spear-grass		
Austrostipa nodosa	Tall Spear-grass		
Austrostipa scabra ssp. falcata	Slender Spear-grass		
Austrostipa sp.	Spear-grass		
Beyeria lechenaultii	Pale Turpentine Bush		
Billardiera sericophora	Silky Apple-berry		
Brachyscome lineariloba	Hard-head Daisy		
Bulbine semibarbata	Small Leek-lily		
Caladenia latifolia	Pink Caladenia		
Carpobrotus rossii (NC)	Native Pigface		
Cassytha glabella f. dispar	Slender Dodder-laurel		
Cassytha melantha	Coarse Dodder-laurel		
Cassytha peninsularis	Peninsula Dodder-laurel		
Cassytha peninsularis var. (NC)	Peninsula Dodder-laurel		
Centrolepis cephaloformis ssp.	Cushion Centrolepis		
Cheiranthera alternifolia	Hand-flower		
Chrysocephalum apiculatum	Common Everlasting		
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Comesperma volubile	Love Creeper		
Convolvulus erubescens (NC)	Australian Bindweed		
Correa pulchella	Salmon Correa		
Crassula closiana	Stalked Crassula		
Crassula colligata ssp. lamprosperma			
Crassula decumbens var. decumbens	Spreading Crassula		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Danthonia sp. (NC)	Wallaby-grass		
Daucus glochidiatus	Native Carrot		
Dianella brevicaulis	Short-stem Flax-lily		
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Dodonaea humilis	Dwarf Hop-bush		
Dodonaea viscosa ssp. spatulata	Sticky Hop-bush		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eremophila crassifolia	Thick-leaf Emubush		
Eremophila glabra ssp. glabra	Tar Bush		
Eucalyptus diversifolia (NC)	Coastal White Mallee		
Eucalyptus diversifolia ssp. diversifolia	Coastal White Mallee		
Eucalyptus oleosa (NC)	Red Mallee		
Eucalyptus rugosa	Coastal White Mallee		
Euchiton sphaericus	Annual Cudweed		
Eutaxia microphylla	Common Eutaxia		
Exocarpos aphyllus	Leafless Cherry		

Species	Common Name	Aus status	SA status
Exocarpos syrticola	Coast Cherry		
Ficinia nodosa	Knobby Club-rush		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Gahnia deusta	Limestone Saw-sedge		
Gahnia lanigera	Black Grass Saw-sedge		
Gnaphalium indutum ssp. indutum	Tiny Cudweed		
Goodenia willisiana	Silver Goodenia		
Gramineae sp.	Grass Family		
Hakea vittata	Limestone Needlebush		
Hardenbergia violacea	Native Lilac		
Helichrysum leucopsideum	Satin Everlasting		
Hibbertia platyphylla ssp. platyphylla			
Hibbertia sericea var. major (NC)	Large Guinea-flower		
Hydrocotyle capillaris	Thread Pennywort		
Hypoxis glabella var. glabella	Tiny Star		
Isoetopsis graminifolia	Grass Cushion		
Lasiopetalum discolor	Coast Velvet-bush		
Lepidosperma congestum			
Lepidosperma congestum (NC)	Clustered Sword-sedge		
Leptorhynchos waitzia	Button Immortelle		
Leucophyta brownii	Coast Cushion Bush		
Leucopogon parviflorus	Coast Beard-heath		
Lichen sp.			
Lomandra collina	Sand Mat-rush		
Lomandra effusa	Scented Mat-rush		
Melaleuca lanceolata	Dryland Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Microcybe pauciflora ssp. pauciflora	Yellow Microcybe		
Microseris lanceolata	Yam Daisy		
Microtis arenaria	Notched Onion-orchid		
Millotia muelleri	Common Bow-flower		
Minuria leptophylla	Minnie Daisy		
Mitrasacme paradoxa (NC)	Wiry Mitrewort		
Moss sp.			
Olearia axillaris	Coast Daisy-bush		
Olearia minor	Heath Daisy-bush		
Oxalis perennans	Native Sorrel		
Oxalis perennans (NC)	Native Sorrel		
Parietaria debilis	Smooth-nettle		
Parietaria debilis (NC)	Smooth-nettle		
Pimelea glauca	Smooth Riceflower		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pittosporum angustifolium	Native Apricot		
Podotheca angustifolia	Sticky Long-heads		
Pogonolepis muelleriana	Stiff Cup-flower		
Pomaderris obcordata	Wedge-leaf Pomaderris		
Poranthera triandra	Three-petal Poranthera		
Pultenaea tenuifolia	Narrow-leaf Bush-pea		
Ranunculus sessiliflorus var. sessiliflorus	Annual Buttercup		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhodanthe pygmaea	Pigmy Daisy		
Sagina maritima	Sea Pearlwort		
Santalum acuminatum	Quandong		

Species	Common Name	Aus status	SA status
Sclerolaena uniflora	Small-spine Bindyi		
Senecio pinnatifolius (NC)	Variable Groundsel		
Spyridium phylicoides	Narrow-leaf Spyridium		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Thysanotus baueri	Mallee Fringe-lily		
Thysanotus patersonii	Twining Fringe-lily		
Trachymene pilosa	Dwarf Trachymene		
Tricoryne tenella	Tufted Yellow Rush-lily		
Triglochin centrocarpum (NC)	Dwarf Arrowgrass		
Triglochin sp.	Arrowgrass/Water-ribbons		
Triodia compacta	Spinifex		
Triodia scariosa	Spinifex		
Veronica hillebrandii	Rigid Speedwell		
Vittadinia australasica var. australasica	Sticky New Holland Daisy		
Vittadinia megacephala	Giant New Holland Daisy		
Wurmbea dioica ssp. dioica	Early Nancy		
Wurmbea dioica ssp. dioica (NC)	Early Star-lily		
Zygophyllum sp.	Twinleaf		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	57 recorded – 47 birds, 0 butterflies, 6 mammals, 5 reptiles, 0 amphibians (an additional 18 reptiles and 24 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	1 survey, 22 opportune sites
# of threatened fauna in cell	7
# of non-indigenous fauna	5 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Sturnus vulgaris	Common Starling	Aves	x
Turdus merula	Common Blackbird	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p
Mus musculus	House Mouse	Mammalia	x
Oryctolagus cuniculus	Rabbit (European Rabbit)	Mammalia	x
Vulpes vulpes	Fox (Red Fox)	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Thinornis rubricollis	Hooded Plover		V
Ardenna carneipes	Flesh-footed Shearwater		R
Cereopsis novaehollandiae	Cape Barren Goose		R
Haematopus fuliginosus	Sooty Oystercatcher		R

Species	Common Name	Aus status	SA status
Haematopus longirostris	Australian Pied Oystercatcher		R
Neophema elegans	Elegant Parrot		R
Neophema petrophila	Rock Parrot		R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Anthochaera carunculata	Red Wattlebird		
Anthus novaeseelandiae	Australasian Pipit		
Aquila audax	Wedge-tailed Eagle		
Artamus cyanopterus	Dusky Woodswallow		
Barnardius zonarius	Australian Ringneck, (Ring-necked Parrot)		
Calidris ruficollis	Red-necked Stint	M	
Chalcites basalis	Horsfield's Bronze-cuckoo		
Chroicocephalus novaehollandiae	Silver Gull		
Colluricincla harmonica	Grey Shrike-thrush		
Coturnix pectoralis	Stubble Quail		
Cracticus tibicen	Australian Magpie		
Cracticus torquatus	Grey Butcherbird		
Drymodes brunneopygia	Southern Scrub-robin		
Falco cenchroides	Nankeen Kestrel		
Glyciphila melanops	Tawny-crowned Honeyeater		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Larus pacificus	Pacific Gull		
Lichenostomus cratitius	Purple-gaped Honeyeater		ssp
Lichenostomus virescens	Singing Honeyeater		
Malurus cyaneus	Superb Fairy-wren		
Malurus pulcherrimus	Blue-breasted Fairy-wren		
Ocyphaps lophotes	Crested Pigeon		
Pardalotus punctatus	Spotted Pardalote		
Phalacrocorax fuscescens	Black-faced Cormorant		
Phalacrocorax sulcirostris	Little Black Cormorant		
Phalacrocorax varius	Pied Cormorant		
Phaps chalcoptera	Common Bronzewing		
Phaps elegans	Brush Bronzewing		
Phylidonyris novaehollandiae	New Holland Honeyeater		
Pomatostomus superciliosus	White-browed Babbler		
Psephotus varius	Mulga Parrot		
Rhipidura leucophrys	Willie Wagtail		
Sericornis frontalis	White-browed Scrubwren		
Strepera versicolor	Grey Currawong		ssp
Thalasseus bergii	Crested Tern		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p

Species	Common Name	Status*	Record
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Macropus fuliginosus	Western Grey Kangaroo		
Macropus robustus	Euro		
Rattus fuscipes	Bush Rat		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Bassiana trilineata	Western Three-lined Skink		R	e
Amphibolurus norrisi	Mallee Tree-dragon			x
Aprasia striolata	Lined Worm-lizard			c
Christinus marmoratus	Marbled Gecko			e
Ctenophorus chapmani	Prickly Dragon			c
Ctenophorus fionni	Peninsula Dragon			c
Ctenophorus pictus	Painted Dragon			x
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Diplodactylus calcicolus	South Coast Gecko			x
Egernia stokesii	Gidgee Skink			e
Gehyra variegata	Tree Dtella			e
Hemiergis peronii	Four-toed Earless Skink			c
Lampropholis delicata	Delicate Skink			c
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			x
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			x
Nephrurus milii	Barking Gecko			c

Species	Common Name	Aus status	SA status	Record
Parasuta spectabilis	Mallee Black-headed Snake			c
Pogona barbata	Eastern Bearded Dragon			c
Tympanocryptis lineata	Five-lined Earless Dragon			c

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP47 Hall Bay

Cell area 1,183 ha. Shoreline length 20.29 km.

Landforms

Pleistocene calcarenite high cliffs dominate this cell; these sit over granite basement, which forms low nearshore reefs. Oblique aerial photography shows frequent calcarenite debris at the cliff base, suggesting active cliff collapse. Thin patchy Holocene cliff top sands are seen in the north and south ends of the cell. A section of cliffs in the centre of the cell shows steep indentation of gullies in the Pleistocene barrier. Low ground in the calcarenite topography at the rear of the coastal barrier encloses the salt flats/ saline lakes Round Lake and Lake Hamilton (immediately inland from the coastal boundary).

Benthic Habitat

Granite reef, with heavy limestone reef at the NW and SE extremities of the cell.

Biota

This is largely cliff top *Olearia axillaris, Leucopogon parviflorus* tall open shrubland over *Threlkeldia diffusa, Tetragonia implexicoma, Rhagodia candolleana ssp. candolleana, Pimelea serpyllifolia ssp. serpyllifolia* low shrubs over *Muehlenbeckia adpressa, Dianella brevicaulis, Carpobrotus rossii, Clematis microphylla var. microphylla, Senecio pinnatifolius* is found up to 600m from the cliff edge, then cleared/ grazed land or saline clay. In the extreme south of the cell this is replaced by acacia shrubland. This cell contain 2 flora and 1 fauna BDBSA survey sites, 3 herbarium record sites and 13 opportune fauna sites.

Land Use/ Land Ownership

The southern half of this cell has a coastal reserve of unalloted Crown land that extends up to 700m inland and is backed by privately owned land, except in the very south of the cell where the unalloted Crown land extends inland to join with the unalloted Crown land that covers Lake Hamilton. The northern half of the cell is largely covered by Crown land perpetual leaseholds (54% of cell area), part of which is fronted by a narrow (c.30m) coastal reserve of unalloted Crown land. In the very north of the cell the leasehold land is backed by privately owned land.

Lake Hamilton (just inland of boundary) is a Wetland of National Importance, SA 011.

Investigator Marine Park offshore.

FIGURE 6.24 Calcarenite cliffs, with development of fluvial topography. (Lake Hamilton and Round Lake in background – outside coastal boundary). Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

Recreation and tourism – sight seeing (Cummins monument)
Agriculture

Threats (Field visits and local reports)

Grazing / wandering stock
Development – potential wind farm site

Conservation Analysis (GIS)

The total of conservation means is 105.05, average for the region. The distribution of values is not complex: the calcarenite undulating coastal plain accumulates medium to low values comprising c.90% of the cell; medium to high totals are found in a small area of cliff top dunes near the cliff edge in the south of the cell, and in a small area of dunes on the edge of Sheringa Beach in the extreme north of the cell.
High conservation values are found for floristic vegetation endemicity, butterfly habitat (moderate to high throughout all vegetated areas of the cell), osprey and sea eagle habitat, viewshed and viewscape, and vegetation block metrics.
Other conservation values accrue from habitat for reptile species (Olearia shrubland), numbers of mammal species, habitat for threatened fauna, endemicity of vegetation communities and numbers of species.
Five mammal, 12 reptile and 27 bird species are recorded in this cell, including the state endangered Eastern Osprey, the state vulnerable Banded Stilt and the state rare Bight Coast Skink (focal species).

Threat Analysis (GIS)

Threat summary layers total 44.90, moderate within the Eyre Peninsula. Patterns of threat totals are more complex: in the main moderate, with higher values near the cliff edge and on the privately owned land at the two ends of the cell.
Viewscape, viewshed, proportion of exotic plant species land ownership and land use are the principal contributors to the threat total. Cliff instability is a factor along most of the shoreline, although it does not contribute a large total. Aggressive weed activity, including African boxthorn, has been recorded on unalloted Crown land in the extreme south of the cell. The threat of ORV activity is low in this cell, although the unalloted Crown land in the southern kilometre of the cell has a concentration of tracks.

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	**Impacts and implications (for this cell)**	**Protect and manage habitat threats**	**Address landscape issues: fire, connectivity, refuges, hydrology**
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Sandy coast near Sheringa Bay shows increased dune instability due to foredune damage	Monitor dune habitat conditions	
2070: +c.80cm.	Sandy coast has marked recession; indentations around calcrete. Some existing pocket beaches lost.	Active management of dune blowouts to slow recession	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides: erosion of calcarenite cliffs		
Intensity of large storms increases	2070: continued cliff erosion	.	
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing vegetation is found in warmer conditions elsewhere)		Maintain N-S connectivity of vegetation within the peninsula

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage	Active weed control	Ensure dune vegetation is within the regional fire plan.
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate		

TABLE 6.22 Recommended Actions and Priority for EP47 Hall Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Combined climate changes and sea level rise throughout this cell. This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution. Seek to improve the resilience of plant and animal habitats by taking opportunities to improve connectivity between vegetation blocks.	Medium (cons)	EP NRM, DENR, community
	Potential impact on breeding habitats of the endangered Eastern Osprey and White-bellied Sea-Eagle, particularly during the breeding season.	Develop site management and monitoring strategy, including consideration to closure, relocation or seasonal closures of roads/walking tracks/car parks in the near vicinity. Ensure management/works programs are not undertaken during the breeding season. Community education.	High (cons)	DENR, DC Lower Eyre Peninsula

Component	Issue	Proposed Action	Priority of Action	Key Players
	Possible future development with potential impact on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, discharges to sensitive marine environment, etc)	Ensure future development is not located in areas of high conservation value or high sensitivity. Review development plan zoning to high conservation areas to increase protection	Medium (cons/ threat)	DC of Lower Eyre Peninsula and Elliston, DENR, DPLG, EP NRM, private land owners, developers, community groups
SE corner of the cell	Unalloted Crown land and adjacent private property has moderate conservation values, threatened by ORV and weed activity	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Implement actions to control or exclude off-road vehicle activity. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	Medium	DENR, EP NRM, DC Lower Eyre Peninsula, private land owners
Northern end of cell	Some ORV activity including tracks/ car parks close to potentially unstable cliff edge; safety hazard and impact on the coastal dune and cliff top vegetation, soil compaction and erosion, weed introduction, disturbance to native fauna species and water runoff erosion	Review of existing tracks with a view to rationalise unnecessary tracks, close or reroute tracks and car parks that are too close to cliff edge. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	High (hazard)	private land owners, DENR, DC of Elliston, EP NRM, community

Component	Issue	Proposed Action	Priority of Action	Key Players
Private and leasehold land	Potential for grazing impacts on vegetation	Work with private landowners to ensure that stock are restricted from the coastal zone (eg. ensure fences are adequate and maintained)		EP NRM, DENR, private land holders

BIOTA

Flora

Remnant vegetation area (ha)	1,102.55 ha, 93.17% of cell area
# flora surveys / records	2 surveys, 3 herbarium record sites
# flora in cell	45
# conservation rated flora in cell	0
# non-indigenous flora in cell	13
Significant CDCS floristic community	*Olearia axillaris* /*Lasiopetalum discolour* shrubland – 52% of SA records in EP
Protected area	No remnant vegetation protected

Weeds

Species	Common Name	Status	Study rating
Asparagus asparagoides (NC)	Bridal Creeper	D, RA	9
Lycium ferocissimum	African Boxthorn	D, RA	8
Anagallis arvensis	Pimpernel		2
Avellinia michelii	Avellinia		0
Avena barbata	Bearded Oat		2
Bromus rubens	Red Brome		2
Catapodium rigidum	Rigid Fescue		1
Hypochaeris glabra	Smooth Cat's Ear		2
Lagurus ovatus	Hare's Tail Grass		2
Medicago minima var. minima	Little Medic		1
Melilotus indicus	King Island Melilot		1
Sonchus oleraceus	Common Sow-thistle		0
Vulpia myuros f. myuros	Rat's-tail Fescue		2

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Acacia anceps			
Acacia anceps (NC)	Angled Wattle		
Acacia cupularis	Cup Wattle		
Acacia longifolia ssp. sophorae	Coastal Wattle		
Acacia pycnantha	Golden Wattle		
Austrostipa drummondii	Cottony Spear-grass		
Austrostipa mundula	Neat Spear-grass		
Austrostipa sp.	Spear-grass		
Carpobrotus rossii	Native Pigface		

Species	Common Name	Aus status	SA status
Carpobrotus rossii (NC)	Native Pigface		
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Comesperma volubile	Love Creeper		
Crassula closiana	Stalked Crassula		
Daviesia arenaria	Sand Bitter-pea		
Dianella brevicaulis	Short-stem Flax-lily		
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Eutaxia microphylla	Common Eutaxia		
Ficinia nodosa	Knobby Club-rush		
Kennedia prostrata	Scarlet Runner		
Lasiopetalum discolor	Coast Velvet-bush		
Leucopogon parviflorus	Coast Beard-heath		
Lotus australis	Austral Trefoil		
Olearia axillaris	Coast Daisy-bush		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pultenaea acerosa	Bristly Bush-pea		
Pultenaea rigida var. ovata	Rigid Bush-pea		
Pultenaea tenuifolia	Narrow-leaf Bush-pea		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Scaevola crassifolia	Cushion Fanflower		
Senecio pinnatifolius (NC)	Variable Groundsel		
Triodia compacta	Spinifex		
Triodia scariosa	Spinifex		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	44 recorded – 27 birds, 0 butterflies, 5 mammals, 12reptiles, 0 amphibians (an additional 14 reptiles and 24 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	1 survey, 13 opportune sites
# of threatened fauna in cell	4
# of non-indigenous fauna	4 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Sturnus vulgaris	Common Starling	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p
Mus musculus	House Mouse	Mammalia	x
Ovis aries	Sheep (Feral Sheep)	Mammalia	x
Vulpes vulpes	Fox (Red Fox)	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Pandion cristatus	Eastern Osprey	M	E
Cladorhynchus leucocephalus	Banded Stilt		V

Species	Common Name	Aus status	SA status
Haematopus fuliginosus	Sooty Oystercatcher		R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Anthochaera carunculata	Red Wattlebird		
Anthus novaeseelandiae	Australasian Pipit		
Aquila audax	Wedge-tailed Eagle		
Charadrius ruficapillus	Red-capped Plover		
Chroicocephalus novaehollandiae	Silver Gull		
Cincloramphus cruralis	Brown Songlark		
Colluricincla harmonica	Grey Shrike-thrush		
Cracticus torquatus	Grey Butcherbird		
Egretta novaehollandiae	White-faced Heron		
Epthianura albifrons	White-fronted Chat		
Falco cenchroides	Nankeen Kestrel		
Hirundo neoxena	Welcome Swallow		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Malurus pulcherrimus	Blue-breasted Fairy-wren		
Mirafra javanica	Horsfield's Bushlark		
Pomatostomus superciliosus	White-browed Babbler		
Sericornis frontalis	White-browed Scrubwren		
Strepera versicolor	Grey Currawong		ssp
Turnix velox	Little Button-quail		
Vanellus miles	Masked Lapwing		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Macropus fuliginosus	Western Grey Kangaroo		
Macropus robustus	Euro		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Pseudemoia baudini	Bight Coast Skink		R	x
Tympanocryptis lineata	Five-lined Earless Dragon			c
Pogona barbata	Eastern Bearded Dragon			x
Parasuta spectabilis	Mallee Black-headed Snake			c
Nephrurus milii	Barking Gecko			x
Morethia adelaidensis	Adelaide Snake-eye			x
Menetia greyii	Dwarf Skink			e
Lialis burtonis	Burton's Legless Lizard			x
Lerista terdigitata	Southern Three-toed Slider			x
Lerista edwardsae	Myall Slider			x
Lerista dorsalis	Southern Four-toed Slider			e
Lampropholis delicata	Delicate Skink			c
Hemiergis peronii	Four-toed Earless Skink			x
Gehyra variegata	Tree Dtella			e
Egernia stokesii	Gidgee Skink			e
Diplodactylus calcicolus	South Coast Gecko			c
Delma butleri	Spinifex Snake-lizard			x
Delma australis	Barred Snake-lizard			e
Cyclodomorphus melanops	Spinifex Slender Bluetongue			x
Ctenotus orientalis	Spotted Ctenotus			e
Ctenophorus pictus	Painted Dragon			c
Ctenophorus fionni	Peninsula Dragon			x
Ctenophorus chapmani	Prickly Dragon			c
Christinus marmoratus	Marbled Gecko			e
Aprasia striolata	Lined Worm-lizard			c
Amphibolurus norrisi	Mallee Tree-dragon			x

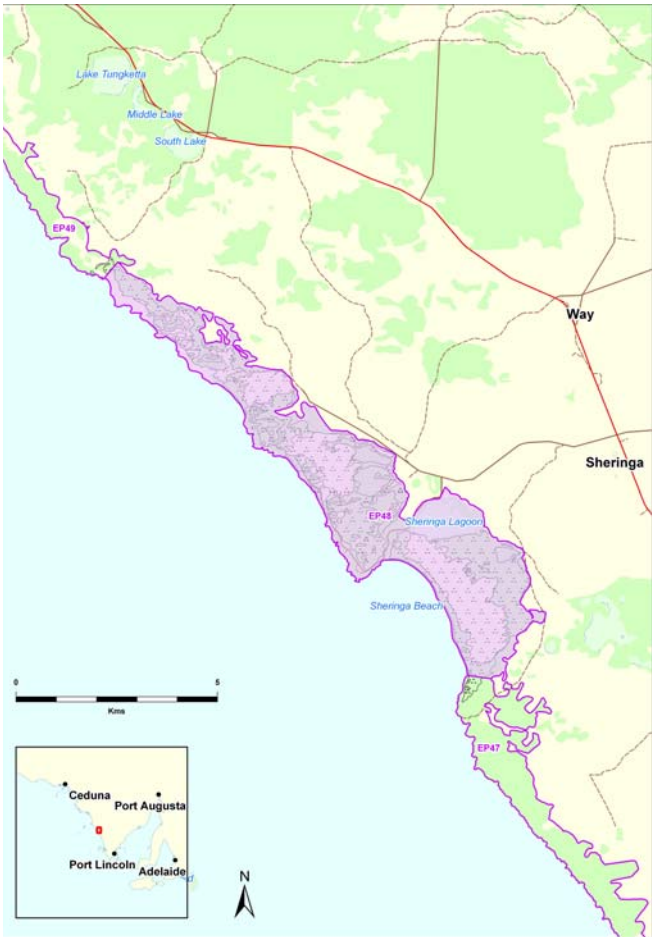
R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP48 Sheringa Beach

Cell area 2,254 ha. Shoreline length 17.02 km.



Landforms

The Pleistocene calcarenite barrier continues to determine the coastal alignment; here the cliffs are lower, and decline to bluffs, then to absent in the middle of the cell, before recovering to 20 to 30m at the headland north-west of Sheringa Beach. This is a high energy coast in part protected by low reefs. Sand beaches are of fine-medium calcareous material, except two pocket beaches south of Tungketta Reef (NW boundary of cell) and Sheringa Beach, which are steep coarse sand beaches: a contrast which suggests a local basement granite supply for the coarse sand accumulations. Dunes, up to 2 km wide, back the bays, bluffs and the cliffs and in area cover over 90% the cell; extensive sand surfaces are de-vegetated and show signs of active transgressive movement. Some dunes can be classified as clifftop, others are linked with current beaches. Brackish run-off/ groundwater is trapped behind the Holocene barrier at Sheringa Lagoon.

Benthic Habitat

Heavy low limestone reef; except fronting the beach 2.5 km NW of Sheringa headland, where bare sand is recorded.

Biota

1,384 ha remnant vegetation, or 61.4% of the cell, (none is protected by reservation). Almost the entire vegetated area is *Olearia axillaris, Leucopogon parviflorus* tall open shrubland over *Threlkeldia diffusa, Tetragonia implexicoma, Rhagodia candolleana ssp. candolleana, Pimelea serpyllifolia ssp. serpyllifolia* low shrubs over *Muehlenbeckia adpressa, Dianella brevicaulis, Carpobrotus rossii, Clematis microphylla var. microphylla, Senecio pinnatifolius*. There is a small area of *Nitraria billardierei, +/-Olearia axillaris* mid open shrubland in the NW corner of the cell.

Land Use/ Land Ownership

The 30m coastal reserve of unalloted Crown land on the cliffs in the NW are backed by privately owned land. Approximately 3km north-west of Sheringa Beach to half way along Sheringa Beach the coastal reserve widens to c.200m and is Crown land Act Reserve under the care, control and management of the District Council of Elliston, backed by privately owned

land. The southern half of the beach is perpetual leasehold Crown land (23% of cell), fronted by a narrow (c.30m) coastal reserve of unalloted Crown land.

Investigator Marine Park offshore.

FIGURE 6.25 Sheringa Beach and Sheringa Lagoon on right. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

The area is popular for fishing, surfing and camping, with numerous campsites located throughout the area. There are also a number of tracks which are used to access popular surf breaks. Local residents also use the Sheringa Beach area to access extensive dune fields for recreational motorcycle and ATV activities, camping and recreational fishing. The Sheringa embayment is also used by professional and commercial fishers to fish for, among other species, rock lobster and Australian Salmon.

Values (Field visits and local reports)

Some significant areas of sheoak grassy woodland on stable dune areas, *Melaleuca halmaturorum* wetland vegetation around the lake.

Threats (Field visits and local reports)

Uncontrolled vehicle (car, quad and motorbike) access to dunes and hind dune areas
Unmanaged stock access from adjoining pastoral properties, poor fences
Uncontrolled camping
Pest animals (foxes, cats, rabbits)
Pest plants (environmental and agricultural via stock access)
Eco-tourism / tourism ventures
Active dune blowouts are impacting on road behind dunes.

Opportunities (Field visits and local reports)

Remove and re-site current amenities to more suitable site away from high tide mark
Remove stock and fence boundary between coastal crown and private land and/or restrict stock access to privately owned sensitive coastal features eg. dunes, clifftops, clifftop dunes, etc.
Improve/expand management of camping areas - rationalise and fully fence designated camping areas
Rationalise access to beach and foredune area from designated camping areas
Undertake pest animal and plant management planning and control works

Conservation Analysis (GIS)

The total of conservation means is 107.72, medium ranking for the region. The pattern of totals shows high medium on the vegetated dunes, with low to medium totals on the de-vegetated dunes and deflated calcarenite surfaces. Overall totals are low for Sheringa Lagoon. Above average scores are found for the following layers: rarity of the plant community within SA, endemic floristic vegetation (high scores for almost all vegetated areas), habitat of threatened bird species (moderate scores for all vegetated areas with slightly higher values near Sheringa Lagoon and along the northern shores), habitat of threatened mammal species, habitat of focal species Eastern Osprey, Beach Slider and Bight Coast Skink (all sand dune areas), scenic amenity and vegetation patch metrics.
46 bird species are recorded in this cell, including the state endangered Eastern Osprey, White-bellied Sea-Eagle and Fairy Tern; also the state vulnerable Hooded Plover.
The cell contains the wreck of the Lucy Flinders, a cutter driven ashore in Sheringa Bay by a gale, in 1925.

Threat Analysis (GIS)

Total threats 49.13, is high for the region. The majority of this cell shows medium to high threat totals, with many small areas having a high total, and some areas with a medium low sum. The principal contributors of threat values are land ownership (mostly privately owned or leased) and land use, scenic amenity, the high proportion of exotic plant species (in addition, there are invasive weeds amongst the dune vegetation, including African boxthorn) and dune instability (the extent of de-vegetated dunes is high, approaching half the dune area). Smaller totals include ORV (movement along the shoreline), mining activity (land more than 800m from the shore is under Eyre Mineral Exploration Licence), and cliff instability (comprising all the calcarenite cliffs within the cell).

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Beach recession will accelerate in line with the acceleration of sea level rise. Dune instability will increase due to foredune damage	Establish monitoring through a beach profile line in Sheringa Bay Monitor dune habitat conditions. Develop a dune management plan to slow dune recession.	
2070: +c.80cm.	Sandy coast recession continues. Pocket beaches lost. Foredune blowouts.	Continue recording change to inform management Active management of dune blowouts	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides. Acceleration of calcarenite cliff erosion.		
Intensity of large storms increases	2070: Damage to beaches, foredunes and cliffs during storm events.		
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing vegetation is found in warmer conditions elsewhere)		Maintain resilience through connectivity between vegetation blocks.
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage	Active weed control	Ensure dune vegetation is within the regional fire plan.
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite and in Sheringa Lake.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains sediment movement into Sheringa Bay.	Monitor beaches, see above.	

TABLE 6.23 Recommended Actions and Priority for EP48 Sheringa Beach

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Combined climate changes and sea level rise throughout this cell. This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution. Seek to improve the resilience of plant and animal habitats by taking opportunities to improve connectivity between vegetation blocks.	Medium (cons)	EP NRM, DENR, DC of Elliston, private land owners, community
	Areas within cell identified as being important for rare and endemic plant communities and as habitat for threatened species, no protection and impact from agricultural activities, recreational activities and land management practices.	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. access control, restrict stock access, track management, pest animal and plant control, restrict access to sensitive locations. Install interpretive/ educational signage. Community education programs.	High	DENR, EP NRM, DC of Elliston, private land owners, community groups

Component	Issue	Proposed Action	Priority of Action	Key Players
	Potential impact on breeding habitat of the endangered Eastern Osprey, particularly during the breeding season.	Develop site management and monitoring strategy, including consideration to closure, relocation or seasonal closures of roads/walking tracks/car parks in the near vicinity. Ensure management/works programs are not undertaken during the breeding season. Community education.	High (cons)	DENR, EP NRM, DC of Elliston
	Unrestricted access and multiple vehicle tracks throughout the cell impacting on the coastal dune and cliff top vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	High (cons/ threat)	Private land owners, DC of Elliston, DENR, EP NRM, SA Tourism
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, dune instability, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	High (cons/ threat)	DENR, EP NRM, DC of Elliston, private land owners
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required).	Medium	EP NRM, private land owners, DENR, DC of Elliston

Component	Issue	Proposed Action	Priority of Action	Key Players
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg rabbits, foxes, cats. Undertake control program as required. Work with private landowners to ensure that stock are restricted from the coastal zone (eg. ensure fences are adequate and maintained)	Medium	EP NRM, DENR, DC of Elliston, private land owners
	Maintenance of coastal access management infrastructure	Use the EP Coastal infrastructure audit to setup a maintenance program	Medium	DENR, DC Elliston, EP NRM, community groups
	Dune blowouts resulting in sand drifts across access roads. Dune instability will increase with climate change and sea level rise.	Review management of dune areas and locations of roads, with a view to improving management and stability of dunes and/or rerouting roads.	Medium	DENR, EP NRM, DC of Elliston, private land owners, community groups
Sheringa Beach and Sheringa Lagoon	Formal camping areas with impact from multiple tracks, weeds, soil compaction, vegetation trampling and removal, local impact from visitors	Develop camping management plan, including actions to minimise visitor impacts, eg. install and/or maintain barriers/fencing to prevent spread and informal tracks. Provision of appropriate amenities. Develop weed management strategy. Manage and maintain facilities/ infrastructure. Install and/or maintain signage.	Medium (cons/ threat)	DC of Elliston, EP NRM, DENR, SA Tourism
Cliff tops	Numerous informal tracks and informal car parks very close to potentially unstable cliff edge; safety hazard and impact from soil compaction, vegetation damage, weed introduction, fauna disturbance, soil stability and water runoff erosion	Review with a view to close or reroute tracks and car parks that are too close to cliff edge.	High (hazard/ cons/ threat)	DENR, DC of Elliston, EP NRM, private land owners, community

Component	Issue	Proposed Action	Priority of Action	Key Players
Sheringa Beach	Vehicles and dogs on beaches a threat to meiofauna and shorebirds	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	High (cons/ threat)	DC of Elliston, EP NRM, DTEI, DENR, EP LGA, Tourism SA, Birds Australia, community
	Accelerating sea level rise will lead to beach and dune recession	Establish a beach profile line to inform management	High (baseline establishment)	DENR, EP NRM
	Marine debris with potential impact on native fauna species	Investigate opportunities for, and/or support, ongoing marine debris cleanup programs. Undertake education program targeting fishers, campers, aquaculture operators	Medium	PIRSA, EP NRM, DENR, aquaculture operators, community, DC of Elliston
Beaches and Crown land coastal reserve	Unregistered off-road vehicle use (eg. quad bikes, trail bikes): illegal, vegetation damage and potential dune destabilisation	Install educational signs on dune vegetation, stability and policy on unregistered vehicles e.g. quad bikes. Undertake compliance program	Medium (cons)	DENR, SAPOL, community, DC of Elliston
Land >800m from the coastline	Mining exploration licence application, with potential impact on sensitive areas and conservation values	Ensure any mining activities avoid areas of high conservation significance. Investigate/ consider refusal of licence in high conservation areas.	Medium	PIRSA, DENR, EP NRM, DC of Elliston

BIOTA

Flora

Remnant vegetation area (ha)	1,384.22 ha, 61.4% of cell area
# flora surveys / records	7 surveys, 2 herbarium record sites
# flora in cell	54 (note: includes a marine species)
# conservation rated flora in cell	0
# non-indigenous flora in cell	18
Significant CDCS floristic community	*Atriplex cinerea* shrublands – 20 sites recorded within SA, 60% of these in EP *Olearia axillaris /Lasiopetalum discolour* shrubland – 52% of SA records in EP
Protected area	None of the remnant vegetation is protected

Weeds

Species	Common Name	Status	Study rating
Euphorbia paralias	Sea Spurge	RA	5
Limonium companyonis	Sea-lavender	RA	7
Asparagus asparagoides (NC)	Bridal Creeper	D, RA	9
Lycium ferocissimum	African Boxthorn	D, RA	8
Diplotaxis tenuifolia	Lincoln Weed	D	3
Ammophila arenaria	Marram Grass		2
Anagallis arvensis	Pimpernel		2
Avena barbata	Bearded Oat		2
Bromus diandrus	Great Brome		2
Bromus rubens	Red Brome		2
Bupleurum semicompositum	Hare's Ear		0
Cakile maritima ssp. maritima	Two-horned Sea Rocket		1
Ehrharta longiflora	Annual Veldt Grass		3
Melilotus indicus	King Island Melilot		1
Parapholis incurva	Curly Ryegrass		1
Rostraria cristata	Annual Cat's-tail		2
Sonchus asper ssp.	Rough Sow-thistle		0
Sonchus oleraceus (NC)	Common Sow-thistle		0

D: Declared weed, RA: Red alert weed

Native flora*

Species	Common Name	Aus status	SA status
Acacia anceps (NC)	Angled Wattle		
Acacia cupularis	Cup Wattle		
Acacia hakeoides	Hakea Wattle		
Acacia longifolia ssp. sophorae	Coastal Wattle		
Allocasuarina verticillata	Drooping Sheoak		
Atriplex cinerea	Coast Saltbush		
Atriplex vesicaria ssp.	Bladder Saltbush		
Austrostipa flavescens	Coast Spear-grass		
Austrostipa scabra ssp. falcata	Slender Spear-grass		
Callitris gracilis	Southern Cypress Pine		
Carpobrotus rossii (NC)	Native Pigface		

Species	Common Name	Aus status	SA status
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Dianella brevicaulis	Short-stem Flax-lily		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Ficinia nodosa	Knobby Club-rush		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Helichrysum leucopsideum	Satin Everlasting		
Hemichroa diandra	Mallee Hemichroa		
Lasiopetalum discolor	Coast Velvet-bush		
Lepidosperma gladiatum	Coast Sword-sedge		
Leucophyta brownii	Coast Cushion Bush		
Leucopogon parviflorus	Coast Beard-heath		
Lichen sp.			
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Moss sp.			
Olearia axillaris	Coast Daisy-bush		
Platysiphonia victoriae			
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Samolus repens	Creeping Brookweed		
Schenkia australis	Spike Centaury		
Senecio pinnatifolius (NC)	Variable Groundsel		
Spinifex hirsutus (NC)	Rolling Spinifex		
Spyridium phylicoides	Narrow-leaf Spyridium		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		

R: Rare, V: Vulnerable, E: Endangered
* note: includes a marine species

Fauna

# of fauna in cell	47 recorded – 46 birds, 0 butterflies, 0 mammals, 1 reptiles, 0 amphibians (an additional 23 reptiles and 24 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	8 opportune sites
# of threatened fauna in cell	9
# of non-indigenous fauna	1 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Sturnus vulgaris	Common Starling	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Pandion cristatus	Eastern Osprey	M	E

Species	Common Name	Aus status	SA status
Sternula nereis	Fairy Tern		E
Thinornis rubricollis	Hooded Plover		V
Arenaria interpres	Ruddy Turnstone	M	R
Biziura lobata	Musk Duck		R
Falco peregrinus	Peregrine Falcon		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Podiceps cristatus	Great Crested Grebe		R
Acanthiza apicalis	Inland Thornbill		
Anas superciliosa	Pacific Black Duck		
Anthus novaeseelandiae	Australasian Pipit		
Aquila audax	Wedge-tailed Eagle		
Calidris ruficollis	Red-necked Stint	M	
Charadrius ruficapillus	Red-capped Plover		
Chroicocephalus novaehollandiae	Silver Gull		
Cincloramphus cruralis	Brown Songlark		
Circus approximans	Swamp Harrier		
Colluricincla harmonica	Grey Shrike-thrush		
Corvus coronoides	Australian Raven		
Corvus mellori	Little Raven		
Cracticus torquatus	Grey Butcherbird		
Cygnus atratus	Black Swan		
Egretta novaehollandiae	White-faced Heron		
Eolophus roseicapillus	Galah		
Epthianura albifrons	White-fronted Chat		
Eudyptula minor	Little Penguin		
Falco cenchroides	Nankeen Kestrel		
Grallina cyanoleuca	Magpie-lark		
Hirundo neoxena	Welcome Swallow		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Pelecanus conspicillatus	Australian Pelican		
Phalacrocorax carbo	Great Cormorant		
Phalacrocorax sulcirostris	Little Black Cormorant		
Poliocephalus poliocephalus	Hoary-headed Grebe		
Pomatostomus superciliosus	White-browed Babbler		
Rhipidura leucophrys	Willie Wagtail		
Sericornis frontalis	White-browed Scrubwren		
Tachybaptus novaehollandiae	Australasian Grebe, (Little Grebe)		
Tadorna tadornoides	Australian Shelduck		
Thalasseus bergii	Crested Tern		
Tringa nebularia	Common Greenshank	M	
Vanellus miles	Masked Lapwing		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p

Species	Common Name	Status*	Record
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

No native mammals recorded

Reptiles

Species	Common Name	Aus status	SA status	Record
Amphibolurus norrisi	Mallee Tree-dragon			e
Aprasia striolata	Lined Worm-lizard			c
Christinus marmoratus	Marbled Gecko			e
Ctenophorus chapmani	Prickly Dragon			c
Ctenophorus fionni	Peninsula Dragon			c
Ctenophorus pictus	Painted Dragon			c
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Diplodactylus calcicolus	South Coast Gecko			c
Egernia stokesii	Gidgee Skink			e
Gehyra variegata	Tree Dtella			e
Hemiergis peronii	Four-toed Earless Skink			x
Lampropholis delicata	Delicate Skink			c
Lerista bougainvillii	Bougainville's Skink			c
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			e
Nephrurus milii	Barking Gecko			c
Parasuta spectabilis	Mallee Black-headed Snake			c
Pogona barbata	Eastern Bearded Dragon			c

Species	Common Name	Aus status	SA status	Record
Pseudechis australis	Mulga Snake			c
Tympanocryptis lineata	Five-lined Earless Dragon			c

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP50 Elliston

Cell area 1,529 ha. Shoreline length 30.58 km.

Landforms

The shore of this cell runs NW - SE from Cape Finniss in a straight alignment, with one major and many minor indentations. This alignment reflects the Pleistocene calcarenite barrier form, in part capped by the Holocene clifftop dunes. The clifftop dunes are up to 900m wide and are well vegetated in the NW half of the cell, while towards the SE end there are areas of de-vegetated dune. The calcarenite cliffs are 30-40m high, extending to 80m, and show many features of active erosion, including collapse features and at least one stack, due to high energy wave attack. There are a number of exposed high energy pocket beaches; the larger beach within Waterloo Bay is a low energy fine-medium sand beach with bar, well sheltered by reefs across the mouth of the bay.

Benthic Habitat

Heavy limestone reef throughout, with seagrass behind reef protection in Waterloo Bay.

Biota

Vegetation is predominantly coastal shrubland. On the exposed clifftops a variety of shrubland communities are recorded: *Nitraria billardierei, +/-Olearia axillaris* mid open shrubland; *Olearia axillaris, Leucopogon parviflorus* tall open shrubland; *Leucophyta brownii, +/-Austrostipa stipoides* low sparse shrubland; *Acacia sp. Winged (C.R.Alcock 4936), +/-Olearia axillaris, +/-Geijera linearifolia* mid open shrubland. There are 5 BDBSA flora surveys, 8 herbarium flora record sites and 21 opportune fauna sites within this cell.

Land Use/ Land Ownership

The southern half of this cell is held under perpetual Crown lease (45% of cell area), fronted by a narrow (c.30m) coastal reserve of unalloted Crown land. Much of the coastal reserve in the northern half of the cell is Crown land Act reserve under the care, control and management of the District Council of Elliston, however, unalloted Crown land coastal reserve occurs on the open coast south of the township, within the township at the end of Beach Road and on the northern side of Waterloo Bay. Most of this coastal reserve is backed by privately owned land, although larger areas of Crown land Act reserve under the care, control and management of the District Council of Elliston surround the Elliston township.

Investigator Marine Park offshore for approximately the southern half of the cell.

FIGURE 6.26 Waterloo Bay and Elliston, looking SE from above Cape Finniss. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

Uses within this cell are many and varied. The southern area of the cell is predominantly used for agricultural purposes, with unrestricted stock utilising the coastal system.

Around Elliston township, the majority of landuse is residential properties. The cliffs and beaches surrounding the town are heavily promoted to tourists who visit the area via a network of tracks and roads. Beaches are used for recreation, including dog walking, fishing, surfing, sight seeing and launching boats into both Waterloo and Anxious Bays.
Offshore aquaculture.

Threats (Field visits and local reports)

The township is considered a source of many weed species, as well as pest animals like cats.
Cliff erosion is an issue on some of the clifftop roads.
Most of the threats to coastal systems to the south of Elliston are due to unrestricted access by stock, including erosion, vegetation destruction and the spread of weeds such as African Boxthorn, Horehound and Limonium sp. Pest animals such as rabbits, foxes and cats are also likely to occur in this area.
PCASS in salt marsh and low lying areas around Waterloo Bay.
Eco-tourism / tourism activities
Development
Boat launching (public safety, hydrocarbon spills)
Marine debris
The extensive de-vegetated dune at the SE end of the cell, does not show signs of ORV damage, and may a result of earlier/ contemporary grazing? However, Cullen & Bird (1980, p.85) note: "Coastal dunes have been damaged in the Elliston district by the impacts of off-road vehicles,

and there is a risk that drifting sand areas will develop and extend landward over farmland and developed areas if this activity is not controlled."

Opportunities (Field visits and local reports)

There are many opportunities for improvement in this cell. Rationalisation of access to coastal cliffs between Wellesley Point and Cape Finniss (and in the vicinity of Point Wellington) by both locals and tourists would be of great benefit in protecting clifftop flora and fauna. This would also help to reduce the effect this access has on local populations of Eastern Osprey and White-bellied Sea-Eagle. This cell would benefit from management of both environmental and garden escape weeds, including African Boxthorns, Limonium spp. African Daisy, succulent spp. and Coast Daisy. Placement of appropriate coastal interpretation signage would assist in communicating special features of the environment to visitors and locals.

Conservation Analysis (GIS)

119.3 – this is a medium total for the region; although the cell total is medium there are some very high totals within it. The cleared and grazed calcrete surface, notably in the SE of the cell, shows very low totals; while the vegetated dunes are high to medium high in summed priority, with some very high totals in the dunes at Cape Finniss and behind Waterloo Bay. Vegetated calcarenite barrier has medium and medium high values.
Above average layer contributions to the total include: rarity of plant communities, endemic plant communities, endemic floristic associations (all vegetated areas), species richness, habitat for threatened and all bird species especially the wetland north of Waterloo Bay), habitat for threatened mammal species, habitat for butterflies (from Cape Finniss to Waterloo Bay), scenic assessment, vegetation metrics and indigenous heritage.
There is one mammal, one reptile, one amphibian and 71 bird species recorded in this cell, including the state endangered Eastern Osprey, White-bellied Sea-Eagle and Fairy Tern; also the state vulnerable Hooded Plover.

Threat Analysis (GIS)

48.17 – this is a high threat total for the region. High threat totals are clearly concentrated in the NW half of the cell, around Elliston, Waterloo Bay and Cape Finniss. The SE half of the cell has a pattern of medium low to low threat totals.
Above average threat totals appear for land ownership and land use, for sea views and visual landscape amenity; more modest values are added from development zoning, existing development (around Waterloo Bay), mining activity (Eyre Peninsula petroleum exploration licenses cover the whole of the NW half of the cell), and weeds, dune and cliff instability. ORV activity appears concentrated immediately south of Elliston and near the Cape Finniss coastal track.

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Beach recession will accelerate in line with the acceleration of sea level rise. Dune instability will increase due to foredune damage	Establish profile survey line in Waterloo Bay, as a baseline to monitor ongoing change. Monitor dune habitat conditions	
2070: +c.80cm.	Sandy coast has marked recession. Some existing pocket beaches lost. .Foredune blowouts.	Continue monitoring to inform management. Active management of dune blowouts	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides	Monitor beach recession.	
Intensity of large storms increases	2070: Frequent damage to foredunes.		
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing vegetation is found in warmer conditions elsewhere)		Maintain N-S connectivity of vegetation within the peninsula
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune and salt marsh habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage	Active weed control in dunes	Ensure dune vegetation is within the regional fire plan.
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Local impact on soil water and vegetation survival. Saline groundwater pressure, due to sea level rise, will affect wetlands adjacent to Elliston, increasing salinity	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite, and within the wetlands.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains sediment movement into Waterloo Bay. High energy wave conditions maintained along cliffs; higher sea levels accelerate cliff erosion.	Monitor cliff erosion.	

TABLE 6.24 Recommended Actions and Priority for EP50 Elliston

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Combined climate changes and sea level rise throughout this cell. This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution. Seek to improve the resilience of plant and animal habitats by taking opportunities to improve connectivity between vegetation blocks.	Medium (cons)	EP NRM, DENR, DC of Elliston, community
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg rabbits, foxes, cats. Undertake control program as required. Work with private landowners to ensure that stock are restricted from the coastal zone eg. ensure fences are adequate and maintained (particularly in the southern half of the cell).	Medium	EP NRM, DC of Elliston, private land owners, DENR
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, private land owners, community groups, EP NRM

Component	Issue	Proposed Action	Priority of Action	Key Players
	Areas within cell identified as being important for rare and endemic plant communities and as habitat for threatened species, including shorebirds and raptors, potential impact from agricultural activities, recreational activities, development zoning and land management practices.	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. access control, restrict stock access, track management, restrict vehicles on beaches, dogs on leashes, pest animal and plant control, restrict access to sensitive locations. Review development plan zoning to these areas to increase protection. Community education programs. Install interpretive/ educational signage. Community education programs.	High (cons/ threat)	DENR, EP NRM, DC of Elliston, DPLG, private land owners, community groups
	Potential impact on breeding habitat of the endangered Eastern Osprey, particularly during the breeding season.	Develop site management and monitoring strategy, including consideration to closure, relocation or seasonal closures of roads/walking tracks/car parks in the near vicinity. Ensure management/works programs are not undertaken during the breeding season. Community education.	High (cons)	DENR, DC of Elliston, community
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	Medium	EP NRM, private land owners, DC of Elliston, DENR
Northern half of cell	Existing development impacting on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Work with private land owners to minimise impact from existing development, including education, restoration where appropriate. Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs and cats, ORV etc	High (cons/ threat)	EP NRM, DC of Elliston, DENR, private land owners, community groups

Component	Issue	Proposed Action	Priority of Action	Key Players
	Areas of unrestricted access, multiple vehicle tracks and informal car parks around the coast (particularly on the cliff tops between Wellesley Pt and Cape Finnis, and around Wellington Pt), some of these are close to potentially unstable cliff edges, impacting on the coastal dune and cliff top vegetation, safety hazard, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks and car parks with a view to rationalise. Close or reroute tracks and car parks that are too close to cliff edge. Block access (eg. fencing/rocks) to tracks and/or car parks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks and/or car parks that are not well defined, or are causing water run-off erosion, design to minimise impact to clifftop dunes and vegetation. Provide and maintain formalised pedestrian access from car parks. Install directional /educational signage. Community education	High (hazard; cons/ threat)	DC of Elliston, DTEI, DENR, EP NRM, private landowners, SA Tourism, community
	Calcarenite cliff erosion accelerates as sea level rises	Undertake annual inspection of potentially hazardous cliff top sites	High (potential hazard)	DC of Elliston, DENR,
	Increased traffic, vehicle and pedestrian concentrated around sculpture locations	Design parking and visitor areas to ensure dune areas not impacted.	Medium	DC of Elliston, DENR, EP NRM, SA Tourism
	Unrestricted pedestrian access in high visitation areas , i.e. dunes near caravan park, cliff tops, with impact soil erosion, stability and compaction, safety hazard, vegetation damage, weed introduction, fauna disturbance and water runoff erosion	Formalise and maintain pedestrian access. Install directional / educational signage where required.	Medium	District Council of Elliston, community, EP NRM
	Salt marsh and low lying areas have the potential for acid sulfate soil following disturbance; in turn this would potentially threaten life forms in surrounding areas.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Medium (threat)	DC of Elliston, DENR, developers, private land owners

Component	Issue	Proposed Action	Priority of Action	Key Players
	Salt marsh and low lying areas near Elliston potentially vulnerable to increased saline groundwater pressure as sea level rises	Maintain a record of salinity in seasonal waterbodies	Medium	DC of Elliston, EP NRM
	Maintenance of coastal access management infrastructure	Use the EP Coastal infrastructure audit to setup a maintenance program	Medium	DENR, DC Elliston, EP NRM, community groups
	Petroleum exploration licence application covers much of the northern half of the cell, with potential impact on sensitive areas and conservation values	Ensure any mining activities avoid areas of high conservation significance. Investigate/ consider refusal of licence in high conservation areas.	Medium	PIRSA, DENR, EP NRM, DC of Elliston
Elliston	Garden escape weeds impacting on surrounding native vegetation	Map extent of weeds and develop management plan for control and removal of weeds and revegetation with native species. Undertake community education program to highlight impact of garden escapees on coastal environment	High	EP NRM, DC of Elliston, private landholders, community, DENR
	Registered non-indigenous heritage sites – Elliston jetty and cast iron lead light, with potential impact from recreational activities	Ensure sites managed to protect from damage. Install interpretive educational signage where appropriate.	Medium	DC of Elliston, DENR, community
Beaches within Waterloo Bay and Anxious Bay	Marine debris with potential impact on native fauna species	Investigate opportunities for, and/or support, ongoing marine debris cleanup programs. Undertake education program targeting fishers, campers, aquaculture operators	Medium (cons/ threat)	PIRSA, EP NRM, DENR, aquaculture operators, community, DC of Elliston
	Beaches and dunes recede as sea level rises; dune instability increases. Also clifftop dunes recover more slowly from damage with increasing aridity	Establish profile survey line in Waterloo Bay, as a baseline to monitor ongoing change. Monitor dune habitat conditions, with a view to review of management strategy	Medium (cons)	DENR, EP NRM, DC of Elliston, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Vehicles and dogs on beaches a threat to meiofauna and shorebirds	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	High (cons/ threat)	DC of Elliston, EP NRM, DTEI, EP LGA, DENR, Tourism SA, Birds Australia, community

BIOTA

Flora

Remnant vegetation area (ha)	1179.99 ha, 77.16% of cell area
# flora surveys / records	5 surveys, 8 herbarium record sites
# flora in cell	516 (note: includes some marine species)
# conservation rated flora in cell	3
# non-indigenous flora in cell	34
Significant CDCS floristic community	*Triodia compacta* hummock grassland - <20 (13) sites recorded along SA coast, 100% of these in EP *Eucalyptus diversifolia / Clematis microphylla* mallee – 81% of SA records in EP *Leucophyta brownie* shrubland– 56% of SA records in EP *Olearia axillaris /Lasiopetalum discolour* shrubland – 52% of SA records in EP
Protected area	None of the remnant vegetation is protected

Weeds

Species	Common Name	Status	Study rating
Acacia cyclops	Western Coastal Wattle	RA	5
Argyranthemum frutescens ssp.	Marguerite Daisy	RA	4
Argyranthemum frutescens ssp. foeniculaceum	Teneriffe Daisy	RA	4
Avena fatua	Wild Oat	RA	5
Euphorbia paralias	Sea Spurge	RA	5
Gazania rigens	Gazania	RA	6

Species	Common Name	Status	Study rating
Limonium companyonis	Sea-lavender	RA	7
Mesembryanthemum crystallinum	Common Iceplant	RA	4
Asparagus asparagoides (NC)	Bridal Creeper	D, RA	9
Euphorbia terracina	False Caper	D, RA	5
Lycium ferocissimum	African Boxthorn	D, RA	8
Oxalis pes-caprae	Soursob	D, RA	5
Diplotaxis tenuifolia	Lincoln Weed	D	3
Aeonium arboreum	Tree Aeonium		1
Anagallis arvensis	Pimpernel		2
Avena barbata	Bearded Oat		2
Bromus diandrus	Great Brome		2
Bromus rigidus	Rigid Brome		2
Bromus rubens	Red Brome		2
Bupleurum semicompositum	Hare's Ear		0
Cakile edentula	American Sea Rocket		0
Cakile maritima ssp. maritima	Two-horned Sea Rocket		1
Critesion murinum ssp. (NC)	Barley-grass		0
Erodium cicutarium	Cut-leaf Heron's-bill		0
Galium murale	Small Bedstraw		0
Hornungia procumbens	Oval Purse		0
Hypochaeris glabra	Smooth Cat's Ear		2
Limonium sinuatum	Notch-leaf Sea-lavender		3
Melilotus indicus	King Island Melilot		1
Parapholis incurva	Curly Ryegrass		1
Rostraria cristata	Annual Cat's-tail		2
Sagina apetala	Annual Pearlwort		0
Silene nocturna	Mediterranean Catchfly		1
Sonchus oleraceus (NC)	Common Sow-thistle		0

D: Declared weed, RA: Red alert weed

Native flora*

Species	Common Name	Aus status	SA status
Austrostipa echinata	Spiny Spear-grass		R
Austrostipa gibbosa	Swollen Spear-grass		R
Myoporum parvifolium	Creeping Boobialla		R
Acacia anceps (NC)	Angled Wattle		
Acacia cupularis	Cup Wattle		
Acacia sp. Winged (C.R.Alcock 4936)	Angled Wattle		
Acacia triquetra	Mallee Wreath Wattle		
Acrocarpia paniculata			
Acrosorium ciliolatum			
Acrothamnion preissii			
Acrotriche patula	Prickly Ground-berry		
Acrotylus australis			
Adelophycus corneus			
Alleynea bicornis			
Amoenothamnion minimum			
Amphibolis antarctica	Sea Nymph		
Amphiplexia racemosa			
Anotrichium crinitum			
Anotrichium elongatum			

Species	Common Name	Aus status	SA status
Anotrichium licmophorum			
Antithamnion armatum			
Antithamnion hanovioides			
Antithamnion pinnafolium			
Antithamnion verticale			
Antrocentrum nigrescens			
Apium annuum	Annual Celery		
Apjohnia laetevirens			
Apoglossum spathulatum			
Areschougia congesta			
Asparagopsis armata			
Atriplex cinerea	Coast Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Audouinella caespitosa			
Audouinella microscopica			
Audouinella spongicola			
Austroclonium charoides			
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrodanthonia setacea	Small-flower Wallaby-grass		
Austrophyllis alcicornis			
Austrostipa flavescens	Coast Spear-grass		
Austrostipa sp.	Spear-grass		
Ballia callitricha			
Beyeria lechenaultii	Pale Turpentine Bush		
Boronia coerulescens ssp. coerulescens	Blue Boronia		
Bostrychia tenuissima			
Calliblepharis planicaulis			
Callithamnion circinnatum			
Callophycus oppositifolius			
Callophyllis cervicornis			
Callophyllis lambertii			
Callophyllis rangiferina			
Capreolia implexa			
Carpobrotus rossii (NC)	Native Pigface		
Carpoglossum confluens			
Carpopeltis phyllophora			
Carpopeltis spongeaplexus			
Carpothamnion gunnianum			
Cassytha peninsularis	Peninsula Dodder-laurel		
Caulerpa brownii			
Caulerpa cactoides			
Caulerpa ellistoniae			
Caulerpa flexilis			
Caulerpa flexilis var. muelleri			
Caulerpa longifolia			
Caulerpa longifolia f. crispata			
Caulerpa obscura			
Caulerpa papillosa			
Caulerpa scalpelliformis			
Caulerpa simpliciuscula			
Caulerpa vesiculifera			
Caulocystis uvifera			
Centroceras clavulatum			

Species	Common Name	Aus status	SA status
Ceramium filiculum			
Ceramium isogonum			
Ceramium puberulum			
Ceramium pusillum			
Ceramium rubrum			
Champia viridis			
Champia zostericola			
Chauviniella coriifolia			
Chlanidophora microphylla			
Chlorodesmis baculifera			
Chondria capreolis			
Chondria curdieana			
Chondria fusifolia			
Chondria incrassata			
Chondria incurva			
Chondrophycus brandenii			
Chondrophycus paniculatus			
Chondrophycus tumidus			
Choreonema thuretii			
Cirrulicarpus nanus			
Cladophora feredayi			
Cladophora valonioides			
Cladophoropsis herpestica			
Cladosiphon filum			
Cladosiphon vermicularis			
Cladostephus spongiosus			
Cladurus elatus			
Claudea elegans			
Clematis microphylla			
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Codium australicum			
Codium capitulatum			
Codium duthieae			
Codium galeatum			
Codium mamillosum			
Codium muelleri			
Codium pomoides			
Codium spongiosum			
Coelarthrum opuntia			
Coeloclonium tasmanicum			
Coeloclonium umbellula			
Coeloclonium verticillatum			
Colacodasya australica			
Colpomenia sinuosa			
Comesperma volubile	Love Creeper		
Correa pulchella	Salmon Correa		
Corybas sp.	Helmet-orchid		
Corynophlaea cystophorae			
Craspedocarpus blepharicarpus			
Craspedocarpus ramentaceus			
Craspedocarpus tenuifolius			
Craspedocarpus venosus			
Crassilingua marginifera			

Species	Common Name	Aus status	SA status
Crassula colligata ssp. lamprosperma			
Crouania mucosa			
Crouania robbii			
Cryptonemia undulata			
Curdiea angustata			
Curdiea obesa			
Cystophora brownii			
Cystophora congesta			
Cystophora cuspidata			
Cystophora expansa			
Cystophora intermedia			
Cystophora monilifera			
Cystophora moniliformis			
Cystophora pectinata			
Cystophora platylobium			
Cystophora polycystidea			
Cystophora racemosa			
Cystophora retorta			
Cystophora siliquosa			
Cystophora subfarcinata			
Cystoseira trinodis			
Dasya baldockii			
Dasya ceramioides			
Dasya clavigera			
Dasya divergens			
Dasya extensa			
Dasya haffiae			
Dasya naccarioides			
Dasya quadrispora			
Dasya villosa			
Dasyclonium flaccidum			
Dasyclonium incisum			
Dasyphila preissii			
Dasythamniella superbiens			
Dasythamniella wollastoniana			
Daucus glochidiatus	Native Carrot		
Delisea hypneoides			
Delisea pulchra			
Dianella brevicaulis	Short-stem Flax-lily		
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Dicranema cincinnalis			
Dicranema revolutum			
Dictyomenia harveyana			
Dictyomenia sonderi			
Dictyomenia tridens			
Dictyopteris muelleri			
Dictyosphaeria sericea			
Dictyota alternifida			
Dictyota diemensis			
Dictyota furcellata			
Dictyota radicans			
Dilophus fastigiatus			
Dilophus robustus			

Species	Common Name	Aus status	SA status
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Distromium flabellatum			
Distromium multifidum			
Dodonaea viscosa ssp. spatulata	Sticky Hop-bush		
Doxodasya bolbochaete			
Doxodasya lanuginosa			
Echinothamnion hookeri			
Echinothamnion hystrix			
Ecklonia radiata			
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Encyothalia cliftonii			
Endosiphonia spinulosa			
Eremophila crassifolia	Thick-leaf Emubush		
Eriochlamys behrii (NC)	Woolly Mantle		
Erythroclonium angustatum			
Erythroclonium muelleri			
Erythrostachys strobilifera			
Erythrymenia minuta			
Eucalyptus calcareana	Nundroo Mallee		
Eucalyptus diversifolia (NC)	Coastal White Mallee		
Eucalyptus oleosa (NC)	Red Mallee		
Eucalyptus oleosa ssp. ampliata	Red Mallee		
Eucalyptus yalatensis	Yalata Mallee		
Euptilocladia spongiosa			
Euptilocladia villosa			
Euptilota articulata			
Eutaxia microphylla	Common Eutaxia		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos syrticola	Coast Cherry		
Feldmannia globifera			
Ficinia nodosa	Knobby Club-rush		
Flabellonema codii			
Frankenia pauciflora var.	Southern Sea-heath		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Gahnia filum	Thatching Grass		
Gelidium australe			
Gelidium pusillum			
Gelinaria ulvoidea			
Gigartina densa			
Gigartina disticha			
Gigartina sonderi			
Giraudia robusta			
Gloiocladia halymenioides			
Gloiophyllis barkeriae			
Gloiosaccion brownii			
Glossophora nigricans			
Gonatogenia subulata			
Goodenia robusta	Woolly Goodenia		
Goodenia varia	Sticky Goodenia		
Gracilaria cliftonii			
Grevillea aspera	Rough Grevillea		
Griffithsia elegans			
Griffithsia grandis			

Species	Common Name	Aus status	SA status
Haliptilon roseum			
Haloplegma duperreyi			
Haloplegma preissii			
Halopteris funicularis			
Halopteris pseudospicata			
Halydictyon arachnoideum			
Halymenia floresia ssp. harveyana			
Halymenia muelleri			
Haplodasya tomentosa			
Haraldiophyllum erosum			
Helichrysum leucopsideum	Satin Everlasting		
Helminthora australis			
Hemichroa diandra	Mallee Hemichroa		
Hemineura frondosa			
Hennedya crispa			
Herpopteros fallax			
Herposiphonia calothrix			
Herposiphonia versicolor			
Heterocladia australis			
Heterocladia umbellifera			
Heterodoxia denticulata			
Heterosiphonia callithamnium			
Heterosiphonia curdieana			
Heterosiphonia gunniana			
Heterosiphonia lawrenciana			
Heterosiphonia muelleri			
Heterosiphonia wrangelioides			
Heterostroma nereidiis			
Hincksia granulosa			
Hincksia mitchelliae			
Hirsutithallia laricina			
Hirsutithallia mucronata			
Hirsutithallia tincta			
Homoeostrichus sinclairii			
Husseya rubra			
Hydrocotyle callicarpa	Tiny Pennywort		
Hydrocotyle capillaris	Thread Pennywort		
Hydrocotyle medicaginoides	Medic Pennywort		
Hydrolithon rupestris			
Hymenena affinis			
Hymenena curdieana			
Hymenena endiviaefolia			
Hymenena multipartita			
Hymenocladia chondricola			
Hymenocladia usnea			
Hypnea filiformis			
Hypnea ramentacea			
Hypoglossum dendroides			
Hypoglossum revolutum			
Hypoxis glabella var. glabella	Tiny Star		
Involucrana crassa			
Janczewskia tasmanica			
Jania affinis			

Species	Common Name	Aus status	SA status
Jania micrarthrodia			
Jania verrucosa			
Kallymenia cribrogloea			
Kallymenia cribrosa			
Kallymenia rubra			
Kraftia dichotoma			
Lasiopetalum discolor	Coast Velvet-bush		
Laurencia brongniartii			
Laurencia elata			
Laurencia filiformis f. dendritica			
Laurencia filiformis f. filiformis			
Laurencia filiformis f. heteroclada			
Laurencia forsteri			
Laurencia shepherdii			
Lawrencia squamata	Thorny Lawrencia		
Lenormandia latifolia			
Lenormandia pardalis			
Lenormandia spectabilis			
Lepidosperma congestum			
Leptophyllis conferta			
Leptosomia rosea			
Leucophyta brownii	Coast Cushion Bush		
Leucopogon parviflorus	Coast Beard-heath		
Lobophora variegata			
Lobospira bicuspidata			
Lomentaria australis			
Lysiana exocarpi ssp. exocarpi	Harlequin Mistletoe		
Macrothamnion pellucidum			
Maireana eriocladа	Rosy Bluebush		
Maireana oppositifolia	Salt Bluebush		
Martensia australis			
Medeiothamnion repens			
Melaleuca halmaturorum	Swamp Paper-bark		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Melanthalia concinna			
Melobesia membranacea			
Mesophyllum engelhartii			
Metagoniolithon chara			
Metagoniolithon radiatum			
Metagoniolithon stelliferum			
Metamastophora flabellata			
Micropeuce feredayae			
Microtis sp.	Onion-orchid		
Moss sp.			
Muehlenbeckia adpressa	Climbing Lignum		
Mychodea aciculare			
Mychodea disticha			
Mychodea marginifera			
Mychodea pusilla			
Mychodea ramulosa			
Myriodesma harveyanum			
Myriodesma integrifolium			
Myriodesma quercifolium			

Species	Common Name	Aus status	SA status
Myriogramme cartilaginea			
Myriogramme gunniana			
Neogoniolithon brassica-florida			
Nitophyllum crispum			
Nitospinosa pristoidea			
Nitraria billardierei	Nitre-bush		
Nizymenia conferta			
Notheia anomala			
Olearia axillaris	Coast Daisy-bush		
Osmundaria prolifera			
Oxalis perennans (NC)	Native Sorrel		
Pachydictyon paniculatum			
Pachydictyon polycladum			
Palmoclathrus stipitatus			
Parietaria debilis (NC)	Smooth-nettle		
Peyssonnelia boudouresquei			
Peyssonnelia capensis			
Peyssonnelia dubyi			
Peyssonnelia novae-hollandiae			
Phacelocarpus apodus			
Phacelocarpus complanatus			
Phacelocarpus peperocarpos			
Phacelocarpus sessilis			
Pimelea flava ssp. dichotoma	Diosma Riceflower		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pittosporum angustifolium	Native Apricot		
Placophora binderi			
Platoma australicum			
Platyclinia ramosa			
Platyclinia stipitata			
Platysiphonia victoriae			
Plocamium angustum			
Plocamium cartilagineum			
Plocamium costatum			
Plocamium mertensii			
Plocamium patagiatum			
Plocamium preissianum			
Pneophyllum fragile			
Podotheca angustifolia	Sticky Long-heads		
Pollexfenia lobata			
Pollexfenia pedicellata			
Polycerea nigrescens			
Polycoelia laciniata			
Polysiphonia australiensis			
Polysiphonia brevisegmenta			
Polysiphonia daveyae			
Polysiphonia decipiens			
Polysiphonia sertularioides			
Poranthera triandra	Three-petal Poranthera		
Porphyra columbina			
Posidonia australis	Southern Tapeweed		
Posidonia coriacea	Leathery Tapeweed		
Posidonia sinuosa	Narrow-leaf Tapeweed		

Species	Common Name	Aus status	SA status
Protokuetzingia australasica			
Pterocladia lucida			
Ptilocladia pulchra			
Ptilocladia vestita			
Ptilothamnion schmitzii			
Pultenaea rigida var. ovata	Rigid Bush-pea		
Pultenaea tenuifolia	Narrow-leaf Bush-pea		
Ralfsia verrucosa			
Rhabdonia clavigera			
Rhabdonia verticillata			
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhipiliopsis peltata			
Rhodopeltis australis			
Rhodophyllis membranacea			
Rhodophyllis multipartita			
Rhodophyllis volans			
Rhodymenia foliifera			
Salsola tragus	Buckbush		
Samolus repens	Creeping Brookweed		
Santalum acuminatum	Quandong		
Sarcomenia delesserioides			
Sarconema filiforme			
Sarcotrichia tenera			
Sargassum decipiens			
Sargassum linearifolium			
Sargassum sonderi			
Sargassum spinuligerum			
Sargassum tristichum			
Sargassum varians			
Sargassum verruculosum			
Scaberia agardhii			
Scaevola crassifolia	Cushion Fanflower		
Schenkia australis	Spike Centaury		
Scytothalia dorycarpa			
Senecio pinnatifolius (NC)	Variable Groundsel		
Senecio pinnatifolius var. maritimus	Variable Groundsel		
Shepleya australis			
Solieria robusta			
Sonderopelta coriacea			
Sphacelaria biradiata			
Sphacelaria carpoglossi			
Sphacelaria novae-caledoniae			
Spongoclonium brownianum			
Spongoclonium conspicuum			
Spongoclonium fasciculatum			
Sporochnus radiciformis			
Sporocladopsis novae-zelandiae			
Spyridia dasyoides			
Spyridia filamentosa			
Spyridia squalida			
Spyridia tasmanica			
Spyridium phylicoides	Narrow-leaf Spyridium		
Stictosiphonia intricata			

Species	Common Name	Aus status	SA status
Stictosporum nitophylloides			
Struvea plumosa			
Suaeda australis	Austral Seablite		
Synarthrophyton patena			
Tanakaella itonoi			
Tecticornia pruinosa	Bluish Samphire		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Thamnophyllis lacerata			
Threlkeldia diffusa	Coast Bonefruit		
Thryptomene micrantha	Ribbed Thryptomene		
Thuretia australasica			
Thuretia quercifolia			
Thysanotus baueri	Mallee Fringe-lily		
Tiparraria aurata			
Trachymene ornata	Cotton-ball Trachymene		
Triglochin sp.	Arrowgrass/Water-ribbons		
Triodia compacta	Spinifex		
Tsengia comosa			
Tsengia feredayae			
Tylotus obtusatus			
Ulva taeniata			
Vidalia spiralis			
Vittadinia australasica var. australasica	Sticky New Holland Daisy		
Webervanbossea kaliformis			
Webervanbossea splachnoides			
Westringia dampieri	Shore Westringia		
Wilsonaea dictyuroides			
Wollastoniella myriophylloides			
Wrangelia australis			
Wrangelia nobilis			
Wrangelia plumosa			
Wrangelia velutina			
Zonaria angustata			
Zonaria crenata			
Zonaria spiralis			
Zonaria turneriana			
Zostera tasmanica	Tasman Grass-wrack		
Zygophyllum billardierei (NC)	Coast Twinleaf		

R: Rare, V: Vulnerable, E: Endangered
*note: includes some marine species

Fauna

# of fauna in cell	74 recorded – 71 birds, 0 butterflies, 1 mammals, 1 reptiles, 1 amphibians (an additional 25 reptiles and 26 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	21 opportune sites
# of threatened fauna in cell	13
# of non-indigenous fauna	5 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Columba livia	Rock Dove	Aves	x
Passer domesticus	House Sparrow	Aves	x
Sturnus vulgaris	Common Starling	Aves	x
Turdus merula	Common Blackbird	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p
Mus musculus	House Mouse	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Pandion cristatus	Eastern Osprey	M	E
Sternula nereis	Fairy Tern		E
Thinornis rubricollis	Hooded Plover		V
Actitis hypoleucos	Common Sandpiper	M	R
Arenaria interpres	Ruddy Turnstone	M	R
Calidris alba	Sanderling	M	R
Falco peregrinus	Peregrine Falcon		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Hylacola cauta	Shy Heathwren (Shy Hylacola)		R
Neophema petrophila	Rock Parrot		R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Acanthiza apicalis	Inland Thornbill		
Anas castanea	Chestnut Teal		
Anas gracilis	Grey Teal		
Anthochaera carunculata	Red Wattlebird		
Anthus novaeseelandiae	Australasian Pipit		
Aquila audax	Wedge-tailed Eagle		
Cacomantis flabelliformis	Fan-tailed Cuckoo		
Cacomantis pallidus	Pallid Cuckoo		
Calidris acuminata	Sharp-tailed Sandpiper	M	
Calidris ruficollis	Red-necked Stint	M	
Chalcites basalis	Horsfield's Bronze-cuckoo		
Charadrius ruficapillus	Red-capped Plover		
Chroicocephalus novaehollandiae	Silver Gull		
Circus assimilis	Spotted Harrier		
Colluricincla harmonica	Grey Shrike-thrush		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Corvus coronoides	Australian Raven		
Corvus mellori	Little Raven		
Cracticus tibicen	Australian Magpie		
Cracticus torquatus	Grey Butcherbird		
Cygnus atratus	Black Swan		
Egretta novaehollandiae	White-faced Heron		
Eolophus roseicapillus	Galah		
Falco berigora	Brown Falcon		
Falco cenchroides	Nankeen Kestrel		
Glossopsitta porphyrocephala	Purple-crowned Lorikeet		
Grallina cyanoleuca	Magpie-lark		

Species	Common Name	Aus status	SA status
Himantopus himantopus	Black-winged Stilt		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Malurus pulcherrimus	Blue-breasted Fairy-wren		
Melithreptus brevirostris	Brown-headed Honeyeater		
Microcarbo melanoleucos	Little Pied Cormorant		
Morus serrator	Australasian Gannet		
Ocyphaps lophotes	Crested Pigeon		
Pardalotus punctatus	Spotted Pardalote		
Pardalotus striatus	Striated Pardalote		
Phalacrocorax carbo	Great Cormorant		
Phalacrocorax sulcirostris	Little Black Cormorant		
Phalacrocorax varius	Pied Cormorant		
Phaps chalcoptera	Common Bronzewing		
Phylidonyris novaehollandiae	New Holland Honeyeater		
Poliocephalus poliocephalus	Hoary-headed Grebe		
Pomatostomus superciliosus	White-browed Babbler		
Rhipidura albiscapa	Grey Fantail		
Rhipidura leucophrys	Willie Wagtail		
Sericornis frontalis	White-browed Scrubwren		
Smicrornis brevirostris	Weebill		
Thalasseus bergii	Crested Tern		
Todiramphus sanctus	Sacred Kingfisher		
Vanellus miles	Masked Lapwing		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p

Species	Common Name	Status*	Record
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

No native mammals recorded

Reptiles

Species	Common Name	Aus status	SA status	Record
Lerista arenicola	Beach Slider		R	c
Amphibolurus norrisi	Mallee Tree-dragon			e
Aprasia striolata	Lined Worm-lizard			c
Christinus marmoratus	Marbled Gecko			e
Ctenophorus chapmani	Prickly Dragon			c
Ctenophorus fionni	Peninsula Dragon			c
Ctenophorus pictus	Painted Dragon			c
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Diplodactylus calcicolus	South Coast Gecko			c
Egernia stokesii	Gidgee Skink			e
Gehyra variegata	Tree Dtella			e
Hemiergis peronii	Four-toed Earless Skink			c
Lerista bougainvillii	Bougainville's Skink			c
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			e
Morethia obscura	Mallee Snake-eye			c
Nephrurus milii	Barking Gecko			c
Parasuta spectabilis	Mallee Black-headed Snake			c
Pogona barbata	Eastern Bearded Dragon			c
Pseudechis australis	Mulga Snake			c
Tympanocryptis lineata	Five-lined Earless Dragon			c

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

Species	Common Name	Aus status	SA status	Record
Crinia signifera	Common Froglet			x

Cell EP51 Lake Newland CR

(Note: at the time of naming the cells and analysis, the area of Lake Newland Conservation Park within this cell had not been gazetted and was still Lake Newland Conservation Reserve, it was gazetted as part of the park in October 2010).

Cell area 431 ha. Shoreline length 7.11 km.

Landforms

Much of the cell is Holocene sands (c.70%), underlain by the Holocene Bridgewater Formation calcarenite, which is seen outcropping at the shore in platforms and reefs, two low bluffs near Walkers Rock, and inland of the dunes. The shoreline near Walkers Rock is a moderate energy coarse sand steep beach; in the shelter of the Waldegrave Islands, in the southern half of the cell, wave energy decreases and a sand flat, with seagrass, has developed in front of the steep coarse sand beach.

Benthic Habitat

Bare sand at the northern end of the cell, gives way to heavy limestone/ calcarenite reef for the majority of the cell. However, shoreline classification observers record seagrass immediately offshore throughout this cell; usually recorded as "growing on fronting sandflats".

Biota

There are five opportune fauna record sites and three flora surveys within this cell. However, none of the flora surveys are within the Lake Newland Conservation Park.
About half the cell is in remnant vegetation, with areas of de-vegetated dune and cleared land. The majority is coastal shrubland: *Olearia axillaris, Leucopogon parviflorus* tall open shrubland over *Threlkeldia diffusa, Tetragonia implexicoma, Rhagodia candolleana ssp. candolleana, Pimelea serpyllifolia ssp. serpyllifolia* low shrubs over *Muehlenbeckia adpressa, Dianella brevicaulis, Carpobrotus rossii, Clematis microphylla var. microphylla, Senecio pinnatifolius*; also *Acacia sp. Winged (C.R.Alcock 4936), +/-Olearia axillaris, +/-Geijera linearifolia* mid open shrubland over *+/-Triodia compacta, +/-Frankenia pauciflora var. fruticulosa* low shrubs. There are also small areas of mallee woodland: *Eucalyptus diversifolia ssp. diversifolia* mid mallee woodland over *+/-Melaleuca lanceolata, +/-Melaleuca uncinata* tall shrubs over *Acrotriche patula, +/-Lasiopetalum discolor* low shrubs, and *Eucalyptus dumosa* mid mallee woodland over *Melaleuca lanceolata, Melaleuca acuminata ssp. acuminata* tall shrubs over *+/-Westringia rigida, +/-Triodia irritans* low shrubs

Land Use/ Land Ownership

Lake Newland Conservation Park adjoins the coast for the northern c.1/3 of the cell and extends inland 200-500m where it is backed by an unmade road reserve and privately owned land.

A coastal reserve of Crown land Act reserve under the care, control and management of the District Council of Elliston, approximately 100-400m wide runs along the coast in the southern two thirds of the cell, which is backed by an unmade road reserve and then privately owned land.

FIGURE 6.27 Lake Newland Conservation Park. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

Basic facilities at Anxious Bay (north of Elliston township) are used by both commercial and professional fishing operators; a large abalone aquaculture operation exists offshore from Waldegrave and West Waldegrave Islands and is accessed via the boat ramp within the cell.

Lake Newland Conservation Park is located in the north of this cell and is accessed for recreational 4WD, ATV and motorbike activities. The beach is, at times, also used extensively as a road to access areas between Cape Finniss and Walker's Rocks; there are also numerous tracks between the boat ramp and Walker's Rocks that are used by both recreational vehicles and commercial vehicles associated with abalone farm activity.

Formal camping occurs in the north of the cell near Walkers Rocks.
Farms to the east of the dune system may be a source of stock accessing the CP

Threats (Field visits and local reports)

Many ORV tracks occur in the CP at the northern end of the cell.
The abalone aquaculture enterprise offshore poses a minor threat to the near-shore and coastal environment in that debris from day-to-day operations is frequently discovered washed up on shore.
Stock access may be a source of erosion and pest plants.
Boat launching (public safety, hydrocarbon spills)
Uncontrolled ORV usage

Uncontrolled camping
Waste management
Collection of fire wood
Wandering stock from adjacent agricultural areas
Boat ramp car park is being incrementally and informally enlarged
Management of formal car park
Significant areas of pyp grass in large dunefields, which has apparently stabilised some areas with a secondary recruitment of native vegetation according to adjoining land owners.

Opportunities (Field visits and local reports)

Managing access to the beach and dune system would be a high priority in order to address a number of issues.
Campground management

Conservation Analysis (GIS)

The sum of conservation means for this cell is 109.39, medium in ranking for the region. Vegetated dunes carry medium high values, de-vegetated and cleared calcrete show low to medium totals, there are few areas with medium totals; there are small areas with very low scores, on some cleared calcrete surfaces.
Above average totals for layers within the cell are found for rarity of plant communities (whole cell statistics), habitat for threatened bird species (notably shorebirds), habitat for threatened mammal species, habitat for focal species Eastern Osprey (whole cell), Beach Slider and Bight Coast Skink (all dunes), sea views, landscape aesthetics, and indigenous heritage.
There are 39 bird species recorded in this cell, including the state endangered Fairy Tern, the vulnerable Hooded Plover and Banded Stilt; (the Sooty Oystercatcher is also recorded here).

Threat Analysis (GIS)

The total of threat means is 56.04, the third highest in the Eyre Peninsula region west of Port Lincoln. Outside the Lake Newland Conservation Park, threat totals are high to medium high, inside the park threat totals are medium.
Threatening processes in many parts are recorded: camping and ORV activity near Walkers Rock and ORV traffic on the beach and in the dunes on the southern half of the cell, development zoning outside the Conservation Park, land ownership and land use (approximately the eastern half of the cell), sea views and landscape aesthetics (whole cell), the whole cell is subject to a petroleum exploration license application, vegetated areas record a large percentage of exotic plants and in the southern half of the cell numbers of invasive weeds are recorded – African boxthorn, bridal creeper, sea lavender. On the northern edge of the cell Aleppo pine occurs; a high total for dune instability reflects the obvious prevalence of de-vegetated dunes.

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Beach recession due to sand movement to nearshore, and increased dune instability due to foredune damage	Monitor dune habitat conditions	
2070: +c.80cm.	Sandy coast has marked recession; indentations around calcrete. Cliff erosion.	Active management of dune blowouts to slow recession	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides: erosion of calcarenite cliffs		
Intensity of large storms increases	2070: continued cliff erosion	.	
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing vegetation is found in warmer conditions elsewhere)		Maintain N-S connectivity of vegetation within the peninsula
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage	Active weed control	Ensure dune vegetation is within the regional fire plan.
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate		

TABLE 6.25 Recommended Actions and Priority for EP51 Lake Newland CR

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Very inadequate data on biodiversity and habitat values	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change. Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution. Seek to improve the resilience of plant and animal habitats by taking opportunities to improve connectivity between vegetation blocks.	Medium (cons)	EP NRM, DENR, community
	Areas within cell identified as being important for rare plant communities and as habitat for threatened species, including shorebirds, potential impact from agricultural activities, recreational activities, development zoning and land management practices.	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. access control, restrict stock access, track management, restrict vehicles on beaches, dogs on leashes, pest animal and plant control, restrict access to sensitive locations. Review development plan zoning to these areas to increase protection. Install interpretive/ educational signage. Community education programs.	High (cons/ threat)	DENR, EP NRM, DC of Elliston, DPLG, private land owners, community groups
	Unrestricted access and multiple vehicle tracks around the coast impacting on the coastal dune and cliff top vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	High	DC of Elliston, DTEI, DENR, EP NRM, private land owners, SA Tourism, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Petroleum exploration licence application covers most of the cell, with potential impact on sensitive areas and conservation values	Ensure any mining activities avoid areas of high conservation significance. Investigate/ consider refusal of licence in high conservation areas.	Medium	PIRSA, DENR, EP NRM, DC of Elliston
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DENR, private land owners, community groups, EP NRM
	Maintenance of coastal access management infrastructure	Use the EP Coastal infrastructure audit to setup a maintenance program	Medium	DENR, DC Elliston, EP NRM, community groups
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required).	Medium	EP NRM, DC of Elliston, private land owners, DENR
Dunes	Many are de-vegetated, and outside the park invasive weeds are prevalent.	Strategic access and weed control to protect the main conservation values of this area – the dune shrubland and habitats for focal species (see above) Develop and implement weed management plan. Review existing tracks with a view to rationalise unnecessary tracks. Implement actions to control and/or exclude off-road vehicle activity.	High (cons/ threat)	DC of Elliston, DENR, EP NRM, private land owners
Anxious Bay boat ramp	Boat ramp car park is being incrementally and informally enlarged, with damage to vegetation and coastal land forms	Formalise the car park with fencing. Block access to informal tracks from car park. Install directional /educational signage. Community education	High (cons/ threat)	DC of Elliston, DENR, DTEI, EP NRM
Lake Newland CP	Inadequate data on biodiversity and habitat values, particularly flora (no sites within this section of the park).	Undertake coastal flora and fauna surveys to inform future management directions.	High	DENR

Component	Issue	Proposed Action	Priority of Action	Key Players
	Formal camping area (Walkers Rock) with impact from multiple tracks, weeds, soil compaction, vegetation trampling and removal, local impact from visitors	Develop camping management plan, including actions to minimise visitor impacts, eg. barriers/fencing to prevent spread and informal tracks, signage, provision of appropriate amenities, weed management, maintenance of facilities/ infrastructure.	High (cons/ threat)	DENR, DC of Elliston, EP NRM
	The CP has areas of high conservation values. Potential impact from weeds, and recreational activities such as off-road vehicles and camping. This area of the park was recently declared as part of the park and was not included in the original management plan.	Review the management of this valuable area. Update the management plan for the conservation park to include this area.	High	DENR
Lake Newland CP, beaches and Crown land coastal reserve	Unregistered off-road vehicle use (eg. quad bikes, trail bikes): illegal, vegetation damage and potential dune destabilisation	Install educational signs on dune vegetation, stability and legislation on unregistered vehicles e.g. quad bikes. Undertake compliance program	High (cons/ threat)	DENR, SAPOL, community, DC of Elliston
Beaches	Vehicles and dogs on beaches a threat to meiofauna and shorebirds including significant shorebird breeding and feeding areas.	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs eg. "chicks on beach".	High (cons/ threat)	Council, EP NRM, DTEI, EP LGA, DENR, Tourism SA, Birds Australia, community,

Component	Issue	Proposed Action	Priority of Action	Key Players
	Marine debris with potential impact on native fauna species	Investigate opportunities for, and/or support, ongoing marine debris cleanup programs. Undertake education program targeting fishers, campers, aquaculture operators	Medium (cons/ threat)	PIRSA, EP NRM, DENR, aquaculture operators, community, DC of Elliston
Salt marsh area behind boat ramp	Salt marsh areas have the potential for acid sulfate soil following disturbance; in turn this would potentially threaten life forms within the surrounding area.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Medium (threat)	DC of Elliston, developers, DENR, EP NRM, private land owners

BIOTA

Flora

Remnant vegetation area (ha)	219.03 ha, 50.81% of cell area
# flora surveys / records	3 surveys
# flora in cell	23
# conservation rated flora in cell	0
# non-indigenous flora in cell	6
Significant CDCS floristic community	*Atriplex cinerea* shrublands – 20 sites recorded within SA, 60% of these in EP
Protected area	17% of remnant vegetation within cell protected by Lake Newland CP

Weeds

Species	Common Name	Status	Study rating
Asparagus asparagoides (NC)	Bridal Creeper	D, RA	9
Lycium ferocissimum	African Boxthorn	D, RA	8
Limonium companyonis	Sea-lavender	RA	7
Euphorbia paralias	Sea Spurge	RA	5
Cakile maritima ssp. maritima	Two-horned Sea Rocket		1
Sonchus asper ssp.	Rough Sow-thistle		0

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Acacia longifolia ssp. sophorae	Coastal Wattle		
Acacia sp. Winged (C.R.Alcock 4936)	Angled Wattle		
Atriplex cinerea	Coast Saltbush		
Carpobrotus rossii (NC)	Native Pigface		

Species	Common Name	Aus status	SA status
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Dianella brevicaulis	Short-stem Flax-lily		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos syrticola	Coast Cherry		
Ficinia nodosa	Knobby Club-rush		
Leucopogon parviflorus	Coast Beard-heath		
Olearia axillaris	Coast Daisy-bush		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Scaevola crassifolia	Cushion Fanflower		
Spinifex hirsutus (NC)	Rolling Spinifex		
Sporobolus virginicus	Salt Couch		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	50 recorded – 39 birds, 0 butterflies, 2 mammals, 8 reptiles, 1 amphibians (an additional 17 reptiles and 27 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	5 opportune sites
# of threatened fauna in cell	8
# of non-indigenous fauna	1 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Sturnus vulgaris	Common Starling	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Sternula nereis	Fairy Tern		E
Cladorhynchus leucocephalus	Banded Stilt		V
Thinornis rubricollis	Hooded Plover		V
Cereopsis novaehollandiae	Cape Barren Goose		R
Egretta sacra	Eastern Reef Egret		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Accipiter fasciatus	Brown Goshawk		
Anas castanea	Chestnut Teal		
Anthochaera carunculata	Red Wattlebird		
Anthus novaeseelandiae	Australasian Pipit		
Calidris acuminata	Sharp-tailed Sandpiper	M	
Calidris ferruginea	Curlew Sandpiper	M	
Calidris ruficollis	Red-necked Stint	M	
Charadrius ruficapillus	Red-capped Plover		

Species	Common Name	Aus status	SA status
Chroicocephalus novaehollandiae	Silver Gull		
Cincloramphus cruralis	Brown Songlark		
Circus assimilis	Spotted Harrier		
Colluricincla harmonica	Grey Shrike-thrush		
Corvus coronoides	Australian Raven		
Cracticus torquatus	Grey Butcherbird		
Cygnus atratus	Black Swan		
Epthianura albifrons	White-fronted Chat		
Hirundo neoxena	Welcome Swallow		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Melopsittacus undulatus	Budgerigar		
Petrochelidon nigricans	Tree Martin		
Phalacrocorax varius	Pied Cormorant		
Phaps chalcoptera	Common Bronzewing		
Pomatostomus superciliosus	White-browed Babbler		
Purnella albifrons	White-fronted Honeyeater		
Rhipidura leucophrys	Willie Wagtail		
Sericornis frontalis	White-browed Scrubwren		
Thalasseus bergii	Crested Tern		
Tringa nebularia	Common Greenshank	M	
Vanellus miles	Masked Lapwing		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p

Species	Common Name	Status*	Record
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Macropus fuliginosus	Western Grey Kangaroo		
Notomys mitchellii	Mitchell's Hopping-mouse		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Lerista arenicola	Beach Slider		R	x
Pseudemoia baudini	Bight Coast Skink		R	c
Ctenophorus pictus	Painted Dragon			x
Ctenotus orientalis	Spotted Ctenotus			x
Hemiergis peronii	Four-toed Earless Skink			x
Parasuta spectabilis	Mallee Black-headed Snake			x
Cyclodomorphus melanops	Spinifex Slender Bluetongue			x
Diplodactylus calcicolus	South Coast Gecko			x
Nephrurus milii	Barking Gecko			x
Amphibolurus norrisi	Mallee Tree-dragon			e
Delma australis	Barred Snake-lizard			e
Egernia stokesii	Gidgee Skink			e
Gehyra variegata	Tree Dtella			e
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			e
Christinus marmoratus	Marbled Gecko			e
Morethia obscura	Mallee Snake-eye			c
Pseudechis australis	Mulga Snake			c
Ctenophorus chapmani	Prickly Dragon			c
Ctenophorus fionni	Peninsula Dragon			c
Pogona barbata	Eastern Bearded Dragon			c
Tympanocryptis lineata	Five-lined Earless Dragon			c

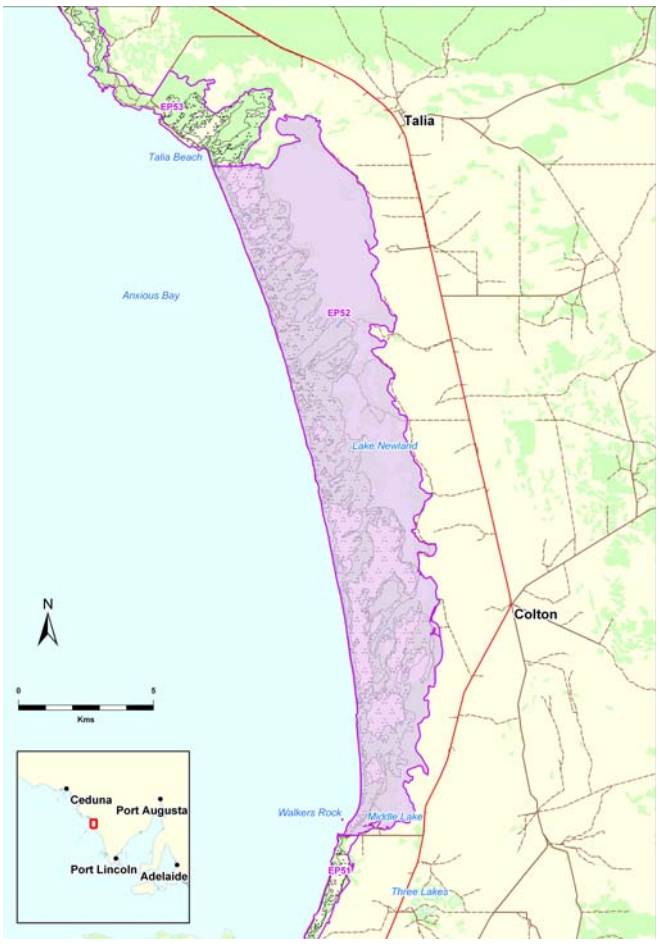
R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

Species	Common Name	Aus status	SA status	Record
Neobatrachus pictus	Burrowing frog			x

Cell EP52 Lake Newland CP

Cell area 9,104 ha. Shoreline length 26.1 km.



Landforms

This large cell runs almost north-south along the open curve of Anxious Bay, including the dunes, a saline lake and lake edge. Anxious Bay beach is a very long sandy beach fronted by wide sandbar and sections of submerged rock reef. Backing the beach is a wide unstable sand dune and Lake Newland. The large Holocene transgressive sand barrier at Anxious Bay blocks the saline wetland of Lake Newland. Since deposition covering the Pleistocene barrier, the Holocene barrier has transgressed several 100s of metres landwards, (Short et al 1986, p.100). This is a high energy section of the coast, with usually dissipative morphology; foredune damage has led to at least three major episodes of transgression, producing long-walled parabolic dune forms. Today approximately a third of the sand barrier is unstable. The back barrier depression is filled by the saline Lake Newland, which has been extensively invaded by transgressive dune movement.

Biota

5,092 ha remnant vegetation, 56% of cell. 47% of cell covered by coastal sand dune. *Olearia axillaris, Leucopogon parviflorus* tall shrubland over *Threkeldia diffusa, Tetragonia implexicoma, Rhagodia candolleana* low shrubland. *Nitraria billardierei, +/-Olearia axillaris* mid open shrubland over *Threlkeldia diffusa, Tetragonia implexicoma, Rhagodia candolleana ssp. candolleana, Atriplex vesicaria ssp. shrubs. Melaleuca lanceolata, +/-Olearia axillaris, +/-Leucopogon parviflorus* tall open shrubland over +/- *Rhagodia candolleana ssp. candolleana, +/-Threlkeldia diffusa* low shrubs.

Benthic Habitat/

Inshore calcarenite reef and platform reef.

Land Use/ Land Ownership

Lake Newland Conservation Park adjoins the coast for this entire cell and constitutes 92% of the cell area, it includes Lake Newland, a Wetland of National Importance, SA 012. Private property adjoins the park within the coastal boundary at the southern end of the cell, and also includes a small section of unalloted Crown land. Areas of unalloted Crown land adjoin the park at the northern end of the cell and fall within the study boundary.

FIGURE 6.28 Anxious Bay, Holocene sand barrier separating the sea from Lake Newland. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

There are numerous vehicle tracks that extend through Lake Newland Conservation Park, most of which are unauthorised. Some are only accessible using motorbikes. There are also a number of camping areas scattered throughout the Park, both formal and informal. The beach is used by vehicles to access dunes in the park, and the beach is popular with recreational fishers, both boaters and beach fishermen. Small craft are launched off the beach at Walkers Rock.

Threats (Field visits and local reports)

Beach rubbish from fishing activity, adjacent abalone farm and campgrounds.
Stock sometimes stray from adjacent farmland through deteriorating fencing, causing erosion, damage to vegetation and the lake itself. Stock may also bring in pest plant species, including Horehound and Limonium spp.
Pest animal species are also found within the park, incl. foxes, cats and rabbits.
Abundant native species, such as kangaroos and emus, have also been known to cause damage to vegetation and fencing within the park.
The most damaging threat in this cell is unmanaged vehicle access, especially from motorbikes and ATVs. Access to dunes and beach are frequently used by both types of vehicles.
PCASS in salt marsh and low lying areas
Collection of firewood
Uncontrolled camping
Wildfire
Boat launching (public safety, hydrocarbon spills)

Opportunities (Field visits and local reports)

Rationalise access to dune systems (both north and south of campground) from Walkers Rock

Rationalise access to saline lake system from Sheridan's Lane (Flinders Hwy) and via Anxious Bay beach to protect integrity of the substrate and vegetation barriers
Manage campground to ensure adequate space for seasonally high numbers of campers which will help to reduce impact on beach
Manage stock access from adjacent farming land
Lake Newland Conservation Park Management Plan

Conservation Analysis (GIS)

The total of summary means is 111.57, medium for the Eyre Peninsula region. The pattern of detailed summary scores is clear: the highest totals are on the vegetated dunes, within a few hundred metres of the shoreline, further inland vegetated dune totals drop to medium high; lakeside flats drop to medium totals, while de-vegetated dunes are medium low. There a number of moderate layer totals which contribute to the conservation score, but few very large values: the threatened status and endemicity of vegetation associations (whole cell), endemicity of floristic vegetation) shows very high values for *Olearia axillaris/ Leucopogon parviflorus* shrubland, widely distributed on the dunes), species richness (close to the shoreline), habitat for threatened bird species and habitat for all bird species (lakes and inner dune areas), habitat for threatened reptile species (vegetated dunes), habitat for threatened mammal species (dunes), visual amenity and indigenous heritage. There are moderate totals for the Beach Slider and Bight Coast Skink (focal species), with very high values within the dunes.
There are 4 mammal, 16 reptile, 1 amphibian and 96 bird species recorded within this cell, including the state endangered Fairy Tern, the state vulnerable Banded Stilt (lakes) and Hooded Plover (shore) and the state rare Beach Slider (focal species).

Threat Analysis (GIS)

Threat total is 25.99, which is very low for the region. The detailed summary threat map shows no part with high to medium high totals, except a small area outside the park in the south-east corner of the cell. There are also some small areas by the beach and foredunes near Talia Beach that show moderate threat totals.
Visual aesthetics, vegetation block degradation (% exotic plants) and invasive weeds are the major threat scores; African boxthorn and bridal creeper appear widespread through the dune.

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Sea level rise: 2030 : +c.20cm	Sandy coast of Anxious Bay shows increased dune instability due to foredune damage. Some recession occurs.	Monitor dune habitat conditions. Set up profile line at Anxious Bay, to establish a baseline for monitoring future recession	
2070: +c.80cm.	Sandy coast has marked recession; effects of nearshore reefs on shoreline reduced. Foreshore damage, frequent blowout incidence: initiation of dune transgressive episodes.	Continue monitoring to inform management Active management of dune blowouts to slow recession	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides: foredune damage		
Intensity of large storms increases	Foredune damage	.	
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing vegetation is found in warmer conditions elsewhere)		Maintain N-S connectivity of vegetation within the peninsula
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage	Active weed control	Ensure dune vegetation is within the regional fire plan.
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Local impact on soil water and vegetation survival; rising salinity in Lake Newland.	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains high energy beach conditions.		

TABLE 6.26 Recommended Actions and Priority for EP52 Lake Newland CP

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Combined climate changes and sea level rise throughout this cell. This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution. Seek to improve the resilience of plant and animal habitats by taking opportunities to improve connectivity between vegetation blocks.	Medium (cons)	EP NRM, DENR, community
	The proliferation of invasive weeds is a threat to the parks conservation values and dune stability. Grassy weeds likely to increase under drier climate change conditions	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	High (cons/ threat)	EP NRM, DENR, DC of Elliston, private land owners,
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	Medium (cons/ threat)	DENR
	Unrestricted access with multiple vehicle tracks throughout cell impacting on the dune and wetland vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	High (cons/ threat)	DENR, DC of Elliston, EP NRM, community groups, SA Tourism

Component	Issue	Proposed Action	Priority of Action	Key Players
	Sea level rise threatens beach recession, foredune damage, blowouts and the initiation of dune transgression	Manage dunes to reduce pressures leading to dune instability. Establish a beach profile to begin monitoring these changes	High (cons/ existing threat)	DENR
	Formal camping areas with impact from multiple tracks, weeds, soil compaction, vegetation trampling and removal, local impact from visitors	Develop camping management plan, including actions to minimise visitor impacts, eg. barriers/fencing to prevent spread and informal tracks, signage, provision of appropriate amenities, weed management, maintenance of facilities/ infrastructure.	Medium	DENR
	Unregistered off-road vehicle use (eg. quad bikes, trail bikes): illegal, vegetation damage and potential dune destabilisation	Install educational signs on dune vegetation, stability and legislation on unregistered vehicles e.g. quad bikes. Undertake compliance program	High (cons/ threat)	DENR, SAPOL, community, DC of Elliston
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, private land owners, community groups, EP NRM
	The CP has high conservation values with impact from agricultural activities, recreational activities, uncontrolled access, weeds and pest animals	Ongoing implementation of the Management Plan to protect threatened species and minimise impacts and threats to flora and fauna. Update Management Plan when possible	High (cons)	DENR
	Introduced animals and potential over abundant native species; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg rabbits, foxes, cats. Monitor abundance of native species, eg. kangaroos, emus. Undertake a control program if required. Work with private land owners to ensure that stock are restricted from the park and ensure fences are adequate and maintained.	Medium	DENR, EP NRM private land owners

Component	Issue	Proposed Action	Priority of Action	Key Players
Beach and foredunes	Vehicles on beaches (and foredunes) a threat to meiofauna and shorebirds including significant shorebird breeding and feeding areas.	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ pest animal control programs. Enforce no vehicles on beach zoned within Lake Newland CP Management Plan as no vehicle access. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	High (cons/ threat)	DENR, EP NRM, Tourism SA, Birds Australia, community
	Marine debris with potential impact on native fauna species	Investigate opportunities for, and/or support, ongoing marine debris cleanup programs. Undertake education program targeting fishers, campers, aquaculture operators	Medium (cons/ threat)	PIRSA, EP NRM, DENR, DC of Elliston, aquaculture operators, community
Lake Newland wetland	Wetland of national and international importance, providing habitat for numerous flora and fauna species including threatened species and communities. Drier climate change conditions and sea level rise threaten increased saline water pressure on Lake Newland	Ensure adequate protection and management in this area to minimise threats (eg. recreational activities, adjacent agricultural activities, etc). Ensure the ecological water requirements of the wetland and park are met. Investigate and monitor hydrological conditions to support management. Manage and protect sensitive areas, eg. springs.	High (cons)	DENR, EP NRM
Salt marsh and low lying areas	Salt marsh areas have the potential for acid sulfate soil following disturbance; in turn this would potentially threaten life forms in the surrounding area.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Medium (threat)	DENR, DC of Elliston, EP NRM, private land owners

BIOTA

Flora

Remnant vegetation area (ha)	5092.48 ha, 55.94% of cell area
# flora surveys / records	11 surveys, 11 herbarium record sites, 1 threatened plant population record site
# flora in cell	191
# conservation rated flora in cell	2
# non-indigenous flora in cell	30
Significant CDCS floristic community	*Olearia axillaris* / *Tetragonia implexicoma* shrubland – 75% of SA records in EP
Protected area	89% of remnant vegetation protected within Lake Newland CP

Weeds

Species	Common Name	Status	Study rating
Arctotheca populifolia	Beach Daisy	RA	7
Argyranthemum frutescens ssp. foeniculaceum	Teneriffe Daisy	RA	4
Euphorbia paralias	Sea Spurge	RA	5
Gazania rigens	Gazania	RA	6
Limonium companyonis	Sea-lavender	RA	7
Asparagus asparagoides (NC)	Bridal Creeper	D, RA	9
Lycium ferocissimum	African Boxthorn	D, RA	8
Pinus halepensis	Aleppo Pine	D, RA	5
Diplotaxis tenuifolia	Lincoln Weed	D	3
Ammophila arenaria	Marram Grass		2
Anagallis arvensis	Pimpernel		2
Avena barbata	Bearded Oat		2
Bromus rigidus	Rigid Brome		2
Bromus rubens	Red Brome		2
Cakile maritima ssp. maritima	Two-horned Sea Rocket		1
Catapodium rigidum	Rigid Fescue		1
Erodium cicutarium	Cut-leaf Heron's-bill		0
Galenia pubescens var. pubescens	Coastal Galenia		0
Galium murale	Small Bedstraw		0
Hordeum marinum	Sea Barley-grass		1
Hornungia procumbens	Oval Purse		0
Isolepis marginata	Little Club-rush		0
Melilotus indicus	King Island Melilot		1
Mesembryanthemum sp.	Iceplant		3
Minuartia mediterranea	Slender Sandwort		0
Moraea setifolia	Thread Iris		0
Rostraria cristata	Annual Cat's-tail		2
Sonchus oleraceus (NC)	Common Sow-thistle		0
Spergularia rubra	Red Sand-spurrey		0
Stellaria media	Chickweed		0

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Austrostipa echinata	Spiny Spear-grass		R
Centrolepis cephaloformis ssp. cephaloformis	Cushion Centrolepis		R
Acacia anceps (NC)	Angled Wattle		
Acacia cupularis	Cup Wattle		
Acacia ligulata	Umbrella Bush		
Acacia longifolia ssp. sophorae	Coastal Wattle		
Acacia sp. Winged (C.R.Alcock 4936)	Angled Wattle		
Acacia triquetra	Mallee Wreath Wattle		
Acrotriche patula	Prickly Ground-berry		
Actites megalocarpa	Coast Sow-thistle		
Adriana klotzschii (NC)	Coast Bitter-bush		
Agrostis avenacea var. avenacea (NC)	Common Blown-grass		
Allocasuarina verticillata	Drooping Sheoak		
Alyogyne huegelii	Native Hibiscus		
Alyxia buxifolia	Sea Box		
Angianthus preissianus	Salt Angianthus		
Apium annuum	Annual Celery		
Apium prostratum var.	Native Celery		
Apium prostratum var. prostratum	Native Celery		
Arthropodium minus	Small Vanilla-lily		
Asteridea athrixioides f. athrixioides	Wirewort		
Atriplex cinerea	Coast Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrodanthonia setacea	Small-flower Wallaby-grass		
Austrofestuca littoralis	Coast Fescue		
Austrostipa drummondii	Cottony Spear-grass		
Austrostipa eremophila	Rusty Spear-grass		
Austrostipa exilis	Heath Spear-grass		
Austrostipa flavescens	Coast Spear-grass		
Austrostipa nitida	Balcarra Spear-grass		
Austrostipa scabra ssp. falcata	Slender Spear-grass		
Austrostipa sp.	Spear-grass		
Baumea juncea	Bare Twig-rush		
Brachyscome lineariloba	Hard-head Daisy		
Bromus arenarius	Sand Brome		
Bulbine semibarbata	Small Leek-lily		
Calandrinia brevipedata	Short-stalked Purslane		
Calandrinia eremaea	Dryland Purslane		
Calandrinia sp.	Purslane/Parakeelya		
Callitris gracilis	Southern Cypress Pine		
Carpobrotus rossii (NC)	Native Pigface		
Cassytha peninsularis	Peninsula Dodder-laurel		
Cassytha peninsularis var. (NC)	Peninsula Dodder-laurel		
Clematis microphylla			
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Comesperma volubile	Love Creeper		
Convolvulus angustissimus ssp. peninsularum	Grassland Bindweed		
Cotula vulgaris var. australasica	Slender Cotula		
Crassula decumbens var. decumbens	Spreading Crassula		
Crassula sieberiana complex	Australian Stonecrop		

Species	Common Name	Aus status	SA status
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Cyperus laevigatus	Bore-drain Sedge		
Daucus glochidiatus	Native Carrot		
Dianella brevicaulis	Short-stem Flax-lily		
Dianella brevicaulis/revoluta var.	Black-anther Flax-lily		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Distichlis distichophylla	Emu-grass		
Dodonaea baueri	Crinkled Hop-bush		
Elymus scaber var. scaber (NC)	Native Wheat-grass		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eriochlamys behrii	Woolly Mantle		
Eucalyptus brachycalyx	Gilja		
Eucalyptus diversifolia (NC)	Coastal White Mallee		
Eutaxia microphylla	Common Eutaxia		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos syrticola	Coast Cherry		
Ficinia nodosa	Knobby Club-rush		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Frankenia sessilis	Small-leaf Sea-heath		
Gahnia filum	Thatching Grass		
Gahnia lanigera	Black Grass Saw-sedge		
Gnaphalium indutum ssp. indutum	Tiny Cudweed		
Goodenia pinnatifida	Cut-leaf Goodenia		
Halosarcia sp. (NC)	Samphire		
Helichrysum leucopsideum	Satin Everlasting		
Hemichroa pentandra	Trailing Hemichroa		
Hydrocotyle capillaris	Thread Pennywort		
Hydrocotyle medicaginoides	Medic Pennywort		
Isoetopsis graminifolia	Grass Cushion		
Isolepis cernua	Nodding Club-rush		
Juncus kraussii	Sea Rush		
Lasiopetalum baueri	Slender Velvet-bush		
Lasiopetalum discolor	Coast Velvet-bush		
Lawrencia glomerata	Clustered Lawrencia		
Lawrencia squamata	Thorny Lawrencia		
Lepidosperma gladiatum	Coast Sword-sedge		
Lepilaena cylindrocarpa	Long-fruit Water-mat		
Leptorhynchos squamatus ssp. squamatus	Scaly Buttons		
Leptorhynchos waitzia	Button Immortelle		
Leucophyta brownii	Coast Cushion Bush		
Leucopogon parviflorus	Coast Beard-heath		
Logania crassifolia	Coast Logania		
Lomandra collina	Sand Mat-rush		
Lotus australis	Austral Trefoil		
Lysiana exocarpi ssp. exocarpi	Harlequin Mistletoe		
Maireana oppositifolia	Salt Bluebush		
Melaleuca brevifolia	Short-leaf Honey-myrtle		
Melaleuca halmaturorum	Swamp Paper-bark		
Melaleuca lanceolata	Dryland Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Microtis arenaria	Notched Onion-orchid		
Millotia major			
Muehlenbeckia adpressa	Climbing Lignum		

Species	Common Name	Aus status	SA status
Myoporum insulare	Common Boobialla		
Nicotiana velutina	Velvet Tobacco		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Oxalis perennans (NC)	Native Sorrel		
Parietaria cardiostegia	Mallee Smooth-nettle		
Parietaria debilis (NC)	Smooth-nettle		
Pittosporum angustifolium	Native Apricot		
Poa poiformis var. poiformis	Coast Tussock-grass		
Podotheca angustifolia	Sticky Long-heads		
Pogonolepis muelleriana	Stiff Cup-flower		
Ptilotus spathulatus f. spathulatus	Pussy-tails		
Puccinellia stricta var. stricta	Australian Saltmarsh-grass		
Pultenaea tenuifolia	Narrow-leaf Bush-pea		
Rhagodia candolleana ssp.	Sea-berry Saltbush		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Ruppia polycarpa	Widgeon Grass		
Ruppia tuberosa	Widgeon Grass		
Sagina maritima	Sea Pearlwort		
Salsola tragus	Buckbush		
Samolus repens	Creeping Brookweed		
Sarcocornia blackiana	Thick-head Samphire		
Sarcocornia quinqueflora	Beaded Samphire		
Sarcocornia sp.	Samphire		
Scaevola crassifolia	Cushion Fanflower		
Schoenoplectus pungens	Spiky Club-rush		
Schoenus nitens	Shiny Bog-rush		
Senecio glossanthus (NC)	Annual Groundsel		
Senecio pinnatifolius (NC)	Variable Groundsel		
Senecio quadridentatus	Cotton Groundsel		
Spinifex hirsutus (NC)	Rolling Spinifex		
Sporobolus virginicus	Salt Couch		
Suaeda australis	Austral Seablite		
Swainsona sp.	Swainson-pea		
Tecticornia arbuscula	Shrubby Samphire		
Tecticornia halocnemoides ssp. halocnemoides	Grey Samphire		
Tecticornia indica ssp. leiostachya	Brown-head Samphire		
Tecticornia pergranulata ssp. pergranulata	Black-seed Samphire		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Thysanotus baueri	Mallee Fringe-lily		
Triglochin centrocarpum (NC)	Dwarf Arrowgrass		
Triglochin mucronata	Prickly Arrowgrass		
Triglochin striata	Streaked Arrowgrass		
Triglochin trichophora			
Veronica hillebrandii	Rigid Speedwell		
Vittadinia australasica var. australasica	Sticky New Holland Daisy		
Vittadinia cuneata var. cuneata f. cuneata	Fuzzy New Holland Daisy		
Vittadinia gracilis	Woolly New Holland Daisy		
Vittadinia megacephala	Giant New Holland Daisy		
Wilsonia backhousei	Narrow-leaf Wilsonia		
Wilsonia humilis	Silky Wilsonia		

Species	Common Name	Aus status	SA status
Wilsonia rotundifolia	Round-leaf Wilsonia		
Zygophyllum ammophilum (NC)	Sand Twinleaf		
Zygophyllum billardierei	Coast Twinleaf		
Zygophyllum sp.	Twinleaf		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	117 recorded – 96 birds, 0 butterflies, 4 mammals, 16 reptiles, 1 amphibians (an additional reptiles and butterflies identified by experts as possibly occurring)
# of fauna surveys / records	5 surveys, 22 opportune sites
# of threatened fauna in cell	13
# of non-indigenous fauna	3 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Alauda arvensis	Eurasian Skylark	Aves	x
Sturnus vulgaris	Common Starling	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p
Mus musculus	House Mouse	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Sternula nereis	Fairy Tern		E
Cladorhynchus leucocephalus	Banded Stilt		V
Thinornis rubricollis	Hooded Plover		V
Actitis hypoleucos	Common Sandpiper	M	R
Arenaria interpres	Ruddy Turnstone	M	R
Biziura lobata	Musk Duck		R
Cereopsis novaehollandiae	Cape Barren Goose		R
Egretta garzetta	Little Egret		R
Egretta sacra	Eastern Reef Egret		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Podiceps cristatus	Great Crested Grebe		R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Acanthiza apicalis	Inland Thornbill		
Acanthiza chrysorrhoa	Yellow-rumped Thornbill		
Accipiter cirrocephalus	Collared Sparrowhawk		
Accipiter fasciatus	Brown Goshawk		
Acrocephalus australis	Australian Reed Warbler, (Clamorous Reed-Warbler)		
Anas castanea	Chestnut Teal		
Anas gracilis	Grey Teal		
Anas superciliosa	Pacific Black Duck		

Species	Common Name	Aus status	SA status
Anthochaera carunculata	Red Wattlebird		
Anthus novaeseelandiae	Australasian Pipit		
Aphelocephala leucopsis	Southern Whiteface		
Aquila audax	Wedge-tailed Eagle		
Ardea modesta	Eastern Great Egret		
Artamus cyanopterus	Dusky Woodswallow		
Aythya australis	Hardhead (White-eyed Duck)		
Calidris acuminata	Sharp-tailed Sandpiper	M	
Calidris ferruginea	Curlew Sandpiper	M	
Calidris ruficollis	Red-necked Stint	M	
Chalcites basalis	Horsfield's Bronze-cuckoo		
Charadrius ruficapillus	Red-capped Plover		
Chroicocephalus novaehollandiae	Silver Gull		
Cincloramphus cruralis	Brown Songlark		
Circus approximans	Swamp Harrier		
Colluricincla harmonica	Grey Shrike-thrush		
Coracina maxima	Ground Cuckoo-shrike		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Corvus coronoides	Australian Raven		
Corvus mellori	Little Raven		
Coturnix pectoralis	Stubble Quail		
Cracticus tibicen	Australian Magpie		
Cracticus torquatus	Grey Butcherbird		
Cygnus atratus	Black Swan		
Dromaius novaehollandiae	Emu		
Egretta novaehollandiae	White-faced Heron		
Elanus axillaris	Black-shouldered Kite		
Elseyornis melanops	Black-fronted Dotterel		
Eolophus roseicapillus	Galah		
Epthianura albifrons	White-fronted Chat		
Falco berigora	Brown Falcon		
Falco cenchroides	Nankeen Kestrel		
Falco longipennis	Australian Hobby		
Fulica atra	Eurasian Coot		
Grallina cyanoleuca	Magpie-lark		
Himantopus himantopus	Black-winged Stilt		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Malurus cyaneus	Superb Fairy-wren		
Malurus lamberti	Variegated Fairy-wren		
Malurus pulcherrimus	Blue-breasted Fairy-wren		
Melopsittacus undulatus	Budgerigar		
Microcarbo melanoleucos	Little Pied Cormorant		
Mirafra javanica	Horsfield's Bushlark		
Morus serrator	Australasian Gannet		
Ocyphaps lophotes	Crested Pigeon		
Pardalotus striatus	Striated Pardalote		
Pelecanus conspicillatus	Australian Pelican		
Phalacrocorax carbo	Great Cormorant		
Phalacrocorax sulcirostris	Little Black Cormorant		
Phalacrocorax varius	Pied Cormorant		

Species	Common Name	Aus status	SA status
Phaps chalcoptera	Common Bronzewing		
Phaps elegans	Brush Bronzewing		
Podargus strigoides	Tawny Frogmouth		
Poliocephalus poliocephalus	Hoary-headed Grebe		
Pomatostomus superciliosus	White-browed Babbler		
Porzana fluminea	Australian Spotted Crake		
Recurvirostra novaehollandiae	Red-necked Avocet		
Rhipidura albiscapa	Grey Fantail		
Rhipidura leucophrys	Willie Wagtail		
Sericornis frontalis	White-browed Scrubwren		
Tadorna tadornoides	Australian Shelduck		
Thalasseus bergii	Crested Tern		
Threskiornis spinicollis	Straw-necked Ibis		
Todiramphus sanctus	Sacred Kingfisher		
Tribonyx ventralis	Black-tailed Native-hen		
Tringa nebularia	Common Greenshank	M	
Tringa stagnatilis	Marsh Sandpiper	M	
Vanellus miles	Masked Lapwing		
Vanellus tricolor	Banded Lapwing		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom

x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Macropus fuliginosus	Western Grey Kangaroo		
Notomys mitchellii	Mitchell's Hopping-mouse		
Sminthopsis crassicaudata	Fat-tailed Dunnart		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Lerista arenicola	Beach Slider		R	x
Amphibolurus norrisi	Mallee Tree-dragon			x
Aprasia striolata	Lined Worm-lizard			x
Christinus marmoratus	Marbled Gecko			e
Cryptoblepharus pulcher	Striped Wall Skink			x
Ctenophorus chapmani	Prickly Dragon			c
Ctenophorus fionni	Peninsula Dragon			c
Ctenophorus fordi	Mallee Dragon			c
Ctenophorus pictus	Painted Dragon			x
Ctenotus orientalis	Spotted Ctenotus			e
Cyclodomorphus melanops	Spinifex Slender Bluetongue			x
Delma australis	Barred Snake-lizard			e
Diplodactylus calcicolus	South Coast Gecko			x
Drysdalia mastersii	Master's Snake			c
Egernia stokesii	Gidgee Skink			x
Gehyra variegata	Tree Dtella			e
Hemiergis peronii	Four-toed Earless Skink			x
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			x
Lerista terdigitata	Southern Three-toed Slider			x
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			x
Morethia obscura	Mallee Snake-eye			c
Nephrurus milii	Barking Gecko			x
Parasuta spectabilis	Mallee Black-headed Snake			x
Pogona barbata	Eastern Bearded Dragon			c
Pseudechis australis	Mulga Snake			c
Pseudonaja inframacula	Peninsula Brown Snake			x
Tiliqua occipitalis	Western Bluetongue			x
Tympanocryptis lineata	Five-lined Earless Dragon			c

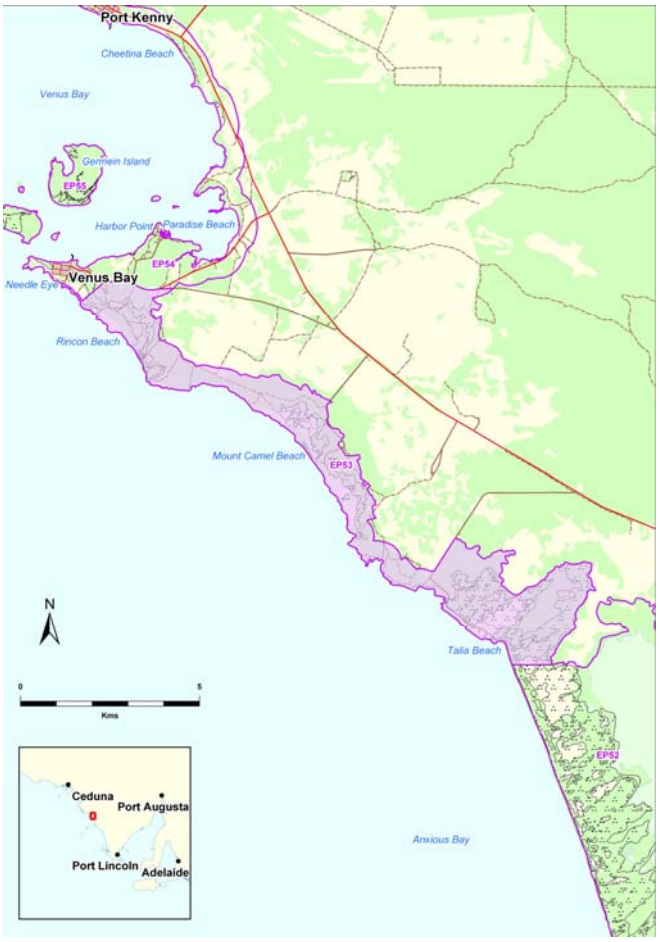
R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

Species	Common Name	Aus status	SA status	Record
Neobatrachus pictus	Burrowing frog			x

Cell EP53 Talia Caves

Cell area 2,127 ha. Shoreline length 21.06km.



Landforms

The bulk of this cell is Pleistocene calcarenite low to medium cliffs, with many pocket beaches and three larger beaches. The beaches are high energy, fine sand shorelines. Nearly all the cliffs are fronted by large sloping calcarenite shore platforms. Clifftop and beach linked Holocene dunes cover nearly all this cell; behind many beaches there is a calcarenite bluff or low cliff, with dunes above. The dunes are frequently deflated near cliff edges, resulting in dune recession. Generally sand volumes are low in this cell, with beach absent, small pocket beaches, narrow beaches and low dunes. There appear to be higher Holocene sand volumes near Talia Beach, where dunes have transgressed over 3 km inland, with extensive de-vegetated extents.

Benthic Habitat

Heavy limestone or calcarenite reef is mapped for the entire cell.

Biota

1,831 ha native vegetation, 86% of the cell.
There are 7 BDBSA flora survey sites, 3 herbarium flora record sites, 1 threatened plant population record site and 8 opportunistic fauna sites within this cell.
This is coastal shrubland: *Olearia axillaris, Leucopogon parviflorus* tall open shrubland; emergent *Dodonaea viscosa ssp. spatulata* mid shrubland; emergent *Acacia sp. Winged (C.R.Alcock 4936)* low shrubland; *Nitraria billardierei, +/-Olearia axillaris* mid open shrubland.

Land Use/ Land Ownership

A large allotment of unalloted Crown land occurs at the southern end of the cell, on the northern boundary of Lake Newland CP, and extends over 3km inland. From Talia Beach to where the Talia Caves road turns perpendicular to the coast, a coastal reserve of Crown land Act reserve under the care, control and management of the District Council of Elliston runs between the road and the coastline, with private property on the landward side of the road. North of this, a narrow (30-200m) coastal reserve of unalloted Crown land adjoins the coast, backed by private land until just south of Rincon Beach. However, in the centre of the cell near Mount Camel Beach, three large allotments adjoining the coastal reserve are under Heritage Agreements. From Rincon Beach to the northern cell boundary large parcels of Crown land Act reserve under the care, control and management of the District Council of Elliston extend up to 1.5 km inland.

West Coast Bays Marine Park offshore in the northern part of the cell, approximately from Rincon Beach.

FIGURE 6.29 Calcarenite headlands with sloping calcarenite ramps; south end of Mt Camel Beach. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

This cell is primarily bounded by private land, therefore general access to the coast is limited. Access to the coast by stock however is common. The southern boundary of this cell is used by ORV and other users to access Lake Newland Conservation Park from Talia Caves Road. Some camping occurs in this area, both inside the park and outside on council land/private land. Fishing is also popular at Talia Beach and Mt Camel Beach. Some housing development has occurred at Mt Camel. Generally, these beaches are too fine-grained and unconsolidated to make driving possible, however some access by motorbikes occurs at Talia Caves.
There are a number of popular surf breaks to the south of Venus Bay township, within the northern boundary of the cell.
Off road vehicle use does occur throughout the cell, particularly quad and trail bikes originating from Venus Bay community during holiday periods.

Threats (Field visits and local reports)

Stock access to coastal cliff/dune areas
Unmanaged vehicle access to coastal cliff/dune areas
Infestations of agricultural weeds due to stock access
Pest animals incl. foxes, cats and rabbits
Development – existing and potential
Uncontrolled camping

Opportunities (Field visits and local reports)

There are opportunities to rationalise ORV access to beaches at Mt Camel, Rincon and Talia. A project to manage access is planned for Mt Camel Beach (construction of a platform and ramp to beach) however this project has stalled for a number of years due to negotiations between key stakeholders.
Conservation and improvement works on Vegetation Heritage Agreements
Managing camping at these sites will also help to reduce threats in this cell.
Controlling weeds and pest animals, including stock, would be a priority to protect native flora and fauna

Conservation Analysis (GIS)

120.93: this is a high total for the region. Patterns for detailed totals appear complex, but some general statements can be made: the highest total values are on the vegetated sand dunes, vegetated calcarenite surfaces have medium to high values, and cleared sites have medium to low totals.
Highest values are from: vegetation communities that are rare in South Australia, sites with threatened flora (medium high widespread), sites with threatened fauna (generally high but highest on dunes), sites with vegetation associations which are endemic to the region (high in all vegetated areas), habitat for threatened birds (especially shorebirds), habitat for threatened mammal species, butterfly habitat (high in all vegetated areas), viewshed, viewscape, vegetation block metrics and indigenous heritage. Many dune areas are valuable habitat for reptiles, notably Beach Slider and Bight Coast Skink, also mammal species.
The cliffs immediately north of Talia Caves are recorded as a geological monument (10C – Talia Caves) for their outcrops of Pandurra Formation.

Threat Analysis (GIS)

The total of threat means, 47.92, is medium for the region. Combined detailed threat distribution is highest between Talia Beach and Talia Caves Road, and between Mount Camel Beach and Rincon Beach; elsewhere totals are medium to low.
Variables contributing to the total include land ownership, viewscape and viewshed, mining activities (applications for petroleum and minerals include most of the cell), proportion of exotic plants and distribution of invasive weeds (boxthorn, bridal creeper, and Sea Lavender widespread), and dune instability.

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Sea level rise: 2030 : +c.20cm	Sandy coast at Mt Camel Beach and Rincon Beach shows increased dune instability due to foredune damage. Some beach recession	Monitor dune habitat conditions	
2070: +c.80cm.	Sandy coast has marked recession; pocket beaches are lost. Erosion of calcrete cliffs accelerated. Intertidal reef life forms on sloping calcarenite shore platforms (ramps) reduced or lost.	Active management of dune blowouts to slow recession	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides: erosion of calcarenite cliffs		
Intensity of large storms increases	2070: continued cliff erosion	.	
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing vegetation is found in warmer conditions elsewhere)		Maintain N-S connectivity of vegetation within the peninsula
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Invasion by grassy weeds and accelerated instability of all dunes	Active weed control. Monitor dune movement to support management	Ensure dune vegetation is within the regional fire plan.
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate		

TABLE 6.27 Recommended Actions and Priority for EP53 Talia Caves

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Combined climate changes and sea level rise throughout this cell. This cell presents a complex pattern of habitats sensitive to change.	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution. Seek to improve the resilience of plant and animal habitats by taking opportunities to improve connectivity between vegetation blocks.	Medium (cons)	EP NRM, DENR, DC of Elliston, private land owners, community
	Areas within cell identified as being important for rare and endemic plant communities, threatened flora and fauna species and as habitat for threatened species, little protection and impact from agricultural activities, development zoning, recreational activities, land management practices, uncontrolled access, weeds and pest animals	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches, dogs on leashes, track management, pest animal and plant control, restrict access to sensitive locations. Install interpretive/ educational signage. Community education programs. Review development plan zoning to these areas to increase protection	High (cons/ threat)	DENR, private land owners, EP NRM, DC of Elliston, DPLG, community
	Informal camping and car parks occur throughout the cell, particularly in the north and south of the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	High (cons/ threat)	DENR, EP NRM, DC of Elliston, private land owners

Component	Issue	Proposed Action	Priority of Action	Key Players
	Unrestricted access and multiple vehicle tracks around the coast, particularly quad and trail bikes originating from Venus Bay community during holiday periods, impacting on the coastal dune and cliff top vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	Medium (cons/ threat)	Private land owners, DC of Elliston, DTEI, DENR, EP NRM, SA Tourism
	Unregistered off-road vehicle use (eg. quad bikes, trail bikes): illegal, vegetation damage and potential dune destabilisation	Install educational signs on dune vegetation, stability and policy on unregistered vehicles e.g. quad bikes. Undertake compliance program	Medium	DENR, SAPOL, DC of Elliston, DTEI, community
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, private land owners, community groups, EP NRM, DC of Elliston
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg rabbits, foxes, cats. Undertake a control program if required. Work with private landowners to ensure that stock are restricted from the coastal zone (eg. ensure fences are adequate and maintained)	Medium	EP NRM, DENR, DC of Elliston, private landholders
	Invasive weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	High (cons/ threat)	EP NRM, DC of Elliston, private land owners, DENR

Component	Issue	Proposed Action	Priority of Action	Key Players
	Maintenance of coastal access management infrastructure	Use the EP Coastal infrastructure audit to setup a maintenance program	Medium	DENR, DC Elliston, EP NRM, community
	Petroleum exploration licence applications cover much of the cell area, and mining exploration licence covers areas >800m from the coast for approx. the southern half of the cell, with potential impact on sensitive areas and conservation values	Ensure any mining activities avoid areas of high conservation significance. Investigate/ consider refusal of licence in high conservation areas.	Medium	PIRSA, DENR, EP NRM, DC of Elliston
Dune areas	These areas are valuable plant and fauna habitat, but are threatened by exotic species and invasive weeds. Stresses on all dunes exacerbated by climate change dryness and grassy weed invasion. Dunes at Rincon and Mt Camel beaches further stressed by increasing foredune damage and recession	Develop and implement pest plant and animal management plan (including monitoring and recording species, removal and rehabilitation as required, especially for African boxthorn and bridal creeper). Monitor movement of dune landforms, undertake stabilisation works where required.	High (cons/ threat	DENR, DC Elliston, EP NRM, private land owners
Cliff tops	Numerous informal vehicle and/or pedestrian tracks and informal car parks close to potentially unstable cliff edge; safety hazard and impact from soil compaction, vegetation damage, weed introduction, fauna disturbance, soil stability and water runoff erosion. Cliff erosion accelerated by sea level rise.	Review with a view to close or reroute tracks and car parks that are too close to cliff edge. Monitor cliff erosion rates.	High (Hazard; cons/ threat)	DENR, private land owners, DC of Elliston
Mount Camel Beach area	Existing development impacting on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Work with private land owners to minimise impact from existing development, including education, restoration where appropriate. Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs and cats, ORV etc	Medium	EP NRM, DC of Elliston, DENR, private land owners, community groups

Component	Issue	Proposed Action	Priority of Action	Key Players
Unalloted Crown land at southern end of cell	Areas of high conservation values. Potential threat from lack of continuity of management with neighbouring conservation park	Review the conservation status of the Crown land with a view to including it into the Lake Newland CP	Medium	DENR
Mount Camel Beach and Talia Beach	Pedestrian access from car parks to the beach impacting on soil stability, erosion and vegetation damage.	Consideration to installing formal access to minimise damage (eg. stairs, etc)	Medium	DENR, DC of Elliston, EP NRM, community groups.
Talia Caves	Significant geological feature present – GSA reference E23 (see section 3.4.1)	Interpretive signage	Low (threat)	GSA SA branch, DENR, DC of Elliston, EP NRM
	Non-indigenous coastal heritage site identified – monument near Talia Caves, but not included on any statutory heritage register, with potential impact from recreational activities	Consider including onto heritage register eg. local heritage lists. Ensure sites managed to protect from damage. Install interpretive educational signage.	Medium	DC of Elliston, DENR, SA Heritage Council, community
Talia Beach	Vehicles and dogs on beaches a threat to meiofauna and shorebirds, internationally significant numbers of some shorebird species have been recorded here. Beaches fronting cliffs reduced or lost through sea level rise: progressive loss of shorebird habitat.	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs eg. “chicks on beach”.	High (cons/ threat)	Council, EP NRM, DTEI, EP LGA, DENR, Tourism SA, Birds Australia, community,

BIOTA

Flora

Remnant vegetation area (ha)	1831.02 ha, 86.10% of cell area
# flora surveys / records	7 surveys, 3 herbarium record sites, 1 threatened plant population record site.
# flora in cell	150
# conservation rated flora in cell	1
# non-indigenous flora in cell	27
Significant CDCS floristic community	*Atriplex cinerea* shrublands – 20 sites recorded within SA, 60% of these in EP *Leucophyta brownie* shrubland– 56% of SA records in EP *Olearia axillaris /Lasiopetalum discolour* shrubland – 52% of SA records in EP
Protected area	17% of remnant vegetation within Heritage Agreement

Weeds

Species	Common Name	Status	Study rating
Euphorbia paralias	Sea Spurge	RA	5
Limonium companyonis	Sea-lavender	RA	7
Asparagus asparagoides (NC)	Bridal Creeper	D, RA	9
Lycium ferocissimum	African Boxthorn	D, RA	8
Marrubium vulgare	Horehound	D, RA	5
Diplotaxis tenuifolia	Lincoln Weed	D	3
Anagallis arvensis	Pimpernel		2
Avellinia michelii	Avellinia		0
Avena barbata	Bearded Oat		2
Brassica tournefortii	Wild Turnip		3
Bromus diandrus	Great Brome		2
Bromus rubens	Red Brome		2
Bupleurum semicompositum	Hare's Ear		0
Cakile maritima ssp. maritima	Two-horned Sea Rocket		1
Catapodium rigidum	Rigid Fescue		1
Galium murale	Small Bedstraw		0
Hordeum distichon			1
Medicago minima var. minima	Little Medic		1
Medicago sp.	Medic		1
Medicago truncatula	Barrel Medic		1
Minuartia mediterranea	Slender Sandwort		0
Moraea setifolia	Thread Iris		0
Parapholis incurva	Curly Ryegrass		1
Romulea rosea var. australis	Common Onion-grass		2
Rostraria cristata	Annual Cat's-tail		2
Silene nocturna	Mediterranean Catchfly		1
Sonchus oleraceus (NC)	Common Sow-thistle		0

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Prostanthera calycina	West Coast Mintbush	V	V

Species	Common Name	Aus status	SA status
Acacia anceps (NC)	Angled Wattle		
Acacia brachybotrya	Grey Mulga-bush		
Acacia cupularis	Cup Wattle		
Acacia longifolia ssp. sophorae	Coastal Wattle		
Acacia sp. Winged (C.R.Alcock 4936)	Angled Wattle		
Acacia spinescens	Spiny Wattle		
Acacia triquetra	Mallee Wreath Wattle		
Acrotriche patula	Prickly Ground-berry		
Angianthus preissianus	Salt Angianthus		
Angianthus tomentosus	Hairy Angianthus		
Apium annuum	Annual Celery		
Atriplex cinerea	Coast Saltbush		
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrodanthonia setacea	Small-flower Wallaby-grass		
Austrostipa drummondii	Cottony Spear-grass		
Austrostipa elegantissima	Feather Spear-grass		
Austrostipa flavescens	Coast Spear-grass		
Austrostipa scabra ssp. falcata	Slender Spear-grass		
Austrostipa sp.	Spear-grass		
Beyeria lechenaultii	Pale Turpentine Bush		
Brachyscome exilis	Slender Daisy		
Brachyscome lineariloba	Hard-head Daisy		
Bulbine semibarbata	Small Leek-lily		
Callitris gracilis	Southern Cypress Pine		
Carpobrotus rossii (NC)	Native Pigface		
Cassytha melantha	Coarse Dodder-laurel		
Cassytha peninsularis	Peninsula Dodder-laurel		
Cassytha peninsularis var. (NC)	Peninsula Dodder-laurel		
Chrysocephalum apiculatum	Common Everlasting		
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Comesperma volubile	Love Creeper		
Convolvulus angustissimus ssp. peninsularum	Grassland Bindweed		
Crassula colorata var.	Dense Crassula		
Daucus glochidiatus	Native Carrot		
Dianella brevicaulis	Short-stem Flax-lily		
Dianella brevicaulis/revoluta var.	Black-anther Flax-lily		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Dodonaea baueri	Crinkled Hop-bush		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eriochlamys behrii	Woolly Mantle		
Eriochlamys behrii (NC)	Woolly Mantle		
Eucalyptus diversifolia (NC)	Coastal White Mallee		
Eucalyptus dumosa	White Mallee		
Eucalyptus gracilis	Yorrell		
Eucalyptus oleosa ssp. ampliata	Red Mallee		
Eucalyptus porosa	Mallee Box		
Eucalyptus yalatensis	Yalata Mallee		
Eutaxia microphylla	Common Eutaxia		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos syrticola	Coast Cherry		
Ficinia nodosa	Knobby Club-rush		
Frankenia pauciflora var.	Southern Sea-heath		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		

Species	Common Name	Aus status	SA status
Gahnia lanigera	Black Grass Saw-sedge		
Geijera linearifolia	Sheep Bush		
Geranium sp.	Geranium		
Gnaphalium indutum ssp. indutum	Tiny Cudweed		
Goodenia blackiana	Native Primrose		
Goodenia pinnatifida	Cut-leaf Goodenia		
Goodenia varia	Sticky Goodenia		
Helichrysum leucopsideum	Satin Everlasting		
Hyalosperma semisterile	Orange Sunray		
Kennedia prostrata	Scarlet Runner		
Lasiopetalum discolor	Coast Velvet-bush		
Lawrencia squamata	Thorny Lawrencia		
Lepidosperma viscidum	Sticky Sword-sedge		
Leucophyta brownii	Coast Cushion Bush		
Leucopogon parviflorus	Coast Beard-heath		
Lichen sp.			
Linum marginale	Native Flax		
Logania crassifolia	Coast Logania		
Lomandra collina	Sand Mat-rush		
Lomandra effusa	Scented Mat-rush		
Lotus australis	Austral Trefoil		
Maireana oppositifolia	Salt Bluebush		
Melaleuca acuminata ssp. acuminata	Mallee Honey-myrtle		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Microseris lanceolata	Yam Daisy		
Microtis unifolia complex	Onion-orchid		
Minuria leptophylla	Minnie Daisy		
Moss sp.			
Myoporum brevipes	Warty Boobialla		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Olearia ramulosa	Twiggy Daisy-bush		
Oxalis perennans (NC)	Native Sorrel		
Ozothamnus decurrens	Ridged Bush-everlasting		
Parietaria debilis (NC)	Smooth-nettle		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pittosporum angustifolium	Native Apricot		
Podotheca angustifolia	Sticky Long-heads		
Pomaderris paniculosa ssp.			
Pomaderris paniculosa ssp. paniculosa	Mallee Pomaderris		
Poranthera triandra	Three-petal Poranthera		
Ptilotus spathulatus f.	Pussy-tails		
Pultenaea tenuifolia	Narrow-leaf Bush-pea		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia crassifolia	Fleshy Saltbush		
Salsola tragus	Buckbush		
Samolus repens	Creeping Brookweed		
Scaevola crassifolia	Cushion Fanflower		
Schenkia australis	Spike Centaury		
Sclerolaena diacantha	Grey Bindyi		
Sclerolaena uniflora	Small-spine Bindyi		
Senecio glossanthus (NC)	Annual Groundsel		
Senecio pinnatifolius (NC)	Variable Groundsel		

Species	Common Name	Aus status	SA status
Sonchus sp.	Sow-thistle		
Spinifex hirsutus (NC)	Rolling Spinifex		
Spyridium phylicoides	Narrow-leaf Spyridium		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Triodia compacta	Spinifex		
Triodia scariosa	Spinifex		
Triptilodiscus pygmaeus	Small Yellow-heads		
Vittadinia australasica var. australasica	Sticky New Holland Daisy		
Vittadinia dissecta var. hirta	Dissected New Holland Daisy		
Vittadinia megacephala	Giant New Holland Daisy		
Westringia dampieri	Shore Westringia		
Wilsonia backhousei	Narrow-leaf Wilsonia		
Zygophyllum billardierei	Coast Twinleaf		
Zygophyllum flavum	Coast Twinleaf		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	29 recorded – 19 birds, 0 butterflies, 1 mammals, 8 reptiles, 1 amphibians (an additional 18 reptiles and 27 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	8 opportune sites
# of threatened fauna in cell	3
# of non-indigenous fauna	2 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Sturnus vulgaris	Common Starling	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p
Mus musculus	House Mouse	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Falco peregrinus	Peregrine Falcon		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Anthus novaeseelandiae	Australasian Pipit		
Chroicocephalus novaehollandiae	Silver Gull		
Cracticus torquatus	Grey Butcherbird		
Eolophus roseicapillus	Galah		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Morus serrator	Australasian Gannet		

Species	Common Name	Aus status	SA status
Phalacrocorax varius	Pied Cormorant		
Phaps elegans	Brush Bronzewing		
Phylidonyris novaehollandiae	New Holland Honeyeater		
Sericornis frontalis	White-browed Scrubwren		
Thalasseus bergii	Crested Tern		
Tringa nebularia	Common Greenshank	M	
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

No native mammals recorded

Reptiles

Species	Common Name	Aus status	SA status	Record
Lerista arenicola	Beach Slider		R	x
Morethia obscura	Mallee Snake-eye			c
Pseudechis australis	Mulga Snake			c

Species	Common Name	Aus status	SA status	Record
Ctenophorus chapmani	Prickly Dragon			c
Ctenophorus fionni	Peninsula Dragon			c
Ctenophorus fordi	Mallee Dragon			c
Drysdalia mastersii	Master's Snake			c
Pogona barbata	Eastern Bearded Dragon			c
Tympanocryptis lineata	Five-lined Earless Dragon			c
Amphibolurus norrisi	Mallee Tree-dragon			e
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Egernia stokesii	Gidgee Skink			e
Gehyra variegata	Tree Dtella			e
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			e
Christinus marmoratus	Marbled Gecko			e
Ctenophorus pictus	Painted Dragon			x
Hemiergis peronii	Four-toed Earless Skink			x
Morethia adelaidensis	Adelaide Snake-eye			x
Parasuta spectabilis	Mallee Black-headed Snake			x
Cyclodomorphus melanops	Spinifex Slender Bluetongue			x
Diplodactylus calcicolus	South Coast Gecko			x
Nephrurus milii	Barking Gecko			x

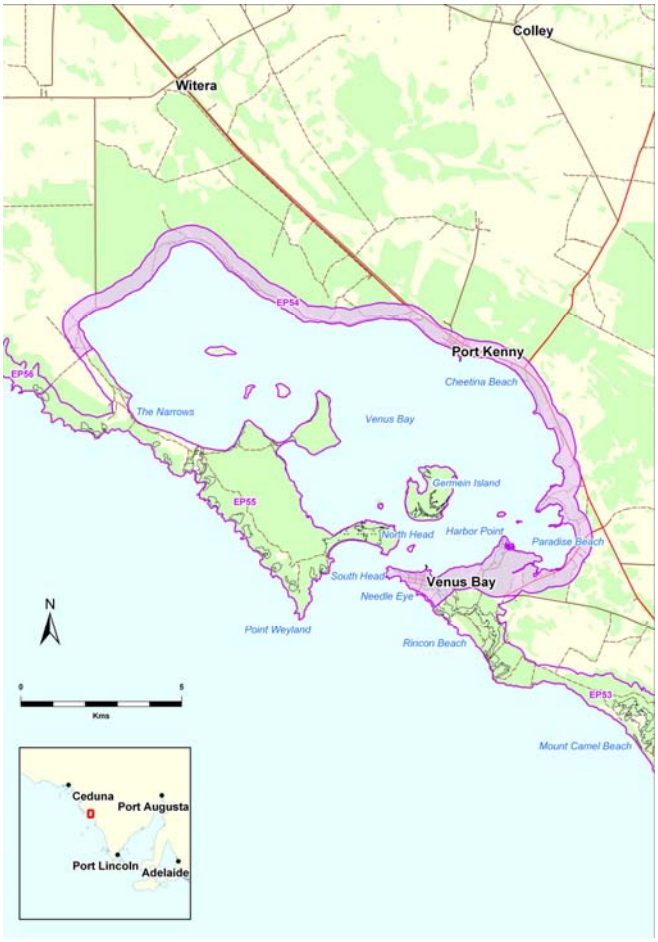
R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

Species	Common Name	Aus status	SA status	Record
Neobatrachus pictus	Burrowing frog			x

Cell EP54 Venus Bay

Cell area 1,778 ha. Shoreline length 45.84km.



Landforms

This cell includes the perimeter of Venus Bay and the South Head headland. This is entirely Pleistocene calcarenite, with some dune and salt marsh areas adjacent to the bay, and more extensive and largely stable dunes at South Head. The inner shores of the Bay appear to be slowly accreting as sand/ shellgrit ridges and sand flats, with sand ridges in places enclosing small salt marsh troughs. Blacks Point is connected to the Weyland Peninsula by a narrow shellgrit tombolo. Short et al (p.106) describe this as a prior bedrock embayment, with the entrance partly blocked by the Pleistocene barrier. Holocene deposits are accumulating in the bay, including a large flood tide delta; this delta is partly above tide level at Germein Island and colonised by mangroves and samphire. (Other islands in the bay are capped by calcrete and vegetated with coastal heath). There are active tidal channels and the delta is continuing to grow. The northern shore of the bay is accreting, with low Holocene shellgrit ridges, with small areas of salt marsh.

Biota

There is 1,090 ha remnant vegetation, 61% of the cell. There are 7 BDBSA flora survey sites within the cell, 10 herbarium record sites, 3 opportunistic flora sites and 34 opportunistic fauna sites.
The calcarenite slopes are populated by eucalypt mallee woodland (*Eucalyptus diversifolia ssp. diversifolia* mid mallee woodland over +/-*Melaleuca lanceolata, +/-Melaleuca uncinata*), while the shellgrit deposits along the shore show small areas of shrubland (*Olearia axillaris, Leucopogon parviflorus* tall open shrubland, also *Acacia sp. Winged (C.R.Alcock 4936), +/-Olearia axillaris, +/-Geijera linearifolia* mid open shrubland), and salt marsh (*Tecticornia halocnemoides ssp., Tecticornia sp., Disphyma crassifolium ssp. clavellatum, Frankenia foliosa, Maireana appressa* low shrubland).

Benthic Habitat

Thinly spread seagrass in the bay. The bay is seagrass, except the tidal delta area of bare sand.

Land Use/ Land Ownership

Venus Bay CP extends from the boundary with EP55 to Seaweed Park, near Port Kenny (36% of cell area). A coastal reserve (30 to 400m) follows the shoreline from the Conservation Park to Venus Bay, much of this is Crown land Act reserve under the care, control and management of

the District Council of Elliston, this is mostly backed by private freehold land. Larger areas of Crown land Act reserve under the care, control and management of the District Council of Elliston occur south of Harbor Point adjacent Paradise Bay and surround the Venus Bay township including South Head and Needle Eye. This cell includes the townships of Venus Bay and Port Kenny. The embayment is listed as an estuary within SA and through the 2007 Eyre Peninsula wetland inventory, most of the embayment was assessed as being in moderate condition, with smaller areas identified as intact or pristine (eg. Germein Island, Harbor Point, etc).

FIGURE 6.30 Venus Bay: South Head and Paradise Bay. Photo: Coast Protection Board, 2007

"Venus Bay Conservation Park makes a significant contribution to the conservation of biodiversity on Eyre Peninsula. It supports a unique and highly diverse array of plant communities and habitats from limestone cliff tops to tidal samphire and mangrove flats. It also includes areas of early-to-mid-successional stage communities regenerating after rolling and/or clearing and ploughing. Several plants of conservation significance occur here, including the nationally, state and regionally vulnerable West Coast Mint-bush, *Prostanthera calycina*. The broad range of coastal heath, mallee, samphire, mangrove, tidal flat, marine habitats and small islands contribute to an extremely diverse avifauna." (DEH 2006b, p.2).

West Coast Bays Marine Park within Venus Bay and offshore.

Uses (Field visits and local reports)

There are a number of residences along the coastal strip between the townships of Venus Bay and Port Kenny.
Professional fishing.
Numerous accesses to shore fishing spots or boat launch spots are visible from the air.
A number of tourist walking trails are located around Venus Bay township some of which are not well marked.

Informal camping (close to Venus Bay township)

Threats (Field visits and local reports)

Extensive PCASS
Formal dump site (not identified in GIS analysis)
Eco-tourism / tourism activities
Development
Uncontrolled access to coastal areas by vehicles and pedestrians (safety hazard)
Introduced animals (fox, cat, rabbits)
Boat launching from sand spit at Venus Bay – disturbing a high tide roost for numerous shorebird species
Beach boat launching in various locations around cell (professional fisherman)
Port Kenny causeway/ jetty has altered coastal processes resulting in amenity impact (eg. odour) and restricted sediment movement potentially impacting sediment supply to nearby beaches.

Opportunities (Field visits and local reports)

Venus Bay Ecological Restoration Program. Note: the park is a focus for fauna re-introduction, as the islands and the fenced peninsula assist predator control. Brush-tailed Bettongs and Greater Bilbies have been successfully re-introduced (Venus Bay Conservation Park Management Plan, 2006).
Ongoing pest animal and weed control program occurring within Venus Bay CP
Rationalise access to the coast at South Head (Venus Bay township) for pedestrians.
Rationalise vehicle access to some coastal areas, including behind Venus Bay township to Rincon Beach.

Conservation Analysis (GIS)

The total for conservation means is 104.04, a medium score within the region. The pattern of detailed total values is clear: all vegetated areas are in the medium to high range; unvegetated areas are low to medium low. There are no high total areas within the cell.
Conservation values well above average for sites with threatened flora, for numbers of species (especially high in the mallee woodlands of the northern part of the cell), habitat for threatened bird species (salt marsh), habitat of all bird species (widespread throughout the cell), priority of sites for all reptiles and amphibians (mallee woodland), habitat for threatened species of mammal, habitat for White-bellied Sea-Eagle (focal species), viewshed and viewscape, vegetation block metrics and indigenous heritage. All salt marsh areas (notably Germein Island and the salt marsh between Venus Bay township and Paradise Beach) are recorded as habitat for the Australian Pied Oystercatcher (focal species).
Ten mammal, 13 reptile, 1 amphibian and 92 bird species are recorded within this cell, including the state endangered White-bellied Sea-Eagle, Eastern Osprey and Fairy Tern. Within the bay the islands are seen as important breeding grounds for many native birds, for example oyster catchers, terns, rock parrots, silver and pacific gulls, cormorants and pelicans.

Threat Analysis (GIS)

The overall detailed threat total is medium: 47.71. The highest totals accumulate in the coastal boundary between Port Kenny and Venus Bay township; also in a smaller area within the park – the cleared land near Koolkanna Waterhole. Principal contributors to the threat total include viewshed and viewscape, ORV activity (near settlements and in cleared land in the park), mining leases (mineral exploration licenses from Paradise Beach to Koolkanna Waterhole), numbers of exotic species and the distribution of invasive weeds (Bridal Creeper in the park and near Port Kenny; African Boxthorn at Cheetina Beach). Areas in private ownership and zoning add some threat values.

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	**Impacts and implications (for this cell)**	**Protect and manage habitat threats**	**Address landscape issues: fire, connectivity, refuges, hydrology**
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Small sandy beaches and salt marsh within Venus Bay show some recession due to sea level rise; but, accretion will occur in some locations due to tidal movement of sediments into the bay.	Establish profile line within this cell to monitor change in salt marsh and beach ridge habitats.	
2070: +c.80cm.	Continued slow drowning of shoreline habitats, mitigated by marine sediment ingress. Pocket beaches near Needle's Eye and South Head lost.		
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides		
Intensity of large storms increases	2070: Rare large storms re-distribute sediments within bay	.	
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing vegetation is found in warmer conditions elsewhere)		Maintain N-S connectivity of vegetation within the peninsula
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage	Active weed control	Ensure dune vegetation is within the regional fire plan.
'Flashy' run off: Drier creeks, but larger rare floods	N/A		

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Groundwater lowering; saline incursion:	Local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate		

TABLE 6.28 Recommended Actions and Priority for EP54 Venus Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	Medium (cons)	DENR, EP NRM
	Combined climate changes and sea level rise throughout this cell. This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution. Seek to improve the resilience of plant and animal habitats by taking opportunities to improve connectivity between vegetation blocks.	Medium (cons)	EP NRM, DENR, DC of Elliston, private land owners, community
	Unrestricted access, multiple vehicle tracks and informal car parks around the coast, with impact on coastal dune, salt marsh and cliff top vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing access with a view to rationalise unnecessary tracks and car parks. Block access (eg. fencing/rocks) to tracks and car parks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks or car parks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	Medium (cons/ threat)	DC of Elliston, private land owners, DENR, EP NRM

Component	Issue	Proposed Action	Priority of Action	Key Players
	Important area for a number of threatened and sensitive flora and fauna species including shorebirds and raptors, with potential disturbance from recreational activities and land management practices	Review management of sensitive locations and species with a view to minimise damage and disturbance and increase protection eg. restrict vehicles on beaches, dogs on leashes, track management, pest animal and plant control, restrict access to sensitive locations. Review development plan zoning to these areas to increase protection. Install interpretive/ educational signage. Community education programs.	High (cons/threat)	DENR, EP NRM, DC of Elliston, DPLG, private land owners, community groups
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	Med (cons/ threat)	Traditional owners, DPC, DC of Elliston, DENR, private land owners, community groups, EP NRM
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	Medium	EP NRM, DC of Elliston, private land owners, DENR, community
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg. rabbits foxes, cats. Undertake a control program if required.	Medium	EP NRM, private land owners, DC of Elliston, DENR
	Mining exploration licence applications cover much of the cell area, with potential impact on sensitive areas and conservation values	Ensure any mining activities avoid areas of high conservation significance. Investigate/ consider refusal of licence in high conservation areas.	Medium	PIRSA, DENR, EP NRM, DC of Elliston

Component	Issue	Proposed Action	Priority of Action	Key Players
	Informal camping occurs within this cell, with potential impact from soil compaction, vegetation damage, increased fire risk, dune instability, weed introduction	Monitor impacts of camping. Review locations, management and need for camping in this location, with consideration to close and sign areas inappropriate for camping and/or formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping is to be allowed	Medium	DC of Elliston, DENR, EP NRM, community
	Maintenance of coastal access management infrastructure	Use the EP Coastal infrastructure audit to setup a maintenance program	Medium	DC Elliston, EP NRM, DENR, community groups
Venus Bay clifftop	Previous unrestricted vehicle access and current unrestricted pedestrian access on cliff top area with impact soil erosion, stability and compaction, safety hazard, vegetation damage, weed introduction, fauna disturbance and water runoff erosion	Review with a view to rationalise unnecessary and unsafe tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade and maintain any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	High (hazard; cons/ threat)	DC of Elliston, DENR, EP NRM
Venus Bay and Port Kenny townships	Potential impact from stormwater flowing into coastal waters with threats to reefs and seagrasses	Ensure &/or implement water sensitive urban design practices	Medium	DC of Elliston
	Non-indigenous coastal heritage site identified – Port Kenny and Venus Bay jetties - but not included on any statutory heritage register, with potential impact from recreational activities	Consider including onto heritage register eg. local heritage lists. Ensure sites managed to protect from damage. Install interpretive educational signage.	Low (threat)	DC of Elliston, DENR, SA Heritage Council, community
All salt marsh and low lying areas	All salt marsh and low lying areas show the potential for acid sulfate soil following disturbance; in turn this would potentially threaten all life forms within the bay.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Medium (threat)	DC of Elliston, DENR, private land owners

Component	Issue	Proposed Action	Priority of Action	Key Players
	These areas critically affected by sea level rise leading to recession, with some local accretion due to marine ingress of sediments.	Monitor movement of these areas by aerial image time series. Establish a surveyed profile to monitor habitat changes.	High (cons/ threat)	DENR, EP NRM
Beaches	Vehicles and dogs on beaches a threat to meiofauna and shorebirds, particularly for boat launching from the sand spit at Venus Bay which is an important high tide roost for numerous shorebird species. Shorebird habitat loss through sea level rise eroding pocket beaches fronting cliffs	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Review beach boat launching locations with a view to rationalise. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	High (con/ threat)	DC of Elliston, DTEI, DENR, EP NRM, EP LGA, private land owners, Tourism SA, Birds Australia, community
Venus Bay CP	The CP has high conservation values	Ongoing implementation of the Management Plan to protect threatened species and minimise impacts and threats to flora and fauna.	High (cons)	DENR
Venus Bay to Port Kenny (inclusive)	Existing development impacting on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Work with private land owners to minimise impact from existing development, including education, restoration where appropriate. Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs and cats, ORV etc	Medium (cons/ threat)	EP NRM, DC of Elliston, DENR, community groups, private land owners

Component	Issue	Proposed Action	Priority of Action	Key Players
	Areas within cell identified as being important for rare and endemic plant communities and as habitat for threatened species, no protection and impact from agricultural activities, development zoning, uncontrolled access, weeds and pest animals	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. access management, pest animal and plant control, restrict access to sensitive locations. Review development plan zoning to these areas to increase protection	High (cons/ threat)	DENR, private land owners, EP NRM, DPLG, DC of Elliston

BIOTA

Flora

Remnant vegetation area (ha)	1089.79 ha, 61.28% of cell area
# flora surveys / records	7 surveys, 3 opportune sites, 10 herbarium record sites
# flora in cell	216 (note: includes some marine species)
# conservation rated flora in cell	7
# non-indigenous flora in cell	45
Significant CDCS floristic community	Nil
Protected area	44.3% of remnant vegetation protected, mostly within Venus Bay CP, but a small area within a Heritage Agreement behind Port Kenny township

Weeds

Species	Common Name	Status	Study rating
Argyranthemum frutescens ssp.	Marguerite Daisy	RA	4
Argyranthemum frutescens ssp. foeniculaceum	Teneriffe Daisy	RA	4
Avena fatua	Wild Oat	RA	5
Carrichtera annua	Ward's Weed	RA	4
Gazania rigens	Gazania	RA	6
Limonium companyonis	Sea-lavender	RA	7
Pennisetum clandestinum	Kikuyu	RA	4
Asparagus asparagoides (NC)	Bridal Creeper	D, RA	9
Chrysanthemoides monilifera ssp. monilifera	Boneseed	D, RA	6
Lycium ferocissimum	African Boxthorn	D, RA	8
Marrubium vulgare	Horehound	D, RA	5
Pinus halepensis	Aleppo Pine	D, RA	5
Diplotaxis tenuifolia	Lincoln Weed	D	3
Anagallis arvensis	Pimpernel		2
Avellinia michelii	Avellinia		0
Avena barbata	Bearded Oat		2
Bromus diandrus	Great Brome		2
Bromus rubens	Red Brome		2
Bupleurum semicompositum	Hare's Ear		0

Species	Common Name	Status	Study rating
Catapodium rigidum	Rigid Fescue		1
Cerastium balearicum	Chickweed		1
Erodium cicutarium	Cut-leaf Heron's-bill		0
Galium murale	Small Bedstraw		0
Hordeum glaucum	Blue Barley-grass		1
Hornungia procumbens	Oval Purse		0
Hypochaeris glabra	Smooth Cat's Ear		2
Lolium perenne	Perennial Ryegrass		1
Lolium perenne	Perennial Ryegrass		1
Medicago minima var. minima	Little Medic		1
Melilotus indicus	King Island Melilot		1
Minuartia mediterranea	Slender Sandwort		0
Moraea setifolia	Thread Iris		0
Parapholis incurva	Curly Ryegrass		1
Polygonum aviculare	Wireweed		0
Reichardia tingitana	False Sowthistle		3
Rostraria cristata	Annual Cat's-tail		2
Schismus barbatus	Arabian Grass		0
Silene apetala	Sand Catchfly		0
Sisymbrium irio	London Mustard		0
Sonchus oleraceus	Common Sow-thistle		0
Spergularia diandra (NC)	Lesser Sand-spurrey		0
Spergularia media (NC)	Coast Sand-spurrey		0
Stellaria media	Chickweed		0
Urospermum picroides	False Hawkbit		0
Vulpia myuros f. myuros	Rat's-tail Fescue		2

D: Declared weed, RA: Red alert weed

Native flora*

Species	Common Name	Aus status	SA status
Austrostipa pilata	Prickly Spear-grass		V
Prostanthera calycina	West Coast Mintbush	V	V
Tecticornia flabelliformis	Bead Samphire	V	V
Caladenia bicalliata ssp. bicalliata	Western Daddy-long-legs		R
Calandrinia sphaerophylla	Bead Purslane		R
Centrolepis cephaloformis ssp. cephaloformis	Cushion Centrolepis		R
Haegiela tatei	Small Nut-heads		R
Acacia anceps			
Acacia cupularis	Cup Wattle		
Acacia rigens	Nealie		
Acacia sp. Winged (C.R.Alcock 4936)	Angled Wattle		
Acacia spinescens	Spiny Wattle		
Acacia triquetra	Mallee Wreath Wattle		
Acrotriche patula	Prickly Ground-berry		
Adriana quadripartita	Coast Bitter-bush		
Allocasuarina verticillata	Drooping Sheoak		
Alyogyne huegelii	Native Hibiscus		
Apium annuum	Annual Celery		
Arthropodium minus	Small Vanilla-lily		
Atriplex cinerea	Coast Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		

Species	Common Name	Aus status	SA status
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrostipa elegantissima	Feather Spear-grass		
Austrostipa eremophila	Rusty Spear-grass		
Austrostipa exilis	Heath Spear-grass		
Austrostipa flavescens	Coast Spear-grass		
Austrostipa sp.	Spear-grass		
Beyeria lechenaultii	Pale Turpentine Bush		
Blennospora drummondii	Dwarf Button-flower		
Brachyscome ciliaris var. lanuginosa	Woolly Variable Daisy		
Brachyscome exilis	Slender Daisy		
Brachyscome lineariloba	Hard-head Daisy		
Bulbine semibarbata	Small Leek-lily		
Caladenia latifolia	Pink Caladenia		
Caladenia stricta	Upright Caladenia		
Calandrinia eremaea	Dryland Purslane		
Calandrinia granulifera	Pigmy Purslane		
Callitris canescens	Scrubby Cypress Pine		
Carpobrotus rossii (NC)	Native Pigface		
Cassytha melantha	Coarse Dodder-laurel		
Cassytha peninsularis	Peninsula Dodder-laurel		
Chrysocephalum apiculatum	Common Everlasting		
Cladophora coelothrix			
Cladophora crinalis			
Cladophora laetevirens			
Cladophoropsis herpestica			
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Comesperma volubile	Love Creeper		
Convolvulus remotus	Grassy Bindweed		
Crassula colligata ssp. lamprosperma			
Crassula colorata var. acuminata	Dense Crassula		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Crassula sp.	Crassula/Stonecrop		
Cryptandra amara var. floribunda (NC)	Pretty Cryptandra		
Cyrtostylis robusta	Robust Gnat-orchid		
Daucus glochidiatus	Native Carrot		
Dianella brevicaulis	Short-stem Flax-lily		
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Dodonaea bursariifolia	Small Hop-bush		
Dodonaea hexandra	Horned Hop-bush		
Dodonaea tepperi	Streaked Hop-bush		
Dodonaea viscosa ssp. spatulata	Sticky Hop-bush		
Einadia nutans ssp. nutans	Climbing Saltbush		
Eremophila crassifolia	Thick-leaf Emubush		
Eucalyptus calcareana	Nundroo Mallee		
Eucalyptus diversifolia (NC)	Coastal White Mallee		
Eucalyptus diversifolia ssp. diversifolia	Coastal White Mallee		
Eucalyptus leptophylla	Narrow-leaf Red Mallee		
Eucalyptus yalatensis	Yalata Mallee		
Euphrasia collina ssp. tetragona	Coast Eyebright		
Eutaxia microphylla	Common Eutaxia		
Eutaxia microphylla var. microphylla (prostrate) (NC)	Common Eutaxia		
Exocarpos aphyllus	Leafless Cherry		

Species	Common Name	Aus status	SA status
Ficinia nodosa	Knobby Club-rush		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Frankenia sessilis	Small-leaf Sea-heath		
Gahnia lanigera	Black Grass Saw-sedge		
Geijera linearifolia	Sheep Bush		
Geranium solanderi var. solanderi	Austral Geranium		
Gnaphalium indutum ssp. indutum	Tiny Cudweed		
Goodenia pusilliflora	Small-flower Goodenia		
Goodenia robusta	Woolly Goodenia		
Goodenia varia	Sticky Goodenia		
Haloragis acutangula f. acutangula	Smooth Raspwort		
Halosarcia sp. (NC)	Samphire		
Helichrysum leucopsideum	Satin Everlasting		
Hydrocotyle medicaginoides	Medic Pennywort		
Hypoxis glabella var. glabella	Tiny Star		
Isoetopsis graminifolia	Grass Cushion		
Lagenophora huegelii	Coarse Bottle-daisy		
Lasiopetalum baueri	Slender Velvet-bush		
Lasiopetalum discolor	Coast Velvet-bush		
Lawrencia squamata	Thorny Lawrencia		
Lepidosperma congestum (NC)	Clustered Sword-sedge		
Lepilaena preissii	Slender Water-mat		
Leptorhynchos waitzia	Button Immortelle		
Leucophyta brownii	Coast Cushion Bush		
Lichen sp.			
Linum marginale	Native Flax		
Logania ovata	Oval-leaf Logania		
Lomandra collina	Sand Mat-rush		
Lomandra effusa	Scented Mat-rush		
Maireana integra	Entire-wing Bluebush		
Maireana oppositifolia	Salt Bluebush		
Melaleuca acuminata ssp. acuminata	Mallee Honey-myrtle		
Melaleuca decussata	Totem-poles		
Melaleuca halmaturorum	Swamp Paper-bark		
Melaleuca lanceolata	Dryland Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Microtis arenaria	Notched Onion-orchid		
Millotia major			
Millotia tenuifolia var. tenuifolia	Soft Millotia		
Minuria leptophylla	Minnie Daisy		
Moss sp.			
Muehlenbeckia adpressa	Climbing Lignum		
Myoporum brevipes	Warty Boobialla		
Myoporum insulare	Common Boobialla		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Olearia brachyphylla	Short-leaf Daisy-bush		
Oxalis perennans (NC)	Native Sorrel		
Parietaria debilis (NC)	Smooth-nettle		
Pelargonium littorale	Native Pelargonium		
Pimelea glauca	Smooth Riceflower		
Pimelea micrantha	Silky Riceflower		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		

Species	Common Name	Aus status	SA status
Pittosporum angustifolium	Native Apricot		
Podolepis tepperi	Delicate Copper-wire Daisy		
Podotheca angustifolia	Sticky Long-heads		
Pogonolepis muelleriana	Stiff Cup-flower		
Pomaderris obcordata	Wedge-leaf Pomaderris		
Pomaderris paniculosa ssp. paniculosa	Mallee Pomaderris		
Prostanthera serpyllifolia ssp. serpyllifolia	Thyme Mintbush		
Ptilotus seminudus	Rabbit-tails		
Pultenaea densifolia	Dense Bush-pea		
Pultenaea elachista	Limestone Bush-pea		
Pultenaea tenuifolia	Narrow-leaf Bush-pea		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia crassifolia	Fleshy Saltbush		
Rhizoclonium implexum			
Rumex sp.	Dock		
Samolus repens	Creeping Brookweed		
Sarcocornia blackiana	Thick-head Samphire		
Sarcocornia quinqueflora	Beaded Samphire		
Scaberia agardhii			
Scaevola crassifolia	Cushion Fanflower		
Sclerolaena diacantha	Grey Bindyi		
Senecio glossanthus (NC)	Annual Groundsel		
Senecio pinnatifolius (NC)	Variable Groundsel		
Senecio pinnatifolius var. maritimus	Variable Groundsel		
Senna artemisioides ssp. petiolaris (NC)	Flat-stalk Senna		
Spyridia filamentosa			
Spyridium phylicoides	Narrow-leaf Spyridium		
Stenopetalum lineare (NC)	Narrow Thread-petal		
Tecticornia halocnemoides ssp. halocnemoides	Grey Samphire		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Thysanotus patersonii	Twining Fringe-lily		
Trachymene pilosa	Dwarf Trachymene		
Triodia compacta	Spinifex		
Vittadinia gracilis	Woolly New Holland Daisy		
Vittadinia megacephala	Giant New Holland Daisy		
Wahlenbergia stricta ssp. stricta	Tall Bluebell		
Westringia dampieri	Shore Westringia		
Westringia eremicola	Slender Westringia		
Wilsonia humilis	Silky Wilsonia		
Zygophyllum ammophilum (NC)	Sand Twinleaf		
Zygophyllum billardierei	Coast Twinleaf		
Zygophyllum flavum	Coast Twinleaf		

R: Rare, V: Vulnerable, E: Endangered
*note: includes some marine species

Fauna

# of fauna in cell	116 recorded – 92 birds, 0 butterflies, 10 mammals, 13 reptiles, 1 amphibians (an additional 16 reptiles and 27 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	34 opportune sites
# of threatened fauna in cell	15
# of non-indigenous fauna	8 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Alauda arvensis	Eurasian Skylark	Aves	x
Columba livia	Rock Dove	Aves	x
Passer domesticus	House Sparrow	Aves	x
Sturnus vulgaris	Common Starling	Aves	x
Turdus merula	Common Blackbird	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p
Felis catus	Cat (Feral Cat)	Mammalia	x
Oryctolagus cuniculus	Rabbit (European Rabbit)	Mammalia	x
Vulpes vulpes	Fox (Red Fox)	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Pandion cristatus	Eastern Osprey	M	E
Sternula nereis	Fairy Tern		E
Cladorhynchus leucocephalus	Banded Stilt		V
Numenius madagascariensis	Eastern Curlew	M	V
Thinornis rubricollis	Hooded Plover		V
Actitis hypoleucos	Common Sandpiper	M	R
Biziura lobata	Musk Duck		R
Calidris alba	Sanderling	M	R
Egretta garzetta	Little Egret		R
Egretta sacra	Eastern Reef Egret		R
Falco peregrinus	Peregrine Falcon		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Neophema petrophila	Rock Parrot		R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Acanthiza apicalis	Inland Thornbill		
Acanthiza chrysorrhoa	Yellow-rumped Thornbill		
Anas castanea	Chestnut Teal		
Anas gracilis	Grey Teal		
Anthochaera carunculata	Red Wattlebird		
Anthus novaeseelandiae	Australasian Pipit		
Aquila audax	Wedge-tailed Eagle		
Ardea modesta	Eastern Great Egret		
Barnardius zonarius	Australian Ringneck, (Ring-necked Parrot)		
Cacomantis pallidus	Pallid Cuckoo		

Species	Common Name	Aus status	SA status
Calidris acuminata	Sharp-tailed Sandpiper	M	
Calidris canutus	Red Knot	M	
Calidris ferruginea	Curlew Sandpiper	M	
Calidris ruficollis	Red-necked Stint	M	
Chalcites basalis	Horsfield's Bronze-cuckoo		
Chroicocephalus novaehollandiae	Silver Gull		
Cincloramphus cruralis	Brown Songlark		
Cincloramphus mathewsi	Rufous Songlark		
Circus assimilis	Spotted Harrier		
Colluricincla harmonica	Grey Shrike-thrush		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Corvus coronoides	Australian Raven		
Corvus mellori	Little Raven		
Coturnix pectoralis	Stubble Quail		
Cracticus tibicen	Australian Magpie		
Cracticus torquatus	Grey Butcherbird		
Cygnus atratus	Black Swan		
Egretta novaehollandiae	White-faced Heron		
Eolophus roseicapillus	Galah		
Epthianura albifrons	White-fronted Chat		
Eurostopodus argus	Spotted Nightjar		
Falco cenchroides	Nankeen Kestrel		
Falco longipennis	Australian Hobby		
Gallirallus philippensis	Buff-banded Rail		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Malurus lamberti	Variegated Fairy-wren		
Malurus pulcherrimus	Blue-breasted Fairy-wren		
Manorina flavigula	Yellow-throated Miner		
Microcarbo melanoleucos	Little Pied Cormorant		
Mirafra javanica	Horsfield's Bushlark		
Morus serrator	Australasian Gannet		
Nymphicus hollandicus	Cockatiel		
Ocyphaps lophotes	Crested Pigeon		
Pardalotus punctatus	Spotted Pardalote		
Pardalotus striatus	Striated Pardalote		
Pelecanus conspicillatus	Australian Pelican		
Petrochelidon ariel	Fairy Martin		
Phalacrocorax carbo	Great Cormorant		
Phalacrocorax fuscescens	Black-faced Cormorant		
Phalacrocorax sulcirostris	Little Black Cormorant		
Phalacrocorax varius	Pied Cormorant		
Phaps chalcoptera	Common Bronzewing		
Phaps elegans	Brush Bronzewing		
Pluvialis squatarola	Grey Plover	M	
Podargus strigoides	Tawny Frogmouth		
Poliocephalus poliocephalus	Hoary-headed Grebe		
Pomatostomus superciliosus	White-browed Babbler		
Psephotus varius	Mulga Parrot		
Rhipidura leucophrys	Willie Wagtail		
Sericornis frontalis	White-browed Scrubwren		

Species	Common Name	Aus status	SA status
Smicrornis brevirostris	Weebill		
Tachybaptus novaehollandiae	Australasian Grebe, (Little Grebe)		
Thalasseus bergii	Crested Tern		
Tribonyx ventralis	Black-tailed Native-hen		
Tringa nebularia	Common Greenshank	M	
Turnix velox	Little Button-quail		
Vanellus miles	Masked Lapwing		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Cercartetus concinnus	Western Pygmy-possum		
Macropus fuliginosus	Western Grey Kangaroo		
Macropus robustus	Euro		
Notomys mitchellii	Mitchell's Hopping-mouse		
Nyctophilus timoriensis	Greater Long-eared Bat	ssp	ssp

Species	Common Name	Aus status	SA status
Sminthopsis crassicaudata	Fat-tailed Dunnart		
Sminthopsis dolichura	Little Long-tailed Dunnart		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Amphibolurus norrisi	Mallee Tree-dragon			e
Christinus marmoratus	Marbled Gecko			x
Ctenophorus chapmani	Prickly Dragon			x
Ctenophorus fionni	Peninsula Dragon			x
Ctenophorus fordi	Mallee Dragon			c
Ctenophorus pictus	Painted Dragon			c
Ctenotus euclae	Bight Coast Ctenotus			x
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Diplodactylus calcicolus	South Coast Gecko			x
Drysdalia mastersii	Master's Snake			c
Egernia stokesii	Gidgee Skink			e
Gehyra variegata	Tree Dtella			e
Hemiergis peronii	Four-toed Earless Skink			c
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			e
Morethia obscura	Mallee Snake-eye			c
Nephrurus milii	Barking Gecko			x
Parasuta spectabilis	Mallee Black-headed Snake			x
Pogona barbata	Eastern Bearded Dragon			x
Pseudechis australis	Mulga Snake			x
Pseudonaja affinis	Dugite			c
Pygopus lepidopodus	Common Scaly-foot			x
Strophurus assimilis	Thorn-tailed Gecko			x
Tympanocryptis lineata	Five-lined Earless Dragon			x
Varanus gouldii	Sand Goanna			x

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

Species	Common Name	Aus status	SA status
Neobatrachus centralis	Trilling Frog		

Cell EP55 Venus Peninsula

Cell area 2,141 ha. Shoreline length 71.28km.

Landforms

This cell includes the peninsula from NW of the Narrows to Point Weyland and North Head headlands, and several small islands within the bay including Germein Island (see map). The peninsula is entirely made up of Pleistocene calcarenite, with some clifftop dunes and dune and salt marsh areas adjacent to the bay, and more extensive and largely stable dunes at North Head. Illustrated below is a destabilised clifftop dune that has transgressed from the ocean side of the peninsula to Venus Bay. The calcarenite surface slopes generally from the open ocean, where cliffs are approximately 100m high, to the bay.

Benthic Habitat

The shallow bay contains extensive seagrass, macro algae and intertidal sandflats. The ocean shore is in heavy calcarenite reef. The tidal channel exits close to South Head and Venus Bay township.

Biota

1,926 ha. – 90% of the cell is remnant vegetation. There are 29 BDBSA flora survey sites and 13 fauna survey sites on the peninsula and islands that make up this cell. In addition there are 11 herbarium flora record sites, 1 reserve database flora record site and 70 opportunistic fauna sites. Vegetation groups vary from coastal shrubland and mallee woodland to samphire and mangrove. Along the calcrete surfaces and remnant dune patches of the high cliffs are *Olearia axillaris, Leucopogon parviflorus* tall open shrublands over *Threlkeldia diffusa, Tetragonia implexicoma, Rhagodia candolleana ssp. candolleana, Pimelea serpyllifolia ssp. serpyllifolia* low shrubs over *Muehlenbeckia adpressa, Dianella brevicaulis, Carpobrotus rossii, Clematis microphylla var. microphylla, Senecio pinnatifolius.* Approximately 500+m from the cliffs shrubland merges to mallee woodland *Eucalyptus oleosa ssp.* mid mallee woodland over *Melaleuca pauperiflora ssp. mutica, +/-Melaleuca lanceolata, +/-Geijera linearifolia* tall shrubs over *Enchylaena tomentosa var. tomentosa, +/-Atriplex vesicaria ssp.* low shrubs over *Sclerolaena diacantha.* The unstable dunes illustrated above retains *Geijera linearifolia, +/-Acacia sp., +/-Senna artemisioides ssp.* mid open shrubland over *Nitraria billardierei over Maireana sp., Austrostipa sp.* shrubs. The sheltered shores of the bay and the islands are mapped as *Tecticornia halocnemoides ssp., Sarcocornia quinqueflora, Suaeda australis, Frankenia pauciflora var. fruticulosa* low open shrubland over *Samolus repens, Scaevola spinescens, Disphyma crassifolium ssp. clavellatum.*

FIGURE 6.31 Venus Peninsula, looking NW towards the Narrows, Venus Bay on the right. Photo: Coast Protection Board, 2007

Land Use/ Land Ownership

The whole of this cell falls within Venus Bay Conservation Park, including the islands within the bay. The embayment is listed as an estuary within SA and through the 2007 Eyre Peninsula wetland inventory, most of the embayment was assessed as being in moderate condition, with smaller areas identified as intact or pristine (eg. Germein Island, Harbor Point, etc).

West Coast Bays Marine Park within Venus Bay and offshore.

Uses (Field visits and local reports)

Conservation, including species recovery.
Recreation and tourism – fishing, sight seeing, walking, nature observation

Values (Field visits and local reports)

The islands within the bay are significant breeding sites for 22 bird species.
Extensive sandflats provide rich source of prey species required for breeding shorebirds and their offspring and non-breeding migratory species

Threats (Field visits and local reports)

Some cats are still found on the peninsula inside the vermin fence.
Visitor impact (if not managed)
Decline in reintroduced species (if not managed)
Over grazing by native species (if not managed)

Opportunities (Field visits and local reports)

Ongoing pest plant and animal control programs occurring within Venus Bay CP

Maintenance of vehicle restriction to Entrance Beach
Venus Bay Sea/Shorebird Count 2004/2005 /2010 D. Armstrong/J. Cooper and Friends of Streaky Bay Parks
AWSG and Shorebirds 2020 surveys 2003, 2009, 2010 Jane Cooper
Pacific Gull Banding Project: Venus Bay 2010. Bruce Robertson.
Venus Bay Ecological Restoration Program. Note: the park is a focus for fauna re-introduction, as the islands and the fenced peninsula assist predator control. Brush-tailed Bettongs and Greater Bilbies have been successfully re-introduced (Venus Bay Conservation Park Management Plan, 2006).

Conservation Analysis (GIS)

The sum of conservation means is 142.41, a very high total – 7th within the region. The mapped pattern of summarised detailed values is relatively simple: all vegetated areas have medium high to high values; the small de-vegetated areas (near the Narrows) have medium low to low totals. The major variables contributing to the conservation total include threatened status: threatened vegetation assemblages, threatened plant species (whole cell) and numbers of all threatened species (very high in salt marsh areas), also total number of all species (high in the southern clifftop shrublands); habitat for threatened and all bird species (notably on the islands and salt marsh areas), habitat for all reptile species (widespread on the vegetated areas of the peninsula), habitat for threatened mammal species and all mammal species (medium to high throughout), habitat for butterfly species (Acacia shrublands); focal species habitat – Australian Pied Oystercatcher (islands and sand and mudflats, salt marsh), Eastern Osprey and White-bellied Sea-Eagle – is extensive here; viewscape and viewshed, and vegetation metrics are all high.
There are registered indigenous sites in this cell.
There are 20 mammal, 27 reptile, 1 amphibian and 86 bird species recorded in this cell including the state endangered Fairy Tern, Eastern Osprey and White-bellied Sea-Eagle, and the state vulnerable Greater Stick-nest Rat, Greater Bilby, Banded Stilt and Hooded Plover. The islands within the bay are significant feeding and breeding sites for a number of bird species.

Threat Analysis (GIS)

Threat totals are low at 29.72, reflecting the statutory protection of the area, as well as its relative remoteness. The detailed map shows no part of the cell with a threat total above medium, and with most parts medium low. ORV tracks underline the isolation of the islands and the Point Weyland area, but indicate activity around the Narrows area. Visibility analysis and visual aesthetics are the only substantial threat values, (though this raises the issue of the sense in which these might be development threats inside a park). Dune and cliff stability, moderate potential for acid sulfate soils and the presence of rabbits (near the Gap) are all localised threats mapped for this cell.

Adaptation to Climate Change Threats

(see also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Rise in frequency of tidal flooding of salt marsh, threatening intertidal salt marsh species, and leading to marsh recession. Loss of sand flat feeding grounds for shorebirds, unless replaced by marine ingress of sediments.	Monitor salt marsh flooding and salt marsh habitat through the establishment of a profile line survey. Ensure salt marsh retreat where possible	
2070: +c.80cm.	Tidal flooding of salt marsh will increase; however change at the low tide line will be complicated by marine ingress of sediment into the bay, and tidal movement of sediment within the bay. Cliff erosion accelerated.	Active management of salt marsh habitats to assist those threatened by sea level 'squeeze', but not saved by sediment accumulation.	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides		
Intensity of large storms increases	2070: Frequent flooding., and to an increasing extent.		
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing vegetation is found in warmer conditions elsewhere)		Maintain N-S connectivity of vegetation within the cell
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune and salt marsh habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Invasion by grassy weeds.	Active weed control	Ensure dune vegetation is within the regional fire plan.
'Flashy' run off: Drier creeks, but larger rare floods	N/A		

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Groundwater lowering; saline incursion:	Local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate	Monitor beaches, see above.	

TABLE 6.29 Recommended Actions and Priority for EP55 Venus Peninsula

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Potential impact on breeding habitats of the endangered Eastern Osprey and White-bellied Sea-Eagle, particularly during the breeding season.	Develop site management and monitoring strategy, including consideration to closure, relocation or seasonal closures of roads/walking tracks/car parks in the near vicinity. Ensure park management works/programs are not undertaken near breeding sites during the breeding season. Community education programs	High (cons)	DENR
	Significant shorebird breeding, feeding and resting habitat, including Australian Pied Oystercatcher, Sooty Oystercatcher and 9 species of migratory shorebirds, with potential disturbance from people, vehicles, and pest animals	Develop and implement site management and monitoring strategies to protect these valuable areas eg. interpretive signage, fencing off nests, use of chick shelters, temporary signage in breeding territories, restricting vehicles. Monitor and manage commercial mud-cockle licences and likely outcomes for shorebirds. Investigate biomass required to support native shorebirds. Undertake and/or support ongoing shorebird monitoring programs. Community education and awareness programs, eg. "chicks on beach".	High (cons/ threat)	DENR, Birds Australia, EP NRM, PIRSA, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, community groups, EP NRM
	Introduced plant and animal species; with impact on vegetation degradation, competition for food and habitat and predation on native species, particularly reintroduced species.	Monitor and record existence and impacts of introduced pest plants and animals eg. foxes, cats, rabbits, boxthorns. Continue to undertake control program as required.	High (cons/ threat)	DENR
	The CP has high conservation values	Ongoing implementation of the Management Plan to protect threatened species and minimise impacts and threats to flora and fauna. Update management plan as required.	High (cons)	DENR
	Climate change and sea level rise is having multiple effects within the cell	Ensure the establishment and maintenance of a time series of aerial photographs at an appropriate high resolution. Maintain connectivity between vegetation blocks to maximise resilience	Medium (cons)	DENR, EP NRM, community groups
	Important area for a number of threatened and sensitive flora and fauna species and communities including shorebirds, raptors and reintroduced species. Important habitat for birds, mammals, reptiles and butterflies.	Undertake coastal flora and fauna surveys to monitor types and numbers of species, ensure conservation and protection of threatened species and communities and inform future management directions.	Medium	DENR
Poorly vegetated dune area SE of the Gap.	Presence of threats by rabbits, ORV and dune instability is notable in view of the high conservation value of the area.	Monitor and record pest plant and animal species and distribution. Continue pest plant and animal control programs. Review existing tracks with a view to rationalise unnecessary tracks. Implement actions to control or exclude off-road vehicle activity.	Medium	DENR

Component	Issue	Proposed Action	Priority of Action	Key Players
All low lying land and salt marsh areas	All salt marsh areas show the potential for acid sulfate soil following disturbance; in turn this would potentially threaten all life forms within the bay.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Medium (threat)	DENR
	Salt marsh areas threatened by ongoing and accelerating sea level rise	Monitor salt marsh habitat change; particularly for sea level rise 'squeeze'.	Medium (cons/ threat)	DENR, EP NRM

BIOTA

Flora

Remnant vegetation area (ha)	1926.54 ha, 89.98% of cell area
# flora surveys / records	19 surveys, 1 opportune site, 11 herbarium record sites, 1 reserve database record site EP53 Talia Caves
# flora in cell	210
# conservation rated flora in cell	6
# non-indigenous flora in cell	43
Significant CDCS floristic community	Nil
Protected area	99% of remnant vegetation protected within Venus Bay CP

Weeds

Species	Common Name	Status	Study rating
Carrichtera annua	Ward's Weed	RA	4
Mesembryanthemum crystallinum	Common Iceplant	RA	4
Lycium ferocissimum	African Boxthorn	D, RA	8
Anagallis arvensis	Pimpernel		2
Avena barbata	Bearded Oat		2
Avena sp.	Oat		2
Brassica tournefortii	Wild Turnip		3
Briza minor	Lesser Quaking-grass		2
Bromus diandrus	Great Brome		2
Bromus madritensis	Compact Brome		2
Bromus rigidus	Rigid Brome		2
Bromus rubens	Red Brome		2
Bupleurum semicompositum	Hare's Ear		0
Cakile maritima ssp. maritima	Two-horned Sea Rocket		1
Catapodium rigidum	Rigid Fescue		1
Centaurea melitensis	Malta Thistle		1
Centaurium sp.	Centaury		1
Centaurium tenuiflorum (NC)	Branched Centaury		1
Erodium cicutarium	Cut-leaf Heron's-bill		0

Species	Common Name	Status	Study rating
Gastridium phleoides	Nit-grass		0
Hordeum leporinum	Wall Barley-grass		1
Lolium perenne X Lolium rigidum	Hybrid Ryegrass		1
Medicago arabica	Spotted Medic		0
Medicago minima var. minima	Little Medic		1
Medicago polymorpha var. polymorpha	Burr-medic		1
Melilotus indicus	King Island Melilot		1
Minuartia mediterranea	Slender Sandwort		0
Moraea setifolia	Thread Iris		0
Neatostema apulum	Hairy Sheepweed		0
Oxalis corniculata ssp. corniculata	Creeping Wood-sorrel		0
Parapholis incurva	Curly Ryegrass		1
Plantago bellardii	Hairy Plantain		2
Rostraria cristata	Annual Cat's-tail		2
Silene nocturna	Mediterranean Catchfly		1
Sisymbrium irio	London Mustard		0
Sisymbrium orientale	Indian Hedge Mustard		0
Solanum nigrum	Black Nightshade		2
Sonchus asper ssp. asper	Rough Sow-thistle		0
Sonchus oleraceus (NC)	Common Sow-thistle		0
Sonchus tenerrimus (NC)	Clammy Sow-thistle		0
Stellaria media	Chickweed		0
Vulpia myuros f.	Fescue		2
Vulpia myuros f. myuros	Rat's-tail Fescue		2

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Caladenia tensa	Inland Green-comb Spider-orchid	E	
Crassula sieberiana	Sieber's Crassula		E
Prostanthera calycina	West Coast Mintbush	V	V
Exocarpos strictus	Pale-fruit Cherry		R
Myoporum parvifolium	Creeping Boobialla		R
Orobanche cernua var. australiana	Australian Broomrape		R
Acacia anceps (NC)	Angled Wattle		
Acacia cupularis	Cup Wattle		
Acacia ligulata	Umbrella Bush		
Acacia sp. Winged (C.R.Alcock 4936)	Angled Wattle		
Acacia spinescens	Spiny Wattle		
Acacia triquetra	Mallee Wreath Wattle		
Acrotriche patula	Prickly Ground-berry		
Allocasuarina verticillata	Drooping Sheoak		
Alyxia buxifolia	Sea Box		
Angianthus preissianus	Salt Angianthus		
Angianthus tomentosus	Hairy Angianthus		
Apium annuum	Annual Celery		
Apium prostratum var. prostratum	Native Celery		
Atriplex paludosa ssp.	Marsh Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Atriplex vesicaria ssp.	Bladder Saltbush		
Austrodanthonia caespitosa	Common Wallaby-grass		

Species	Common Name	Aus status	SA status
Austrodanthonia setacea	Small-flower Wallaby-grass		
Austrostipa elegantissima	Feather Spear-grass		
Austrostipa eremophila	Rusty Spear-grass		
Austrostipa exilis	Heath Spear-grass		
Austrostipa flavescens	Coast Spear-grass		
Austrostipa scabra ssp. falcata	Slender Spear-grass		
Austrostipa scabra ssp. scabra	Rough Spear-grass		
Austrostipa sp.	Spear-grass		
Avicennia marina ssp. marina	Grey Mangrove		
Beyeria lechenaultii	Pale Turpentine Bush		
Boronia inornata ssp. leptophylla	Dryland Boronia		
Brachyscome ciliaris var.	Variable Daisy		
Brachyscome ciliaris var. lanuginosa	Woolly Variable Daisy		
Brachyscome sp.	Native Daisy		
Bromus arenarius	Sand Brome		
Bulbine alata	Winged Bulbine-lily		
Bulbine semibarbata	Small Leek-lily		
Caladenia septuosa	Eyre Peninsula Spider-orchid		
Calandrinia sp.	Purslane/Parakeelya		
Carpobrotus rossii (NC)	Native Pigface		
Cassytha peninsularis	Peninsula Dodder-laurel		
Cassytha peninsularis var. (NC)	Peninsula Dodder-laurel		
Cassytha sp.	Dodder-laurel		
Chrysocephalum apiculatum	Common Everlasting		
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Comesperma volubile	Love Creeper		
Convolvulus remotus	Grassy Bindweed		
Correa pulchella	Salmon Correa		
Crassula colorata var.	Dense Crassula		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Crassula sp.	Crassula/Stonecrop		
Dianella brevicaulis	Short-stem Flax-lily		
Dianella brevicaulis/revoluta var.	Black-anther Flax-lily		
Dianella revoluta (NC)			
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Distichlis distichophylla	Emu-grass		
Dodonaea baueri	Crinkled Hop-bush		
Dodonaea viscosa ssp. angustissima	Narrow-leaf Hop-bush		
Dodonaea viscosa ssp. spatulata	Sticky Hop-bush		
Enchylaena tomentosa var.	Ruby Saltbush		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eremophila crassifolia	Thick-leaf Emubush		
Eriochlamys behrii (NC)	Woolly Mantle		
Erodium cygnorum ssp. glandulosum (NC)	Clammy Heron's-bill		
Eucalyptus calcareana	Nundroo Mallee		
Eucalyptus gracilis	Yorrell		
Eucalyptus oleosa (NC)	Red Mallee		
Eucalyptus rugosa	Coastal White Mallee		
Eutaxia microphylla	Common Eutaxia		
Eutaxia sp.	Eutaxia		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos syrticola	Coast Cherry		

Species	Common Name	Aus status	SA status
Frankenia pauciflora var.	Southern Sea-heath		
Frankenia serpyllifolia	Thyme Sea-heath		
Frankenia sp.	Sea-heath		
Gahnia lanigera	Black Grass Saw-sedge		
Gahnia sp.	Saw-sedge		
Galium sp.	Bedstraw		
Geijera linearifolia	Sheep Bush		
Genoplesium nigricans	Black Midge-orchid		
Geranium sp.	Geranium		
Gnaphalium sp. (NC)			
Goodenia pinnatifida	Cut-leaf Goodenia		
Goodenia robusta	Woolly Goodenia		
Goodenia varia	Sticky Goodenia		
Goodenia willisiana	Silver Goodenia		
Haloragis sp.	Raspwort		
Helichrysum leucopsideum	Satin Everlasting		
Lasiopetalum discolor	Coast Velvet-bush		
Lasiopetalum sp.	Velvet-bush		
Lawrencia sp.	Lawrencia		
Lepidosperma congestum (NC)	Clustered Sword-sedge		
Lepidosperma laterale (NC)	Sharp Sword-sedge		
Lepidosperma sp.	Sword-sedge/Rapier-sedge		
Lepidosperma viscidum	Sticky Sword-sedge		
Leptorhynchos waitzia	Button Immortelle		
Leucophyta brownii	Coast Cushion Bush		
Leucopogon cordifolius	Heart-leaf Beard-heath		
Leucopogon parviflorus	Coast Beard-heath		
Logania crassifolia	Coast Logania		
Lomandra effusa	Scented Mat-rush		
Lycium australe	Australian Boxthorn		
Maireana erioclada	Rosy Bluebush		
Maireana oppositifolia	Salt Bluebush		
Maireana trichoptera	Hairy-fruit Bluebush		
Malva preissiana	Australian Hollyhock		
Malvastrum americanum var. americanum	Malvastrum		
Melaleuca halmaturorum	Swamp Paper-bark		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Melaleuca pauperiflora (NC)	Boree		
Minuria leptophylla	Minnie Daisy		
Muehlenbeckia adpressa	Climbing Lignum		
Myoporum insulare	Common Boobialla		
Neurachne alopecuroidea	Fox-tail Mulga-grass		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Olearia ramulosa	Twiggy Daisy-bush		
Opercularia turpis	Twiggy Stinkweed		
Oxalis perennans (NC)	Native Sorrel		
Parietaria debilis (NC)	Smooth-nettle		
Pelargonium littorale	Native Pelargonium		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pittosporum angustifolium	Native Apricot		
Poa poiformis var. poiformis	Coast Tussock-grass		
Podolepis rugata var.	Pleated Copper-wire Daisy		

Species	Common Name	Aus status	SA status
Podolepis rugata var. littoralis	Coast Copper-wire Daisy		
Podotheca angustifolia	Sticky Long-heads		
Pomaderris paniculosa ssp.			
Poranthera microphylla (NC)	Small Poranthera		
Pterostylis mutica	Midget Greenhood		
Ptilotus sessilifolius var. sessilifolius	Crimson-tails		
Pultenaea tenuifolia	Narrow-leaf Bush-pea		
Pyrorchis nigricans	Black Fire-orchid		
Rhagodia candolleana ssp.	Sea-berry Saltbush		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia crassifolia	Fleshy Saltbush		
Salsola tragus	Buckbush		
Samolus repens	Creeping Brookweed		
Santalum acuminatum	Quandong		
Sarcocornia quinqueflora	Beaded Samphire		
Scaevola crassifolia	Cushion Fanflower		
Sclerolaena uniflora	Small-spine Bindyi		
Senecio glossanthus (NC)	Annual Groundsel		
Senecio pinnatifolius (NC)	Variable Groundsel		
Spyridium phylicoides	Narrow-leaf Spyridium		
Tecticornia halocnemoides ssp. halocnemoides	Grey Samphire		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Thryptomene calycina	Grampians Thryptomene		
Thryptomene micrantha	Ribbed Thryptomene		
Thysanotus baueri	Mallee Fringe-lily		
Thysanotus patersonii	Twining Fringe-lily		
Triodia compacta	Spinifex		
Triodia irritans	Spinifex		
Vittadinia australasica var. australasica	Sticky New Holland Daisy		
Westringia dampieri	Shore Westringia		
Wilsonia backhousei	Narrow-leaf Wilsonia		
Zygophyllum billardierei	Coast Twinleaf		
Zygophyllum billardierei (NC)	Coast Twinleaf		
Zygophyllum emarginatum	Notched Twinleaf		
Zygophyllum flavum	Coast Twinleaf		
Zygophyllum sp.	Twinleaf		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	131 recorded – 86 birds, 0 butterflies, 20 mammals, 27 reptiles, 1 amphibian (an additional 7 reptiles and 27 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	13 surveys, 70 opportune site
# of threatened fauna in cell	20
# of non-indigenous fauna	5 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Sturnus vulgaris	Common Starling	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p
Felis catus	Cat (Feral Cat)	Mammalia	x
Mus musculus	House Mouse	Mammalia	x
Oryctolagus cuniculus	Rabbit (European Rabbit)	Mammalia	x
Vulpes vulpes	Fox (Red Fox)	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Pandion cristatus	Eastern Osprey	M	E
Sternula nereis	Fairy Tern		E
Cladorhynchus leucocephalus	Banded Stilt		V
Numenius madagascariensis	Eastern Curlew	M	V
Thinornis rubricollis	Hooded Plover		V
Biziura lobata	Musk Duck		R
Calidris alba	Sanderling	M	R
Calidris tenuirostris	Great Knot	M	R
Falco peregrinus	Peregrine Falcon		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Hylacola cauta	Shy Heathwren (Shy Hylacola)		R
Limosa lapponica	Bar-tailed Godwit	M	R
Neophema petrophila	Rock Parrot		R
Numenius phaeopus	Whimbrel	M	R
Lichenostomus cratitius	Purple-gaped Honeyeater		ssp
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Acanthiza apicalis	Inland Thornbill		
Acanthiza chrysorrhoa	Yellow-rumped Thornbill		
Anas castanea	Chestnut Teal		
Anthochaera carunculata	Red Wattlebird		
Anthus novaeseelandiae	Australasian Pipit		
Aquila audax	Wedge-tailed Eagle		
Artamus cyanopterus	Dusky Woodswallow		
Barnardius zonarius	Australian Ringneck, (Ring-necked Parrot)		
Cacomantis flabelliformis	Fan-tailed Cuckoo		
Calidris acuminata	Sharp-tailed Sandpiper	M	
Calidris ferruginea	Curlew Sandpiper	M	
Calidris ruficollis	Red-necked Stint	M	
Chalcites basalis	Horsfield's Bronze-cuckoo		
Charadrius ruficapillus	Red-capped Plover		
Chroicocephalus novaehollandiae	Silver Gull		
Cincloramphus cruralis	Brown Songlark		
Circus approximans	Swamp Harrier		
Colluricincla harmonica	Grey Shrike-thrush		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Corvus coronoides	Australian Raven		
Corvus mellori	Little Raven		
Coturnix pectoralis	Stubble Quail		

Species	Common Name	Aus status	SA status
Cracticus tibicen	Australian Magpie		
Cracticus torquatus	Grey Butcherbird		
Cygnus atratus	Black Swan		
Eolophus roseicapillus	Galah		
Epthianura albifrons	White-fronted Chat		
Falco berigora	Brown Falcon		
Falco cenchroides	Nankeen Kestrel		
Falco longipennis	Australian Hobby		
Gallirallus philippensis	Buff-banded Rail		
Glyciphila melanops	Tawny-crowned Honeyeater		
Hieraaetus morphnoides	Little Eagle		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Larus pacificus	Pacific Gull		
Lichenostomus leucotis	White-eared Honeyeater		
Lichenostomus virescens	Singing Honeyeater		
Malurus lamberti	Variegated Fairy-wren		
Malurus pulcherrimus	Blue-breasted Fairy-wren		
Manorina flavigula	Yellow-throated Miner		
Ocyphaps lophotes	Crested Pigeon		
Oreoica gutturalis	Crested Bellbird		
Pardalotus punctatus	Spotted Pardalote		
Pardalotus striatus	Striated Pardalote		
Pelecanus conspicillatus	Australian Pelican		
Petrochelidon nigricans	Tree Martin		
Phalacrocorax carbo	Great Cormorant		
Phalacrocorax fuscescens	Black-faced Cormorant		
Phalacrocorax sulcirostris	Little Black Cormorant		
Phalacrocorax varius	Pied Cormorant		
Phaps chalcoptera	Common Bronzewing		
Phaps elegans	Brush Bronzewing		
Pluvialis squatarola	Grey Plover	M	
Pomatostomus superciliosus	White-browed Babbler		
Psephotus varius	Mulga Parrot		
Purnella albifrons	White-fronted Honeyeater		
Rhipidura leucophrys	Willie Wagtail		
Sericornis frontalis	White-browed Scrubwren		
Smicrornis brevirostris	Weebill		
Thalasseus bergii	Crested Tern		
Tribonyx ventralis	Black-tailed Native-hen		
Tringa nebularia	Common Greenshank	M	
Turnix velox	Little Button-quail		
Vanellus miles	Masked Lapwing		
Vanellus tricolor	Banded Lapwing		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p

Species	Common Name	Status*	Record
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Leporillus conditor	Greater Stick-nest Rat	V	V
Macrotis lagotis	Greater Bilby	V	V
Bettongia penicillata ogilbyi	Brush-tailed Bettong		R
Cercartetus concinnus	Western Pygmy-possum		
Chalinolobus gouldii	Gould's Wattled Bat		
Chalinolobus morio	Chocolate Wattled Bat		
Lasiorhinus latifrons	Southern Hairy-nosed Wombat		
Macropus fuliginosus	Western Grey Kangaroo		
Macropus robustus	Euro		
Notomys mitchellii	Mitchell's Hopping-mouse		
Nyctophilus geoffroyi	Lesser Long-eared Bat		
Nyctophilus timoriensis	Greater Long-eared Bat	ssp	ssp
Sminthopsis crassicaudata	Fat-tailed Dunnart		
Sminthopsis dolichura	Little Long-tailed Dunnart		
Tadarida australis	White-striped Freetail-bat		
Vespadelus regulus	Southern Forest Bat		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Amphibolurus norrisi	Mallee Tree-dragon			x
Aprasia striolata	Lined Worm-lizard			x
Christinus marmoratus	Marbled Gecko			x
Ctenophorus chapmani	Prickly Dragon			x
Ctenophorus fionni	Peninsula Dragon			x
Ctenophorus fordi	Mallee Dragon			c
Ctenotus euclae	Bight Coast Ctenotus			x
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			x
Delma butleri	Spinifex Snake-lizard			x
Diplodactylus calcicolus	South Coast Gecko			x
Drysdalia mastersii	Master's Snake			x
Egernia stokesii	Gidgee Skink			x
Gehyra variegata	Tree Dtella			e
Hemiergis peronii	Four-toed Earless Skink			x
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			x
Lerista terdigitata	Southern Three-toed Slider			x
Lialis burtonis	Burton's Legless Lizard			x
Liopholis multiscutata	Bull Skink			x
Menetia greyii	Dwarf Skink			x
Morethia adelaidensis	Adelaide Snake-eye			x
Morethia obscura	Mallee Snake-eye			x
Nephrurus milii	Barking Gecko			x
Parasuta nigriceps	Mitchell's Short-tailed Snake			x
Parasuta spectabilis	Mallee Black-headed Snake			x
Pogona barbata	Eastern Bearded Dragon			x
Pogona minor	Dwarf Bearded Dragon			x
Pseudechis australis	Mulga Snake			x
Pseudonaja affinis	Dugite			c
Pseudonaja aspidorhyncha	Patch-nosed Brown Snake			x
Pygopus lepidopodus	Common Scaly-foot			c
Strophurus assimilis	Thorn-tailed Gecko			x
Tympanocryptis lineata	Five-lined Earless Dragon			c

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

Species	Common Name	Aus status	SA status
Neobatrachus centralis	Trilling Frog		

Cell EP56 Tyringa Beach

Cell area 1,222 ha. Shoreline length 26.56 km.

Landforms

The gently sloping coastal plain is composed of Pleistocene calcarenite, which is seen in high (>50m) cliffs in the eastern half of the cell and low bluffs in the western half. Although the shoreline is in detail indented, its outline is in the form of an open embayment: sand accumulation in dunes is most extensive at the head of this embayment. The cliffs in the west of the cell dominate a rugged, indented eroding coastline, with many tiny pocket beaches. Beaches in the west of the cell are in coarse mineral sand (granite origin), steep, and wave energy is high except where there is reef protection. In the east of the cell fine to medium sand beaches are found. Holocene dunes, and cliff top dunes are frequent, and usually stable. Many cliff tops are deflated, and the calcrete surface is unvegetated.

Baird Bay Islands CP is made up of two islands, the unnamed island in the centre of Baird Bay (within EP57) and Jones Island at the mouth of the bay. Jones Island is limestone over granite, covered predominantly by low heath vegetation. "Jones Island is the remnant of a calcarenite wall that once held back the ocean from the low-lying valley to the north." (DEH 2006c, p.4)

Benthic Habitat

Calcarenite limestone reef throughout, except in the western end of the cell, where inshore granite reef is located. Small granite platforms and reefs found throughout the cell.

Biota

1,039 ha., or 85% of the cell is remnant vegetation. This cell has 19 BDBSA flora survey sites, 1 opportune flora site, 3 herbarium flora record sites, 3 BDBSA fauna survey sites and 11 opportune fauna record sites.
The cliff tops and dunes are in *Olearia axillaris/Leucopogon parviflorus* shrubland, with *Eucalyptus dumosa* mallee woodland a little further inland.

Land Use/ Land Ownership

A small coastal reserve of unalloted Crown land is found along this cell (20%), backed by privately owned land, with the exception of a small area of leasehold, centrally within the cell. Venus Bay CP extends over the eastern most 6 km of the cell, 25%, by area. This cell also

includes Jones Island of the Baird Bay Islands Conservation Park. The Baird Bay Islands Conservation Park is on the Register of the National Estate.

West Coast Bays Marine Park offshore.

FIGURE 6.32 Tyringa Beach; bluff with stabilised transgressive dune; calcarenite eroding cliffs. Photo: Coast Protection Board, 2007.

Uses (Field visits and local reports)

There are many clifftop ORV access tracks in the coastal zone between Baird Bay and where cliffs start at the end of Tyringa Beach (as seen in photograph, above). These are used by fishermen, surfers and recreational beach users. Stock access to the coast from adjacent farmland is also sometimes an issue here. Some farmers are good at keeping stock out, however others consider the coastal zone to be a grazing area.

Values (Field visits and local reports)

Two breeding pairs of Hooded Plover occur within this cell (Cooper 2010).

Threats (Field visits and local reports)

Sand mine
Vehicles on beaches in some areas (track from cliff to beach issue with erosion)
Vehicle track along cliff top (safety)
Many vehicles tracks through the dune deflation area between the foredune and rear dunes, east of Tyringa Beach, where petrified tree roots have been exposed, tracks causing soil instability and vegetation damage.
Grazing by stock
Uncontrolled ORV access on coastal cliffs and dunes
Uncontrolled camping

Feral animal infestations (fox, cat and rabbit)
Camping areas and accessways are degraded with a significant weed burden

Opportunities (Field visits and local reports)

Scoping the Shoreline 2006-2010: One site at the beach immediately west of Venus Bay CP, 3 surveys per year for 5 years (Cooper & Graham 2010).
Opportunities exist to rationalise access to coastal cliff areas between Baird Bay and Tyringa Beach to protect cliff areas and improve safety of locals and visitors
Management of weeds and feral animals
Improve stock management

Conservation Analysis (GIS)

The total of summary conservation means, 125.87, is high for the region. Most areas total medium high, with the higher scores being on the sand dune areas. Low totals are found on the small cleared areas. The higher totals for individual layers are for priority based on the threatened status of flora (whole cell), endemic floristic vegetation (shrubland areas), species richness (highest on dunes), habitat for reptile species (almost all vegetated areas show good values), habitat for threatened mammal species, habitat for mammal species (almost all vegetated areas show good values), butterfly habitat (western half of cell), habitat for the Eastern Osprey and the White-bellied Sea-Eagle (focal species), views of the sea and scenic amenity, and vegetation metrics.
Eleven mammal, 15 reptile, 1 amphibian and 50 bird species have been recorded in this cell, including the two raptor focal species noted above the state endangered Fairy Tern and the state vulnerable Hooded Plover.

Threat Analysis (GIS)

47.68: this is a medium total threat value for the region. Whilst the highest threat levels are found near the head of the embayment near Tyringa Beach, extensive moderate – high areas are of most of the cell, except its western end, in the conservation park.
While only a few layers stand out as high threat, there are several moderate totals. High totals include: land ownership, sea views, mining activities (much of the cell is subject to mineral exploration licences; Silica Beach is a contemporary tenement – the Baird Bay silica gravel mine), weeds and the presence of rabbits (in the dunes, east of Tyringa Beach). Locally, dune and cliff stability are notable. ORV threat is lower than many other areas, although does occur along the coast predominantly outside the CP. Almost the entire cell is zoned coastal and no settlement is present.

Adaptation to Climate Change Threats

(see also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Beaches will recede Dune instability will increase due to foredune damage	Monitor shoreline and dune change through aerial image record	
2070: +c.80cm.	Sandy coast has marked recession; beaches in front of calcarenite cliffs and bluffs lost, (loss of some shorebird habitat). Where there is a beach foredune connection, the dunes will recede through erosion and blowouts. Intertidal reef and platform habitats lost.	Active management of dune blowouts	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides. Foredune damage.		
Intensity of large storms increases	2070: Frequent damage to foredunes.	Active management of dune blowouts	
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing vegetation is found in warmer conditions elsewhere)		Maintain N-S connectivity of vegetation within the peninsula
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune and salt marsh habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Invasion by grassy weeds.	Active weed control in dunes.	Ensure dune vegetation is within the regional fire plan.
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate	Monitor beaches, see above.	

TABLE 6.30 Recommended Actions and Priority for EP56 Tyringa Beach

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Areas within cell identified as being important for rare and endemic plant communities and as habitat for threatened species, including shorebirds and raptors, little protection and impact from agricultural activities, recreational activities, uncontrolled access, weeds and pest animals	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches, dogs on leashes, track management, pest animal and plant control, restrict access to sensitive locations. Install interpretive/ educational signage. Community education programs.	High (cons/ threat)	DENR, private land owners, EP NRM, DC of Streaky Bay, community
	Potential impact on breeding habitats of the endangered Eastern Osprey, particularly during the breeding season.	Develop site management and monitoring strategy, including consideration to closure, relocation or seasonal closures of roads/walking tracks/car parks in the near vicinity. Ensure management/works programs are not undertaken during the breeding season. Community education programs	High (cons)	DENR, DC of Streaky Bay, EP NRM
	Climate change and sea level rise is having multiple effects within the cell	Ensure the establishment and maintenance of a time series of aerial photographs at an appropriate high resolution. Maintain connectivity between vegetation blocks to maximise resilience	Medium (cons)	DENR, EP NRM, community groups

Component	Issue	Proposed Action	Priority of Action	Key Players
	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	Medium (cons)	DENR, EP NRM
Area west of Venus Bay CP	Unrestricted access and multiple vehicle tracks around the coast, including tracks onto beaches, impacting on the coastal dune and cliff top vegetation (such as the west coast mint bush), soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	High (con/ threat)	DC of Streaky Bay, DTEI, DENR, EP NRM, SA Tourism, community
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	Medium	DENR, EP NRM, DC of Streaky Bay, private land owners, community
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species, including stock grazing on the vulnerable West Coast Mintbush.	Monitor and record existence and impacts of introduced pest animals eg rabbits, foxes, cats. Undertake a control program if required. Work with private landowners to ensure that stock are restricted from the coastal zone (eg. ensure fences are adequate and maintained)	Medium	EP NRM, DENR, DC of Streaky Bay, private landholders
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	Medium (threat)	EP NRM, private land owners, DENR, DC of Streaky Bay, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Mining exploration licence applications cover much of the cell area outside of the Venus Bay CP, with potential impact on sensitive areas and conservation values	Ensure any mining activities avoid areas of high conservation significance. Investigate/ consider refusal of licence in high conservation areas.	Medium	PIRSA, DENR, EP NRM, DC of Streaky Bay
	Silica sand mining tenements occur in the western area of the cell, with mostly low, vegetated cliff top dunes, potential impact on sensitive areas, coastal vegetation, soil stability, soil compaction and erosion, weed introduction and disturbance to native fauna species	Investigate sustainability and environmental effects of mining sand at Silica Beach. Ensure any mining activities avoid areas of high conservation significance and management practices are in place to minimise potential impacts and ensure areas utilised are appropriately rehabilitated. Investigate/ consider removal of tenements from high conservation areas.	High (cons/ threat)	PIRSA, mine operator/ owner, DENR, EP NRM, DC of Streaky Bay
Beaches	Significant shorebird habitat, including 2 pairs of breeding Hooded Plover, with potential disturbance from people, vehicles, dogs and pest animals. Vehicles on beaches also a threat to meiofauna.	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas, pest animal control programs. Undertake and/or support ongoing shorebird monitoring programs. Hooded Plover signage required at both ends of the 1.4 km sandy beach immediately west of Venus Bay CP. (EP NRM/BA Beach-nesting Birds project). Raising community awareness through interpretive signage and other programs eg. "chicks on beach".	High (cons/ threat)	DC of Streaky Bay, EP NRM, DTEI, DENR, EP LGA, Tourism SA, Birds Australia, community

Component	Issue	Proposed Action	Priority of Action	Key Players
Cliff tops	Numerous informal tracks and informal car parks very close to potentially unstable cliff edge; safety hazard and impact from soil compaction, vegetation damage, weed introduction, fauna disturbance, soil stability and water runoff erosion	Review with a view to close or reroute tracks and car parks that are too close to cliff edge.	High (Hazard; cons/ threat)	DENR, DC of Streaky Bay, EP NRM, private land owners, community
Dune areas near Tyringa Beach	These show valuable vegetation associations, but rabbits mapped here	Protect native flora by undertaking pest animal control program	High	EP NRM, DENR, private land owners
Venus Bay CP	Minimal access to this area serves to protect the fauna populations	Maintain limited access	High (cons)	DENR, DC of Streaky Bay
	The CP has high conservation values	Ongoing implementation of the Management Plan to protect threatened species and minimise impacts and threats to flora and fauna.	High (cons)	DENR
	Introduced plant and animal species; with impact on vegetation degradation, competition for food and habitat and predation on native species, particularly reintroduced species.	Monitor and record existence and impacts of introduced pest plants and animals eg. foxes, cats, rabbits, boxthorns. Continue to undertake control program as required.	High (cons)	DENR

BIOTA

Flora

Remnant vegetation area (ha)	1038.84 ha, 85.0% of cell area
# flora surveys / records	19 surveys, 1 opportune site, 3 herbarium record sites
# flora in cell	138
# conservation rated flora in cell	4
# non-indigenous flora in cell	19
Significant CDCS floristic community	*Leucophyta brownie* shrubland– 56% of SA records in EP *Melaleuca lanceolata / Senecio lautus* shrubland – 97% of SA records in EP *Olearia axillaris /Lasiopetalum discolour* shrubland – 52% of SA records in EP
Protected area	27% of remnant vegetation protected within Venus Bay CP

Weeds

Species	Common Name	Status	Study rating
Mesembryanthemum crystallinum	Common Iceplant	RA	4
Lycium ferocissimum	African Boxthorn	D, RA	8
Marrubium vulgare	Horehound	D, RA	5
Oxalis pes-caprae	Soursob	D, RA	5
Anagallis arvensis	Pimpernel		2
Austrostipa variabilis	Variable Spear-grass		0
Avena barbata	Bearded Oat		2
Brassica tournefortii	Wild Turnip		3
Bromus diandrus	Great Brome		2
Bupleurum semicompositum	Hare's Ear		0
Centaurium tenuiflorum (NC)	Branched Centaury		1
Oxalis corniculata ssp. corniculata	Creeping Wood-sorrel		0
Parapholis incurva	Curly Ryegrass		1
Rostraria cristata	Annual Cat's-tail		2
Silene apetala	Sand Catchfly		0
Silene nocturna	Mediterranean Catchfly		1
Sonchus asper ssp. asper	Rough Sow-thistle		0
Sonchus oleraceus (NC)	Common Sow-thistle		0
Vulpia myuros f. myuros	Rat's-tail Fescue		2

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Prostanthera calycina	West Coast Mintbush	V	V
Austrodanthonia laevis	Smooth Wallaby-grass		R
Austrostipa echinata	Spiny Spear-grass		R
Poa fax	Scaly Poa		R
Acacia anceps			
Acacia anceps (NC)	Angled Wattle		
Acacia cupularis	Cup Wattle		
Acacia sp. Winged (C.R.Alcock 4936)	Angled Wattle		
Acacia spinescens	Spiny Wattle		
Acrotriche patula	Prickly Ground-berry		
Actinobole uliginosum	Flannel Cudweed		
Allocasuarina verticillata	Drooping Sheoak		
Alyxia buxifolia	Sea Box		
Apium prostratum var. prostratum	Native Celery		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrodanthonia setacea	Small-flower Wallaby-grass		
Austrostipa drummondii	Cottony Spear-grass		
Austrostipa elegantissima	Feather Spear-grass		
Austrostipa exilis	Heath Spear-grass		
Austrostipa flavescens	Coast Spear-grass		
Baeckea crassifolia	Desert Baeckea		
Beyeria lechenaultii	Pale Turpentine Bush		
Beyeria opaca	Dark Turpentine Bush		
Callistemon rugulosus	Scarlet Bottlebrush		
Carpobrotus rossii	Native Pigface		

Species	Common Name	Aus status	SA status
Carpobrotus rossii (NC)	Native Pigface		
Cassytha peninsularis	Peninsula Dodder-laurel		
Cassytha sp.	Dodder-laurel		
Chrysocephalum apiculatum	Common Everlasting		
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Comesperma volubile	Love Creeper		
Correa pulchella	Salmon Correa		
Correa reflexa var.			
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Danthonia sp. (NC)	Wallaby-grass		
Daucus glochidiatus	Native Carrot		
Dianella revoluta (NC)			
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eremophila crassifolia	Thick-leaf Emubush		
Eremophila deserti	Turkey-bush		
Eremophila glabra (NC)	Tar Bush		
Eremophila glabra ssp. Murray (A.G.Spooner 14470)	Small Tar Bush		
Eremophila weldii	Purple Emubush		
Eriochlamys behrii	Woolly Mantle		
Eriochlamys behrii (NC)	Woolly Mantle		
Eucalyptus diversifolia (NC)	Coastal White Mallee		
Eucalyptus diversifolia ssp. diversifolia	Coastal White Mallee		
Eucalyptus dumosa complex	White Mallee		
Eucalyptus yalatensis	Yalata Mallee		
Eutaxia microphylla	Common Eutaxia		
Exocarpos aphyllus	Leafless Cherry		
Ficinia nodosa	Knobby Club-rush		
Frankenia cordata			
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Frankenia pauciflora var. gunnii	Southern Sea-heath		
Frankenia sessilis	Small-leaf Sea-heath		
Gahnia lanigera	Black Grass Saw-sedge		
Geijera linearifolia	Sheep Bush		
Goodenia robusta	Woolly Goodenia		
Goodenia varia	Sticky Goodenia		
Goodenia willisiana	Silver Goodenia		
Hardenbergia violacea	Native Lilac		
Helichrysum leucopsideum	Satin Everlasting		
Lasiopetalum discolor	Coast Velvet-bush		
Leiocarpa supina	Coast Plover-daisy		
Leiocarpa tomentosa	Woolly Plover-daisy		
Lepidosperma congestum			
Lepidosperma congestum (NC)	Clustered Sword-sedge		
Lepidosperma viscidum	Sticky Sword-sedge		
Leucophyta brownii	Coast Cushion Bush		
Logania crassifolia	Coast Logania		
Lomandra effusa	Scented Mat-rush		
Lycium australe	Australian Boxthorn		
Maireana erioclada	Rosy Bluebush		
Maireana oppositifolia	Salt Bluebush		
Malva preissiana	Australian Hollyhock		

Species	Common Name	Aus status	SA status
Melaleuca lanceolata	Dryland Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Minuria leptophylla	Minnie Daisy		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Opercularia turpis	Twiggy Stinkweed		
Pelargonium australe	Austral Stork's-bill		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pittosporum angustifolium	Native Apricot		
Plantago hispida	Hairy Plantain		
Poa poiformis var. poiformis	Coast Tussock-grass		
Podotheca angustifolia	Sticky Long-heads		
Pterostylis sanguinea	Blood Greenhood		
Pultenaea elachista	Limestone Bush-pea		
Pultenaea tenuifolia	Narrow-leaf Bush-pea		
Rhagodia candolleana ssp.	Sea-berry Saltbush		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia crassifolia	Fleshy Saltbush		
Scaevola crassifolia	Cushion Fanflower		
Schenkia australis	Spike Centaury		
Sclerolaena diacantha	Grey Bindyi		
Senecio pinnatifolius (NC)	Variable Groundsel		
Spyridium phylicoides	Narrow-leaf Spyridium		
Tecticornia halocnemoides ssp. halocnemoides	Grey Samphire		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Thryptomene micrantha	Ribbed Thryptomene		
Thysanotus baueri	Mallee Fringe-lily		
Tricoryne tenella	Tufted Yellow Rush-lily		
Triodia compacta	Spinifex		
Triodia irritans complex	Spinifex		
Vittadinia dissecta var. hirta	Dissected New Holland Daisy		
Westringia dampieri	Shore Westringia		
Wurmbea dioica ssp. dioica	Early Nancy		
Wurmbea dioica ssp. dioica (NC)	Early Star-lily		
Zygophyllum apiculatum	Pointed Twinleaf		
Zygophyllum billardierei	Coast Twinleaf		
Zygophyllum billardierei (NC)	Coast Twinleaf		
Zygophyllum sp.	Twinleaf		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	77 recorded – 50 birds, 0 butterflies, 11 mammals, 15 reptiles, 1 amphibian (an additional 14 reptiles and 27 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	3 survey sites, 11 opportune site
# of threatened fauna in cell	15
# of non-indigenous fauna	6 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Passer domesticus	House Sparrow	Aves	x
Sturnus vulgaris	Common Starling	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p
Felis catus	Cat (Feral Cat)	Mammalia	x
Mus musculus	House Mouse	Mammalia	x
Oryctolagus cuniculus	Rabbit (European Rabbit)	Mammalia	x
Vulpes vulpes	Fox (Red Fox)	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Pandion cristatus	Eastern Osprey	M	E
Sternula nereis	Fairy Tern		E
*Cladorhynchus leucocephalus***	Banded Stilt** (see below)		V
*Numenius madagascariensis***	Eastern Curlew** (see below)	M	V
Thinornis rubricollis	Hooded Plover		V
Actitis hypoleucos	Common Sandpiper	M	R
Arenaria interpres	Ruddy Turnstone	M	R
Biziura lobata	Musk Duck		R
Cereopsis novaehollandiae	Cape Barren Goose		R
Egretta sacra	Eastern Reef Egret		R
Falco peregrinus	Peregrine Falcon		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Neophema petrophila	Rock Parrot		R
Anthus novaeseelandiae	Australasian Pipit		
Artamus personatus	Masked Woodswallow		
Artamus superciliosus	White-browed Woodswallow		
Calidris ferruginea	Curlew Sandpiper	M	
Calidris ruficollis	Red-necked Stint	M	
Chroicocephalus novaehollandiae	Silver Gull		
Cincloramphus cruralis	Brown Songlark		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Corvus mellori	Little Raven		
Egretta novaehollandiae	White-faced Heron		
Eolophus roseicapillus	Galah		
Eudyptula minor	Little Penguin		
Falco cenchroides	Nankeen Kestrel		
Glyciphila melanops	Tawny-crowned Honeyeater		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Malurus pulcherrimus	Blue-breasted Fairy-wren		
Megalurus gramineus	Little Grassbird		
Pardalotus punctatus	Spotted Pardalote		
Pelecanus conspicillatus	Australian Pelican		
Phalacrocorax carbo	Great Cormorant		
Phalacrocorax fuscescens	Black-faced Cormorant		

Species	Common Name	Aus status	SA status
Phalacrocorax sulcirostris	Little Black Cormorant		
Phalacrocorax varius	Pied Cormorant		
Pluvialis squatarola	Grey Plover	M	
Rhipidura leucophrys	Willie Wagtail		
Sericornis frontalis	White-browed Scrubwren		
Thalasseus bergii	Crested Tern		
Tringa nebularia	Common Greenshank	M	
Vanellus miles	Masked Lapwing		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

** note: Eastern Curlew and Banded Stilt have been included, but are unlikely to occur here as this cell does not provide suitable habitat. It is likely that the survey data for these records has a low spatial accuracy (eg. older records) or they have been mis-identified.

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom

x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Cercartetus concinnus	Western Pygmy-possum		

Species	Common Name	Aus status	SA status
Macropus fuliginosus	Western Grey Kangaroo		
Macropus robustus	Euro		
Notomys mitchellii	Mitchell's Hopping-mouse		
Nyctophilus timoriensis	Greater Long-eared Bat	ssp	ssp
Sminthopsis crassicaudata	Fat-tailed Dunnart		
Sminthopsis dolichura	Little Long-tailed Dunnart		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Amphibolurus norrisi	Mallee Tree-dragon			x
Christinus marmoratus	Marbled Gecko			x
Ctenophorus chapmani	Prickly Dragon			x
Ctenophorus fionni	Peninsula Dragon			x
Ctenophorus fordi	Mallee Dragon			c
Ctenotus euclae	Bight Coast Ctenotus			x
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Demansia reticulata	Desert Whipsnake			x
Diplodactylus calcicolus	South Coast Gecko			x
Drysdalia mastersii	Master's Snake			c
Egernia stokesii	Gidgee Skink			e
Gehyra variegata	Tree Dtella			e
Hemiergis peronii	Four-toed Earless Skink			x
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			x
Liopholis multiscutata	Bull Skink			x
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			x
Morethia obscura	Mallee Snake-eye			c
Nephrurus milii	Barking Gecko			x
Parasuta spectabilis	Mallee Black-headed Snake			x
Pogona barbata	Eastern Bearded Dragon			x
Pseudechis australis	Mulga Snake			c
Pseudonaja affinis	Dugite			c
Pygopus lepidopodus	Common Scaly-foot			c
Strophurus assimilis	Thorn-tailed Gecko			x
Tympanocryptis lineata	Five-lined Earless Dragon			c

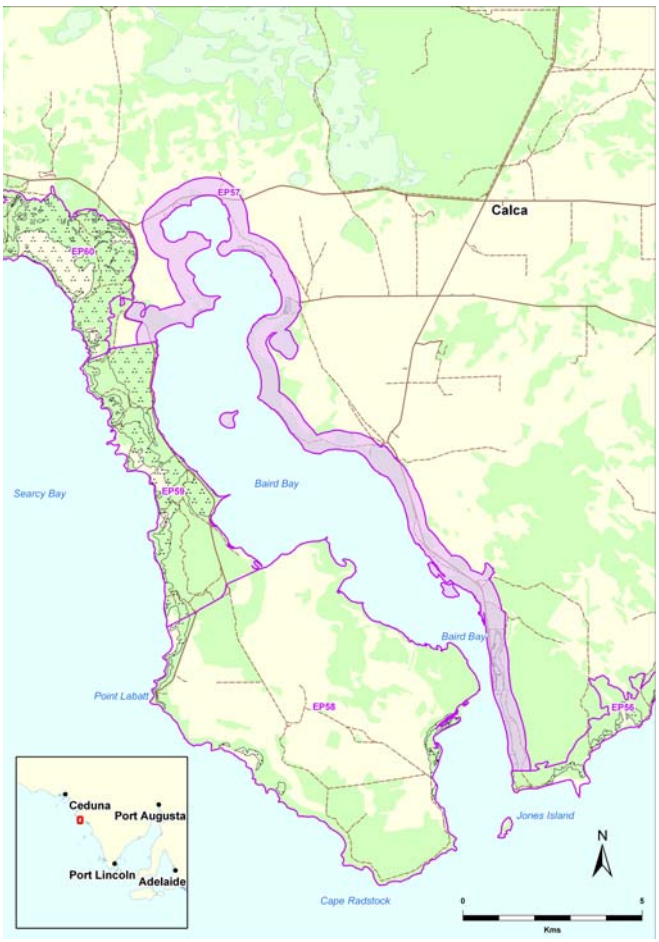
R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

Species	Common Name	Aus status	SA status
Neobatrachus centralis	Trilling Frog		

Cell EP57 Baird Bay

Cell area 1,652 ha. Shoreline length is 41.18km.



Landforms

Baird Bay is a long narrow embayment, consisting of vast shallow sandflats with patchy seagrass; in the southern half of the bay the sandflats form a flood tide delta bisected by a single channel. The northern and eastern shores are generally of very low elevation, with low calcarenite bluffs, small calcareous (broken mollusc shells) Holocene dunes and chenier ridges; these are backed by Pleistocene beach ridges, suggesting an earlier raised sea level. Small areas of supra-tidal salt marsh are found along the shore and among the sand ridges, however no mangroves are recorded, (raised summer salinities and low tidal flushing). At the entrance, Baird Bay Beach is a 4km steep coarse sand beach, fronted by inshore sand flats and backed by narrow vegetated sand dunes. In places within the cell there are fresh water and brackish groundwater soaks.

[Baird Bay Islands CP is made up of two islands, the unnamed island in the centre of Baird Bay and Jones Island (within EP56) at the mouth of the bay].

Benthic Habitat

The bay is mapped as patches of bare sand, dense and medium seagrass. Around Jones Island in the mouth of the bay extensive low limestone reefs appear.

Biota

43.45% of the cell is remnant vegetation. This cell contains 8 flora and 1 fauna BDBSA survey sites, 1 opportune flora site, 5 herbarium flora record sites and 12 opportune fauna sites. South of Baird Bay township *Olearia axillaris* shrubland and *Eucalyptus diversifolia* mallee woodland are found; further north small patches of grassland, sedge and salt marsh are main remnants: *Gahnia filum*, *Gahnia lanigera*, *Triodia compacta* (around soaks and springs). Some woodland patches remain, including *Allocasuarina verticulata* and *Eucalyptus brachycalyx*. Small patches of salt marsh recorded. 99% of the vegetation in this cell is not protected.

Land Use/ Land Ownership

A coastal reserve of unalloted Crown land extends around the lengthy shoreline of this cell, varying in width from <10m to >600m at the Washpool, and backed by privately owned land. This cell includes the unnamed island of the Baird Bay Islands Conservation Park. A small allotment of Crown land Act reserve under the care, control and management of the District

Council of Streaky Bay occurs just north of the Baird Bay settlement. The Baird Bay Islands Conservation Park is on the Register of the National Estate. Baird Bay is a Wetland of National Importance, SA 004. The settlement of Baird Bay is within this cell.

Baird Bay is a Wetland of National Importance, SA 004.

West Coast Bays Marine Park within Baird Bay and offshore.

FIGURE 6.33 Baird Bay looking towards Pondla. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

Baird Bay is an important fishing ground for local commercial and recreational fishers, targeting primarily King George Whiting.
Ecotourism venture operate in Baird Bay, focussing on taking visitors out to swim with sea lions.
Agriculture – grazing and cropping
Recreation– ORV use, hunting / shooting, boating, well defined formal campsite
Rubbish dump – now closed
Water extraction

Values (Field visits and local reports)

Shorebird data set spans 32 years (Cooper 2010), Baird Bay 2020 Shorebird Area stretches along the eastern shoreline from the Un-named Island to Baird Bay village and comprises 3 count areas.
21 shorebird species; 14 EPBC listed migratory species and 7 resident species. The eastern shoreline; sandflats, sedgeland and salt marsh with ground water soaks is rich in meiofauna. This critical shorebird habitat in Baird Bay has regularly supported 2,000-3,000 shorebirds since monitoring began in 1979 (Cooper 2010). Baird Bay has nationally significant populations of Red-necked Stint, Ruddy Turnstone, Common Greenshank and Grey Plover.

The bay and groundwater soaks have provided a drought refuge in the past and habitat for 12 species of waterbirds. Pelicans, cormorants, gulls and terns and buff banded rail breed on the islands, feed in the bay and rest on the sandbars and spits.
Soaks are present both above and below highwater.

Threats (Field visits and local reports)

There are numerous infestations of coastal weeds, primarily agricultural weed species, however there are European Olive, African Boxthorns and Acacia Cyclops populations present
Old Calca settlement site and school have areas of weeds and rubbish dumps.
Large weed numbers (succulents) behind township
Agriculture – encroachment, wandering stock
Water extraction
Eco-tourism / tourism ventures
Uncontrolled ORV usage
Development
PCASS
Pre 1980s – duck shooters and hides
10 years of drought with unregulated water extraction for stock

Opportunities (Field visits and local reports)

AWSG 1980-2003 and Shorebirds 2020 Population Monitoring Program 2004-2011.
The Baird Bay township dump is the focus of a current devolved grants process with the Friends of Sceale Bay Chain of Bays project. This project will rehabilitate the site by removing rubbish, controlling weed species and revegetation of the site. A fencing project by an adjacent landholder has largely restricted the headland from stock access.
Protection of ground water resources
Active community
Educational opportunities

Conservation Analysis (GIS)

Total conservation means sum to 113.7, a medium total within the region. The top of the bay, north of 'Pondla' ruin, shows low totals, while much of the rest of the cell is medium to high. Gahnia sedgelands and Melaleuca over Gahnia shows high totals for small areas south of 'Kalka' and west of the 'Washpool Spring'.

Although there are several valuable variables that make up this priority score, other very low total scores reduce the total to a moderate one; low scores for vegetation metrics and heritage values are significant here. High totals are found for vegetation associations with threatened status, associations with rarity within SA, vegetation with threatened status for plant species, threatened status of fauna, vegetation with a high endemism value, animal and plant species richness, habitat for threatened birds, habitat for numbers of bird species, habitat for threatened mammals, habitat for the Eastern Osprey and Australian Pied Oystercatcher (focal species), also viewscape and viewshed.
Four mammal, 2 reptile and 81 birds species have been recorded for this cell, including a variety of ducks; threatened bird species include the state endangered Eastern Osprey, White-bellied Sea-Eagle and Fairy Tern, and also numerous EPBC listed migratory species including Grey Plover, Ruddy Turnstone, Common Greenshank and Red-necked Stint.

Threat Analysis (GIS)

The total of threat summary layers is 49.54, high for the region. These high totals are widespread throughout the cell, notably at the head of the bay; near to Baird Bay settlement there are a number of areas where high threat totals overlap high conservation totals.
Individual threat layers which have high totals include: ORV (throughout the cell, with some concentration near Baird Bay settlement), land ownership and land use, viewshed and viewscape, numbers of exotic plant species and invasive weeds (notably African Boxthorn in eucalyptus mallee woodland and Acacia shrubland between 'Pondla' and 'Kalka').

Adaptation to Climate Change Threats

(see also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	**Impacts and implications (for this cell)**	**Protect and manage habitat threats**	**Address landscape issues: fire, connectivity, refuges, hydrology**
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Rise in frequency of tidal flooding of small salt marsh areas, threatening intertidal salt marsh species, and leading to marsh recession	Monitor salt marsh flooding and salt marsh habitat through the establishment of a profile line survey. Ensure salt marsh retreat where possible	
	Sandy coast near Baird Bay settlement will show recession	Monitor dune habitat conditions	
2070: +c.80cm.	Sandy coast shows marked recession;	Active management of dune blowouts	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides.	Monitor salt marsh flooding and beach recession. Ensure salt marsh retreat where possible.	
	Marine sediment ingress into bay, leading to migration of sandflats and shoreline changes	Monitor using aerial image time series, see above.	
Intensity of large storms increases	2070: Frequent flooding., and to an increasing extent.	Ensure salt marsh retreat where possible.	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing vegetation is found in warmer conditions elsewhere)		Maintain N-S connectivity of vegetation within the peninsula
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune and salt marsh habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Grassy weed invasion	Active weed control	Ensure dune vegetation is within the regional fire plan.
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Increasing saline groundwater pressure on freshwater soaks. Local impact on soil water and vegetation survival	Monitoring to inform management of soaks, and of plant assets	Monitor level and salinity of water table within the calcarenite.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate		

TABLE 6.31 Recommended Actions and Priority for EP57 Baird Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly mammals and reptiles.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Potential impact on breeding habitats of the endangered White-bellied Sea-Eagle, particularly during the breeding season.	Develop site management and monitoring strategy, including closure, relocation or seasonal closures of roads/walking tracks/car parks in the near vicinity. Ensure management/works programs are not undertaken during the breeding season. Community education.	Medium (threat)	Private land owner, DENR

Component	Issue	Proposed Action	Priority of Action	Key Players
	Climate change and sea level rise is having multiple effects within the cell	Ensure the establishment and maintenance of a time series of aerial photographs at an appropriate high resolution. Maintain connectivity between vegetation blocks to maximise resilience	Medium (cons)	DENR, EP NRM, community groups
	Areas within cell identified as being important for rare and endemic plant communities and as habitat for threatened species, including shorebirds and raptors, with potential disturbance from agricultural activities, development zoning, recreational activities, land management practices, uncontrolled access, weeds and pest animals	Review management and land and water management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. dogs on leashes, track management, rehabilitation of old dumpsites, pest animal and plant control, restrict access to sensitive locations. Investigate and mitigate impacts on freshwater soaks eg. the Washpool Work with private landowners to ensure that stock are restricted from the coastal zone (eg. ensure fences are adequate and maintained) Install interpretive/ educational signage. Community education programs. Review development plan zoning to these areas to increase protection	High (cons/ threat)	DENR, private land owners, EP NRM, DPLG, DC of Streaky Bay, community groups
	Existing development impacting on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Work with private land owners to minimise impact from existing development, including education, restoration where appropriate and/or negotiation/enforcement to ensure the developments and agriculture do not encroach on the Crown coastal reserve Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs, cats and ORV, etc	High (cons/ threat)	EP NRM, DC of Streaky bay, DENR, private land owners, community groups
	Fresh water soaks threatened by rising sea level and saline groundwater pressure	Monitor soaks to inform management	Medium (cons)	EP NRM, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Unrestricted access and multiple vehicle tracks around the coast impacting on the coastal vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	Medium (cons/ threat)	Private land owners, DC of Streaky Bay, DTEI, DENR, EP NRM
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	High (cons/ threat)	EP NRM, private land owners, DC of Streaky Bay, DENR
	Eco-tourism activities with potential impacts on native species	Manage and monitor these activities to ensure they are not negatively impacting on native species, and are adhering to marine mammal interaction guidelines.	Medium	PIRSA, SARDI, DENR, EP NRM, tourism operators
All salt marsh and low lying areas	All salt marsh and low lying areas show the potential for acid sulfate soil following disturbance; in turn this would potentially threaten all life forms within the bay.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Medium	DC of Streaky Bay, DENR, EP NRM, developers, private land owners
	Salt marsh areas threatened by acceleration in rise of sea level	Monitor salt marsh for sea level rise squeeze; facilitate retreat where possible.	Medium	DENR, EP NRM, DC of Streaky Bay, community
Baird Bay settlement	Formal camping area with impact from multiple tracks, weeds, soil compaction, vegetation trampling and removal, local impact from visitors	Develop camping management plan, including actions to minimise visitor impacts, eg. barriers/ fencing to prevent spread and informal tracks, signage, provision of appropriate amenities, weed management, maintenance of facilities/ infrastructure.	Medium	DC of Streaky Bay, EP NRM, SA Tourism, DENR, community

Component	Issue	Proposed Action	Priority of Action	Key Players
Northern end of Baird Bay	Introduced animals (rabbits); with impact on vegetation degradation, competition for food and habitat with native species.	Monitor and record existence and impacts of introduced pest animals eg. rabbits. Undertake a control program if required.	Medium	EP NRM, private land owners, DC of Streaky bay, DENR
Cell south of Washpool	Mining exploration licence applications cover this area, with potential impact on sensitive areas and conservation values	Ensure any mining activities avoid areas of high conservation significance. Investigate/ consider refusal of licence in high conservation areas.	Medium	PIRSA, DENR, EP NRM, DC of Streaky Bay
Mallee woodland south of Pondla	Presence of invasive weeds, notably boxthorn.	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required).	High (cons/ threat)	EP NRM, DENR, DC of Streaky Bay, private landowners
Beaches, sandbars, sand spits and islands	Significant shorebird breeding, feeding and resting habitat with potential disturbance from people, dogs and pest animals, etc.	Develop and implement site management and monitoring strategies to protect these valuable, eg. interpretive signage, fencing off nests, use of chick shelters, pest animal control programs, temporary signage in breeding territories, restricting off-leash dogs during breeding/migratory season. Undertake and/or support ongoing shorebird monitoring programs. Community education and awareness programs, eg. "chicks on beach".	High (cons/ threat)	DC of Streaky Bay, EP NRM, DTEI, DENR, SA Tourism, Birds Australia, community

BIOTA

Flora

Remnant vegetation area (ha)	779.99 ha, 47.20% of cell area
# flora surveys / records	8 surveys, 1 opportune sites, 5 herbarium record sites
# flora in cell	145
# conservation rated flora in cell	5
# non-indigenous flora in cell	28
Significant CDCS floristic community	*Triodia compacta* hummock grassland - <20 (13) sites recorded along SA coast, 100% of these in EP
Protected area	0.33% of remnant vegetation protected within Baird Bay Islands CP, 0.1% of remnant vegetation within Heritage Agreement

Weeds

Species	Common Name	Status	Study rating
Asparagus asparagoides (NC)	Bridal Creeper	D, RA	9
Lycium ferocissimum	African Boxthorn	D, RA	8
Olea europaea ssp.	Olive	D, RA	5
Oxalis pes-caprae	Soursob	D, RA	5
Mesembryanthemum crystallinum	Common Iceplant	RA	4
Ammophila arenaria	Marram Grass		2
Anagallis arvensis	Pimpernel		2
Apium graveolens	Celery		0
Arctotheca calendula	Cape Weed		1
Avellinia michelii	Avellinia		0
Avena barbata	Bearded Oat		2
Bromus diandrus	Great Brome		2
Bromus madritensis	Compact Brome		2
Bromus rubens	Red Brome		2
Bupleurum semicompositum	Hare's Ear		0
Hainardia cylindrica	Common Barb-grass		0
Hypochaeris glabra	Smooth Cat's Ear		2
Medicago polymorpha var. polymorpha	Burr-medic		1
Mesembryanthemum sp.	Iceplant		3
Oxalis corniculata ssp. corniculata	Creeping Wood-sorrel		0
Paspalum vaginatum	Salt-water Couch		2
Rostraria cristata	Annual Cat's-tail		2
Silene nocturna	Mediterranean Catchfly		1
Sisymbrium erysimoides	Smooth Mustard		0
Sisymbrium irio	London Mustard		0
Sonchus oleraceus (NC)	Common Sow-thistle		0
Spergularia sp.	Sand-spurrey		0
Urospermum picroides	False Hawkbit		0

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Caladenia tensa	Inland Green-comb Spider-orchid	E	
Crassula sieberiana	Sieber's Crassula		E
Tecticornia flabelliformis	Bead Samphire	V	V
Myoporum parvifolium	Creeping Boobialla		R
Poa fax	Scaly Poa		R
Acacia anceps			
Acacia anceps (NC)	Angled Wattle		
Acacia cupularis	Cup Wattle		
Acacia ligulata	Umbrella Bush		
Acrotriche patula	Prickly Ground-berry		
Apium prostratum var. prostratum	Native Celery		
Atriplex cinerea	Coast Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrodanthonia setacea	Small-flower Wallaby-grass		
Austrostipa drummondii	Cottony Spear-grass		
Austrostipa elegantissima	Feather Spear-grass		

Species	Common Name	Aus status	SA status
Austrostipa flavescens	Coast Spear-grass		
Austrostipa scabra ssp. falcata	Slender Spear-grass		
Baumea juncea	Bare Twig-rush		
Beyeria lechenaultii	Pale Turpentine Bush		
Blennospora drummondii	Dwarf Button-flower		
Brachyscome lineariloba	Hard-head Daisy		
Brachyscome perpusilla	Tiny Daisy		
Brachyscome sp.	Native Daisy		
Caladenia capillata	Wispy Spider-orchid		
Carpobrotus rossii (NC)	Native Pigface		
Cassytha melantha	Coarse Dodder-laurel		
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Comesperma volubile	Love Creeper		
Cyperus laevigatus	Bore-drain Sedge		
Cyrtostylis robusta	Robust Gnat-orchid		
Daucus glochidiatus	Native Carrot		
Dianella brevicaulis	Short-stem Flax-lily		
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Dodonaea baueri	Crinkled Hop-bush		
Dodonaea hexandra	Horned Hop-bush		
Drosera macrantha ssp. planchonii	Climbing Sundew		
Elymus scaber var. scaber	Native Wheat-grass		
Elymus scaber var. scaber (NC)	Native Wheat-grass		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eremophila glabra ssp. Murray (A.G.Spooner 14470)	Small Tar Bush		
Eriochilus cucullatus	Parson's Bands		
Erodium crinitum	Blue Heron's-bill		
Erodium sp.	Heron's-bill/Crowfoot		
Eucalyptus calcareana	Nundroo Mallee		
Eucalyptus diversifolia (NC)	Coastal White Mallee		
Eutaxia microphylla	Common Eutaxia		
Exocarpos aphyllus	Leafless Cherry		
Ficinia nodosa	Knobby Club-rush		
Frankenia pauciflora var. gunnii	Southern Sea-heath		
Gahnia filum	Thatching Grass		
Gahnia lanigera	Black Grass Saw-sedge		
Gahnia trifida	Cutting Grass		
Geijera linearifolia	Sheep Bush		
Geranium sp.	Geranium		
Goodenia pusilliflora	Small-flower Goodenia		
Halosarcia sp. (NC)	Samphire		
Helichrysum leucopsideum	Satin Everlasting		
Hydrocotyle pilifera var. glabrata	Buttercup Pennywort		
Juncus kraussii	Sea Rush		
Lasiopetalum behrii	Pink Velvet-bush		
Lasiopetalum discolor	Coast Velvet-bush		
Lepidosperma congestum (NC)	Clustered Sword-sedge		
Lichen sp.			
Linum marginale	Native Flax		
Lycium australe	Australian Boxthorn		
Maireana oppositifolia	Salt Bluebush		

Species	Common Name	Aus status	SA status
Malva preissiana	Australian Hollyhock		
Melaleuca acuminata ssp. acuminata	Mallee Honey-myrtle		
Melaleuca halmaturorum	Swamp Paper-bark		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Melaleuca uncinata (NC)	Broombush		
Microseris lanceolata	Yam Daisy		
Microtis arenaria	Notched Onion-orchid		
Millotia tenuifolia var. tenuifolia	Soft Millotia		
Moss sp.			
Muehlenbeckia adpressa	Climbing Lignum		
Olearia axillaris	Coast Daisy-bush		
Oxalis perennans (NC)	Native Sorrel		
Pelargonium littorale	Native Pelargonium		
Pittosporum angustifolium	Native Apricot		
Plantago sp. B (R.Bates 44765)	Little Plantain		
Poa poiformis var. poiformis	Coast Tussock-grass		
Pogonolepis muelleriana	Stiff Cup-flower		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Salsola tragus	Buckbush		
Samolus repens	Creeping Brookweed		
Sarcocornia blackiana	Thick-head Samphire		
Sarcocornia quinqueflora	Beaded Samphire		
Scaevola crassifolia	Cushion Fanflower		
Selliera radicans	Shiny Swamp-mat		
Senecio glossanthus (NC)	Annual Groundsel		
Senecio pinnatifolius (NC)	Variable Groundsel		
Senecio spanomerus			
Spinifex hirsutus	Rolling Spinifex		
Sporobolus virginicus	Salt Couch		
Suaeda australis	Austral Seablite		
Tecticornia halocnemoides ssp. halocnemoides	Grey Samphire		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Thelymitra nuda	Scented Sun-orchid		
Thelymitra nuda (NC)	Scented Sun-orchid		
Threlkeldia diffusa	Coast Bonefruit		
Thryptomene micrantha	Ribbed Thryptomene		
Thysanotus patersonii	Twining Fringe-lily		
Trachymene pilosa	Dwarf Trachymene		
Triglochin striata	Streaked Arrowgrass		
Triodia irritans	Spinifex		
Vittadinia australasica var.	Sticky New Holland Daisy		
Vittadinia megacephala	Giant New Holland Daisy		
Wahlenbergia gracilenta	Annual Bluebell		
Westringia dampieri	Shore Westringia		
Wurmbea dioica ssp. dioica (NC)	Early Star-lily		
Wurmbea dioica ssp. dioica (NC)	Early Nancy		
Zygophyllum apiculatum	Pointed Twinleaf		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	87 recorded – 81 birds, 0 butterflies, 4 mammals, 2 reptiles, 0 amphibians (an additional 23 reptiles and 27 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	1 survey site, 12 opportune sites
# of threatened fauna in cell	18
# of non-indigenous fauna	5 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Sturnus vulgaris	Common Starling	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p
Felis catus	Cat (Feral Cat)	Mammalia	x
Mus musculus	House Mouse	Mammalia	x
Oryctolagus cuniculus	Rabbit (European Rabbit)	Mammalia	x
Vulpes vulpes	Fox (Red Fox)	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Pandion cristatus	Eastern Osprey	M	E
Sternula nereis	Fairy Tern		E
Cladorhynchus leucocephalus	Banded Stilt		V
Numenius madagascariensis	Eastern Curlew	M	V
Thinornis rubricollis	Hooded Plover		V
Arenaria interpres	Ruddy Turnstone	M	R
Biziura lobata	Musk Duck		R
Calidris tenuirostris	Great Knot	M	R
Charadrius leschenaultii	Greater Sand Plover	M	R
Charadrius mongolus	Lesser Sand Plover	M	R
Egretta garzetta	Little Egret		R
Egretta sacra	Eastern Reef Egret		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Limosa lapponica	Bar-tailed Godwit	M	R
Pluvialis fulva	Pacific Golden Plover	M	R
Podiceps cristatus	Great Crested Grebe		R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Acanthiza chrysorrhoa	Yellow-rumped Thornbill		
Anas castanea	Chestnut Teal		
Anas gracilis	Grey Teal		
Anthochaera carunculata	Red Wattlebird		
Anthus novaeseelandiae	Australasian Pipit		
Aquila audax	Wedge-tailed Eagle		
Ardea modesta	Eastern Great Egret		
Artamus cyanopterus	Dusky Woodswallow		
Cacomantis pallidus	Pallid Cuckoo		
Calidris acuminata	Sharp-tailed Sandpiper	M	

Species	Common Name	Aus status	SA status
Calidris canutus	Red Knot	M	
Calidris ferruginea	Curlew Sandpiper	M	
Calidris ruficollis	Red-necked Stint	M	
Chalcites osculans	Black-eared Cuckoo		
Charadrius bicinctus	Double-banded Plover		
Charadrius ruficapillus	Red-capped Plover		
Chroicocephalus novaehollandiae	Silver Gull		
Cincloramphus cruralis	Brown Songlark		
Circus approximans	Swamp Harrier		
Circus assimilis	Spotted Harrier		
Colluricincla harmonica	Grey Shrike-thrush		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Coturnix pectoralis	Stubble Quail		
Cracticus tibicen	Australian Magpie		
Cracticus torquatus	Grey Butcherbird		
Cygnus atratus	Black Swan		
Egretta novaehollandiae	White-faced Heron		
Eolophus roseicapillus	Galah		
Epthianura albifrons	White-fronted Chat		
Falco cenchroides	Nankeen Kestrel		
Gallirallus philippensis	Buff-banded Rail		
Glyciphila melanops	Tawny-crowned Honeyeater		
Himantopus himantopus	Black-winged Stilt		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Larus pacificus	Pacific Gull		
Lichenostomus leucotis	White-eared Honeyeater		
Lichenostomus virescens	Singing Honeyeater		
Malurus lamberti	Variegated Fairy-wren		
Microcarbo melanoleucos	Little Pied Cormorant		
Mirafra javanica	Horsfield's Bushlark		
Ocyphaps lophotes	Crested Pigeon		
Pelecanus conspicillatus	Australian Pelican		
Phalacrocorax carbo	Great Cormorant		
Phalacrocorax fuscescens	Black-faced Cormorant		
Phalacrocorax varius	Pied Cormorant		
Phaps chalcoptera	Common Bronzewing		
Phylidonyris novaehollandiae	New Holland Honeyeater		
Pluvialis squatarola	Grey Plover	M	
Poliocephalus poliocephalus	Hoary-headed Grebe		
Pomatostomus superciliosus	White-browed Babbler		
Psephotus varius	Mulga Parrot		
Purnella albifrons	White-fronted Honeyeater		
Rhipidura albiscapa	Grey Fantail		
Rhipidura leucophrys	Willie Wagtail		
Sericornis frontalis	White-browed Scrubwren		
Thalasseus bergii	Crested Tern		
Tribonyx ventralis	Black-tailed Native-hen		
Tringa nebularia	Common Greenshank	M	
Vanellus miles	Masked Lapwing		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

No mammal species recorded

Reptiles

Species	Common Name	Aus status	SA status	Record
Amphibolurus norrisi	Mallee Tree-dragon			e
Christinus marmoratus	Marbled Gecko			e
Ctenophorus chapmani	Prickly Dragon			c
Ctenophorus fionni	Peninsula Dragon			c
Ctenophorus fordi	Mallee Dragon			c
Ctenotus euclae	Bight Coast Ctenotus			c
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Diplodactylus calcicolus	South Coast Gecko			c
Egernia stokesii	Gidgee Skink			e
Gehyra variegata	Tree Dtella			e
Hemiergis peronii	Four-toed Earless Skink			c
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e

Species	Common Name	Aus status	SA status	Record
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			e
Morethia obscura	Mallee Snake-eye			x
Nephrurus milii	Barking Gecko			c
Parasuta spectabilis	Mallee Black-headed Snake			x
Pogona barbata	Eastern Bearded Dragon			c
Pseudechis australis	Mulga Snake			c
Pseudonaja affinis	Dugite			c
Pygopus lepidopodus	Common Scaly-foot			c
Tympanocryptis lineata	Five-lined Earless Dragon			c

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP58 Point Labatt

Cell area 4,851 ha. Shoreline length 35.94 km.

Landforms

This peninsula is calcarenite over basement rocks: the granite/ adamellite of the Hiltaba Suite basement is exposed in an extensive shore platform at Point Labatt. The calcarenite plateau shows small clifftop dunes on the western edge and slopes gradually towards Baird Bay, where seagrass and intertidal mudflats are interspersed with low calcarenite bluffs. Shorelines are varied. Point Labatt to the north is calcarenite cliffs 10 – 50m, with sand at the base and some dunes. Point Labatt to Cape Radstock is cliffs >100m, with fresh cliff faces and collapse features suggesting relatively rapid erosion. East of Cape Radstock cliff heights rapidly decline and as the shoreline turns to enter Baird Bay there is first low cliffs and then sandy beaches backed by dunes and sand spits protecting salt marsh areas.

Benthic Habitat

Limestone reef tracks the whole west coast to the entrance of Baird Bay, with the small exception of Point Labatt, where granite reef is recorded. Baird Bay is mapped with both dense and medium patchy seagrass, together with bare sand patches.

Biota

This cell contains 2,107ha of remnant vegetation, which is 43.5% of the cell area. The pattern of vegetation communities is complex. On the west coast *Olearia axillaris, Leucopogon parviflorus* shrubland and *Nitraria billardierei, Olearia axillaris* mid open shrubland is found in the most exposed areas, with low open mallee *Eucalyptus dumosa* further back from the cliff edge. The lower slopes in the east have small patches of *Triodia compacta* hummock grassland, *Gahnia lanigera* sedgeland, *Allocasuarina verticillata* low woodland, with wetlands of *Melaleuca halmaturorum* over *Gahnia filum*, also *Tecticornia halocnemoides* ssp. salt marsh.
There are 9 BDBSA flora surveys, 5 opportune flora sites, 7 herbarium flora record sites, 1 flora reserve database record site, 8 fauna opportune sites and 2 fauna reserve database record sites.

Land Use/ Land Ownership

Point Labatt Conservation Park is located on the north west point of this cell and accounts for 0.75% of the cell area.; offshore is a small aquatic Reserve prohibited area, to protect the Australian Sea-lion colony.
A coastal reserve of unalloted Crown land extends along the entire shoreline of the peninsula (apart from the Conservation Park), varying in width from approximately 30m to over 1km on

the eastern side of the peninsula in a salt marsh habitat. This is backed by privately owned land mainly used for agricultural purposes.

Baird Bay is a Wetland of National Importance, SA 004.

West Coast Bays Marine Park within Baird Bay and offshore.

FIGURE 6.34 Sediment constructing sand spit and salt marsh, entrance to Baird Bay, east side of EP58. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

Past issues with stock grazing in the coastal reserve.
Tarwonga is currently stocked well below capacity and managed for sustainable grazing. In future, the landholder proposes to undertake rehabilitation of sheoak grassy woodlands to implement sustainable grazing regimes on former cropping land, as well as revegetating lowland shrublands with perennial pasture and native shrublands to supplement this.
A lookout and viewing platform exists at Point Labatt for viewing of sea lion haul out area.
Shacks located on south west side of the peninsula.
Conservation – Point Labatt CP

Threats (Field visits and local reports)

Eco-tourism / tourism ventures – eg. previous proposal to construct road in sensitive coastal area.
Development

Opportunities (Field visits and local reports)

The private landholder, with their land management consultant, has been implementing actions from their environmental management plan to protect the conservation values of the area. A

recent project on the Baird Bay side of Cape Radstock installed almost 10km of stock proof fencing to exclude stock from the fragile samphire coastal wetlands and low vegetated coastal dune system. This project also followed on from an Envirofund project that protected a further 6km of coastline as well as the high coastal cliffs between Point Labatt and Cape Radstock; the coastline on the property of Tarwonga is subsequently almost entirely fenced to restrict stock and vehicles.
Continue to support and assist environmental works in this area
Opportunity to continue re-establishing sheoak grasslands, grazing management and rabbit control
(Point Labatt Conservation Park Management Plan objectives and actions on conservation of flora & fauna; protection of sea-lion colony; public safety; public use and education).

Conservation Analysis (GIS)

The sum of conservation means is 93.86, average for the region. Medium high values characterise the remnant vegetation of the coastal slopes; low values are found for the cleared land of the centre of the peninsula. Some very small areas of high values are found within the salt marsh and the sand dunes. Summary statistics show there are many layers with very low values for this cell, hence its modest total.
The conservation layers with high totals include threatened flora associations, habitat for threatened bird species (mainly along the shores of Baird Bay), habitat for threatened mammals (woodland and dune areas), habitat for White-bellied Sea Eagle (focal species), and viewshed. There is a registered Indigenous heritage site within the cell.

FIGURE 6.35 Pt Labatt, west side of EP58, granite platform and ramp, calcarenite cliff, (with observation platform). Photo: Coast Protection Board, 2007

Threat Analysis (GIS)

The threat total for EP58 is 51.04, very high within the region. With the exception of the small sand dune and salt marsh areas, the entire cell shows high to medium high values.

Major contributors to this high total are zoning (primary industry and coastal zone), land ownership and land use, viewshed and viewscape, proportion of exotic plant species and distribution of invasive weeds.

Adaptation to Climate Change Threats

(see also discussion of scenario in section 4.11)

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	**Impacts and implications (for this cell)**	**Protect and manage habitat threats**	**Address landscape issues: fire, connectivity, refuges, hydrology**
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Rise in frequency of tidal flooding of salt marsh, threatening intertidal salt marsh species, and leading to marsh recession. Recession and some loss of small pocket beaches on west side of peninsula.	Monitor salt marsh flooding and salt marsh habitat, and shoreline change, through the establishment of a profile line survey near the entrance to Baird Bay. Ensure salt marsh retreat where possible	
2070: +c.80cm.	Loss of small pocket beaches on west side of peninsula. Marked reduction of inter-tidal platform habitat		
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides Increased migration of marine ingress sediment into bay, leading to shoreline change, and change in low tide shorebird feeding areas	Monitor salt marsh flooding. Establish salt marsh retreat buffer zones. Monitor sediment movement, using time series of aerial images, see above.	
Intensity of large storms increases	2070: Frequent flooding., and to an increasing extent.	Ensure salt marsh retreat where possible.	
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing vegetation is found in warmer conditions elsewhere)		Maintain N-S connectivity of vegetation within the peninsula

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune and salt marsh habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage	Active weed control	Ensure dune vegetation is within the regional fire plan.
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Local impact on soil water and vegetation survival, through increased saline groundwater pressure.	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains sediment movement towards the south along the west coast of the peninsula, leading to phases of erosion and accretion at beaches.	Monitor beaches, see above.	

TABLE 6.32 Recommended Actions and Priority for EP58 Point Labatt

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	Medium (cons)	DENR, EP NRM
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, private land owners, community groups, EP NRM
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg. rabbits. Undertake a control program if required. Work with private landowners to ensure that stock are restricted from the coastal zone (eg. ensure fences are adequate and maintained)	Medium (cons)	EP NRM, private land owners, DENR

Component	Issue	Proposed Action	Priority of Action	Key Players
	Potential impact on breeding habitat of the endangered White-bellied Sea-Eagle, particularly during the breeding season.	Develop site management and monitoring strategy, including consideration to closure, relocation or seasonal closures of roads/walking tracks/car parks in the near vicinity. Ensure management/works programs are not undertaken during the breeding season. Community education.	High (cons)	DENR, private land owners
	Areas within cell identified as being important for rare and endemic plant communities and as habitat for threatened species, including shorebirds and raptors, with potential disturbance from agricultural activities, development zoning, recreational activities, land management practices, uncontrolled access, weeds and pest animals	Continue to support and work with private landowner to ensure protection and management of sensitive areas. Review development plan zoning to these areas to increase protection. Install interpretive/ educational signage where appropriate. Community education programs. Review development plan zoning to these areas to increase protection	High (cons/ threat)	Private land owners, DENR, EP NRM, DPLG, DC of Streaky Bay, community
	Existing development impacting on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Work with private land owner to ensure impacts from existing development are minimise including education and/or restoration where appropriate	Medium (cons/ threat)	EP NRM, DENR, private land owner
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	Medium	EP NRM, private land owners, DENR, community

Component	Issue	Proposed Action	Priority of Action	Key Players
Point Labatt CP	Potential & actual impact on high conservation values, including from weeds, pest animals, runoff erosion and recreational activities.	Ongoing implementation of the Management Plan to protect threatened species and minimise impacts and threats to flora and fauna. Update Management Plan as required	High (cons)	DENR
Cliff tops	Some informal tracks and informal car parks close to potentially unstable cliff edge; safety hazard and impact from soil compaction, vegetation damage, weed introduction, fauna disturbance, soil stability and water runoff erosion	Review with a view to close or reroute tracks and car parks that are too close to cliff edge.	High (Hazard; cons/ threat)	DENR, private land owners
All salt marsh and low lying areas	All salt marsh and low lying areas show the potential for acid sulfate soil following disturbance; in turn this would potentially threaten all life forms within the bay.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Medium	Private land owners, DENR, DC of Streaky Bay, developers, EP NRM

BIOTA

Flora

Remnant vegetation area (ha)	2,107.37 ha, 43.45% of cell area
# flora in cell	121
# flora surveys / records	9 surveys, 5 opportune sites, 7 herbarium record sites, 2 threatened plant population record site, 1 reserve database record site.
# conservation rated flora in cell	2
# non-indigenous flora in cell	13
Significant CDCS floristic community	Nil
Protected area	2% of remnant vegetation protected within Pt Labatt CP

Weeds

Species	Common Name	Status	Study rating
Argyranthemum frutescens ssp. foeniculaceum	Teneriffe Daisy	RA	4
Mesembryanthemum crystallinum	Common Iceplant	RA	4
Lycium ferocissimum	African Boxthorn	D, RA	8
Anagallis *arvensis*	Pimpernel		2

Species	Common Name	Status	Study rating
Avena barbata	Bearded Oat		2
Briza maxima	Large Quaking-grass		0
Bromus rubens	Red Brome		2
Bupleurum semicompositum	Hare's Ear		0
Centaurium sp.	Centaury		1
Medicago sp.	Medic		1
Sonchus oleraceus (NC)	Common Sow-thistle		0
Spergularia media (NC)	Coast Sand-spurrey		0
Spergularia sp.	Sand-spurrey		0

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Prostanthera calycina	West Coast Mintbush	V	V
Poa fax	Scaly Poa		R
Acacia anceps			
Acacia cupularis	Cup Wattle		
Acacia longifolia ssp. sophorae	Coastal Wattle		
Acacia sp. Winged (C.R.Alcock 4936)	Angled Wattle		
Acacia spinescens	Spiny Wattle		
Acrotriche cordata	Blunt-leaf Ground-berry		
Acrotriche patula	Prickly Ground-berry		
Allocasuarina verticillata	Drooping Sheoak		
Angianthus tomentosus	Hairy Angianthus		
Atriplex paludosa ssp.	Marsh Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrostipa drummondii	Cottony Spear-grass		
Austrostipa elegantissima	Feather Spear-grass		
Austrostipa exilis	Heath Spear-grass		
Austrostipa nitida	Balcarra Spear-grass		
Austrostipa sp.	Spear-grass		
Austrostipa velutina			
Beyeria lechenaultii	Pale Turpentine Bush		
Brachyscome ciliaris var. ciliaris	Variable Daisy		
Caladenia dilatata complex	Green-comb Spider-orchid		
Callitris canescens	Scrubby Cypress Pine		
Carpobrotus rossii (NC)	Native Pigface		
Cassytha glabella f. dispar	Slender Dodder-laurel		
Chrysocephalum apiculatum	Common Everlasting		
Comesperma volubile	Love Creeper		
Danthonia sp. (NC)	Wallaby-grass		
Daucus glochidiatus	Native Carrot		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eremophila crassifolia	Thick-leaf Emubush		
Eremophila glabra ssp. glabra	Tar Bush		
Eucalyptus diversifolia ssp. diversifolia	Coastal White Mallee		
Eucalyptus oleosa ssp. ampliata	Red Mallee		
Eucalyptus yalatensis	Yalata Mallee		
Eutaxia microphylla	Common Eutaxia		

Species	Common Name	Aus status	SA status
Exocarpos aphyllus	Leafless Cherry		
Exocarpos sparteus	Slender Cherry		
Exocarpos syrticola	Coast Cherry		
Ficinia nodosa	Knobby Club-rush		
Frankenia pauciflora var. gunnii	Southern Sea-heath		
Frankenia sessilis	Small-leaf Sea-heath		
Gahnia lanigera	Black Grass Saw-sedge		
Geijera linearifolia	Sheep Bush		
Goodenia pinnatifida	Cut-leaf Goodenia		
Goodenia varia	Sticky Goodenia		
Halosarcia sp. (NC)	Samphire		
Helichrysum leucopsideum	Satin Everlasting		
Lasiopetalum discolor	Coast Velvet-bush		
Lawrencia squamata	Thorny Lawrencia		
Lepidosperma congestum (NC)	Clustered Sword-sedge		
Lepidosperma viscidum	Sticky Sword-sedge		
Leucophyta brownii	Coast Cushion Bush		
Lomandra collina	Sand Mat-rush		
Lomandra effusa	Scented Mat-rush		
Lycium australe	Australian Boxthorn		
Maireana erioclada	Rosy Bluebush		
Maireana oppositifolia	Salt Bluebush		
Maireana trichoptera	Hairy-fruit Bluebush		
Melaleuca halmaturorum	Swamp Paper-bark		
Melaleuca lanceolata	Dryland Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Microseris lanceolata	Yam Daisy		
Minuria leptophylla	Minnie Daisy		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Olearia ramulosa	Twiggy Daisy-bush		
Opercularia turpis	Twiggy Stinkweed		
Oxalis perennans (NC)	Native Sorrel		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pittosporum angustifolium	Native Apricot		
Podolepis rugata var. littoralis	Coast Copper-wire Daisy		
Pterostylis cycnocephala	Swan-head Greenhood		
Pultenaea elachista	Limestone Bush-pea		
Pultenaea tenuifolia	Narrow-leaf Bush-pea		
Rhagodia candolleana ssp.	Sea-berry Saltbush		
Rhagodia crassifolia	Fleshy Saltbush		
Samolus repens	Creeping Brookweed		
Sarcocornia blackiana	Thick-head Samphire		
Sarcocornia quinqueflora	Beaded Samphire		
Scaevola crassifolia	Cushion Fanflower		
Sclerolaena uniflora	Small-spine Bindyi		
Senecio pinnatifolius (NC)	Variable Groundsel		
Senecio pinnatifolius var. maritimus	Variable Groundsel		
Senecio sp.	Groundsel		
Sonchus sp.	Sow-thistle		
Sporobolus virginicus	Salt Couch		
Spyridium phylicoides	Narrow-leaf Spyridium		
Tecticornia arbuscula	Shrubby Samphire		

Species	Common Name	Aus status	SA status
Tecticornia halocnemoides ssp.	Grey Samphire		
Tecticornia halocnemoides ssp. longispicata	Grey Samphire		
Tecticornia indica ssp.	Brown-head Samphire		
Tecticornia pruinosa	Bluish Samphire		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Thryptomene micrantha	Ribbed Thryptomene		
Thysanotus sp.	Fringe-lily		
Trichanthodium skirrophorum	Woolly Yellow-heads		
Triodia compacta	Spinifex		
Triodia irritans	Spinifex		
Triodia sp. (NC)	Spinifex		
Westringia dampieri	Shore Westringia		
Wilsonia humilis	Silky Wilsonia		
Zygophyllum ammophilum (NC)	Sand Twinleaf		
Zygophyllum billardierei	Coast Twinleaf		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	50 recorded – 47 birds, 0 butterflies, 2 mammals, 1 reptiles, 0 amphibians (an additional 24 reptiles and 27 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	8 opportune sites, 2 reserve database record sites
# of threatened fauna in cell	19
# of non-indigenous fauna	2 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Pieris rapae rapae	Cabbage White	Invertebrate	p
Felis catus	Cat (Feral Cat)	Mammalia	x
Vulpes vulpes	Fox (Red Fox)	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Pandion cristatus	Eastern Osprey	M	E
Sternula nereis	Fairy Tern		E
Cladorhynchus leucocephalus	Banded Stilt		V
Numenius madagascariensis	Eastern Curlew	M	V
Thinornis rubricollis	Hooded Plover		V
Arenaria interpres	Ruddy Turnstone	M	R
Biziura lobata	Musk Duck		R
Calidris alba	Sanderling	M	R
Calidris tenuirostris	Great Knot	M	R

Species	Common Name	Aus status	SA status
Charadrius leschenaultii	Greater Sand Plover	M	R
Charadrius mongolus	Lesser Sand Plover	M	R
Egretta sacra	Eastern Reef Egret		R
Falco peregrinus	Peregrine Falcon		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Limosa lapponica	Bar-tailed Godwit	M	R
Pluvialis fulva	Pacific Golden Plover	M	R
Podiceps cristatus	Great Crested Grebe		R
Anas gracilis	Grey Teal		
Ardea modesta	Eastern Great Egret		
Ardenna tenuirostris	Short-tailed Shearwater		
Calamanthus campestris	Rufous Fieldwren		
Calidris acuminata	Sharp-tailed Sandpiper	M	
Calidris canutus	Red Knot	M	
Calidris ferruginea	Curlew Sandpiper	M	
Calidris ruficollis	Red-necked Stint	M	
Charadrius bicinctus	Double-banded Plover		
Chroicocephalus novaehollandiae	Silver Gull		
Corvus coronoides	Australian Raven		
Cygnus atratus	Black Swan		
Falco cenchroides	Nankeen Kestrel		
Himantopus himantopus	Black-winged Stilt		
Hirundo neoxena	Welcome Swallow		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Morus serrator	Australasian Gannet		
Oreoica gutturalis	Crested Bellbird		
Pelecanus conspicillatus	Australian Pelican		
Phalacrocorax carbo	Great Cormorant		
Phalacrocorax fuscescens	Black-faced Cormorant		
Phalacrocorax sulcirostris	Little Black Cormorant		
Phalacrocorax varius	Pied Cormorant		
Pluvialis squatarola	Grey Plover	M	
Thalasseus bergii	Crested Tern		
Tringa nebularia	Common Greenshank	M	
Vanellus miles	Masked Lapwing		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p

Species	Common Name	Status*	Record
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

No mammal species recorded

Reptiles

Species	Common Name	Aus status	SA status	Record
Amphibolurus norrisi	Mallee Tree-dragon			e
Christinus marmoratus	Marbled Gecko			e
Ctenophorus chapmani	Prickly Dragon			c
Ctenophorus fionni	Peninsula Dragon			c
Ctenophorus fordi	Mallee Dragon			c
Ctenotus euclae	Bight Coast Ctenotus			c
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Diplodactylus calcicolus	South Coast Gecko			c
Egernia stokesii	Gidgee Skink			e
Gehyra variegata	Tree Dtella			e
Hemiergis peronii	Four-toed Earless Skink			c
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			x
Morethia obscura	Mallee Snake-eye			c
Nephrurus milii	Barking Gecko			c
Parasuta spectabilis	Mallee Black-headed Snake			c
Pogona barbata	Eastern Bearded Dragon			c
Pseudechis australis	Mulga Snake			c
Pseudonaja affinis	Dugite			c
Pygopus lepidopodus	Common Scaly-foot			c
Tympanocryptis lineata	Five-lined Earless Dragon			c

R: Rare, V: Vulnerable, E: Endangered

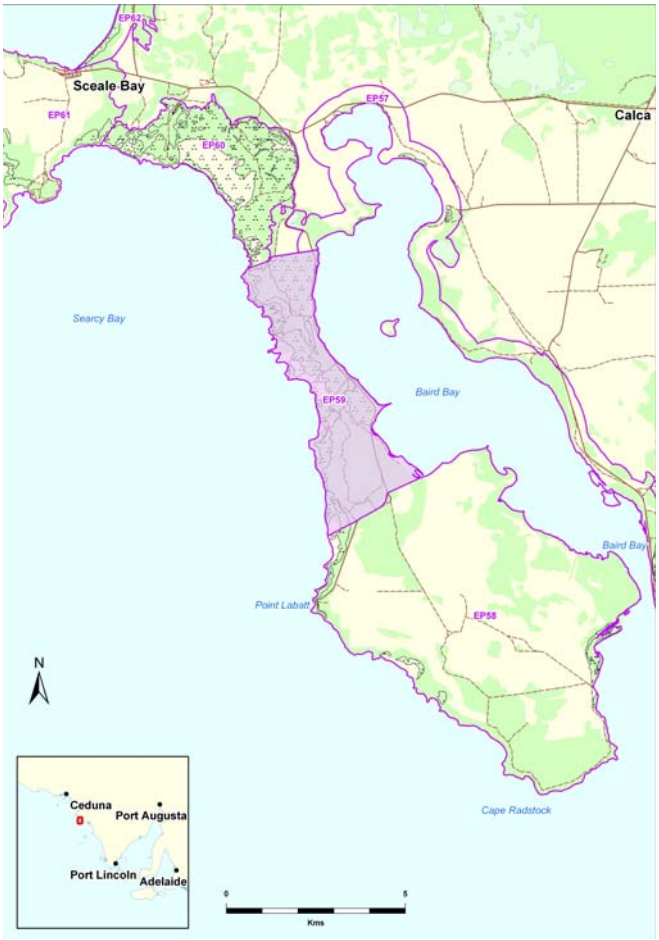
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP59 Calca Peninsula

Cell area 1,310 ha. Shoreline length 20.98 km.



Landforms

This small cell comprises the narrow stem of the calcarenite Calca Peninsula, between Baird Bay and the Southern Ocean, and from 1 to 2 km wide. The Searcy Bay south shore is mainly low/medium eroding cliffs with small inaccessible beaches. These beaches are of coarse sand in the north and south and fine sand on the beach and dune, centrally placed in the cell. Wave energy is high; however there are many inshore reefs. The Baird Bay shore is a sheltered intertidal salt marsh shore fronted by seagrass, in part low calcarenite bluffs fronted by sands and intertidal seagrass. There are small quantities of Holocene sand accumulation, and a small sand spit is forming. The low undulating calcarenite surface is approximately 50% sand dune covered.

Benthic Habitat

Searcy Bay has limestone reef throughout, except for a small area of granite reef (below). Baird Bay is sandy with seagrass patches.

Biota

1,184 ha or 52% of the cell is remnant vegetation. There are 6 BDBSA flora survey sites, 2 herbarium flora record sites and 7 opportune fauna sites in this cell.
The cell may broadly be divided between tall open shrubland in the west and mid-mallee eucalyptus woodland in the east: *Olearia axillaris, Leucopogon parviflorus* tall open shrubland over *Threlkeldia diffusa, Tetragonia implexicoma, Rhagodia candolleana ssp. candolleana, Pimelea serpyllifolia ssp. serpyllifolia* low shrubs over *Muehlenbeckia adpressa, Dianella brevicaulis, Carpobrotus rossii, Clematis microphylla var. microphylla, Senecio pinnatifolius; Eucalyptus brachycalyx, Eucalyptus oleosa ssp.* mid mallee woodland over +/-*Melaleuca pauperiflora ssp. mutica, +/-Melaleuca lanceolata* tall shrubs over +/-*Olearia muelleri, +/-Maireana erioclada* low shrubs.
In the south of the cell there are smaller patches of low shrubland/ grassland: *Triodia compacta, Frankenia pauciflora var. fruticulosa, +/-Gahnia lanigera* low hummock grassland; also *Melaleuca lanceolata* tall shrubland.

Land Use/ Land Ownership

A coastal reserve of unalloted Crown land runs along the extent of the Searcy Bay and Baird Bay shoreline, varying in width from approximately 20m to >700 m on the south west boundary of the cell. The coastal reserve is backed by 11 privately owned allotments, 10 of which are under Heritage Agreements (77% of cell area). Baird Bay is a Wetland of National Importance, SA 004.

West Coast Bays Marine Park within Baird Bay and offshore.

FIGURE 6.36 Calca Peninsula: Searcy Bay, granite basement reef with overlying calcarenite; clifftop dunes, and calcarenite surface, dune; Baird Bay and sandspit. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

Salmon Beach, a popular fishing spot in Searcy Bay, is accessible from the Point Labatt Road at the Point Labatt end of the series of Heritage Agreement blocks, and numerous tracks extend along the cliffs from this primary access track. A number of surf breaks are accessed via the Point Labatt Road; most are found up behind the dunes near the intersection of Point Labatt Road and Benbarber Road.
Recreation and tourism – camping, ORV use, surfing, fishing, sight seeing
Scattered dwellings
Boat launching and fishing in Baird Bay

Threats (Field visits and local reports)

Unmanaged access is the main issue in this cell. There are infestations of some weeds including African Boxthorn and some European Olive. Stock is an issue in some areas of this cell, particularly accessing dues from the top of the cell.
Uncontrolled camping
Development

Opportunities (Field visits and local reports)

Rationalise vehicle movement and track closure / re-alignment

Conservation Analysis (GIS)

Calca Peninsula has a high total score for the region: 122.86. Generally the higher scores are on the dunes, and the vegetated limestone plateau. Some smaller areas have medium/low totals: de-vegetated dunes; a small area of *Geijera linearifolia* shrubland on the Baird Bay coast; and parts of the mallee woodland and parts of the Triodia grassland in the south of the cell. Small deflated areas on cliff tops along the exposed western shore total very low values.
The highest values contributing to the total are rarity of vegetation associations, endemicity of vegetation associations, habitat for threatened bird species, habitat for a number of reptile species, butterfly habitat, habitat for focal species Eastern Osprey and White-bellied Sea-Eagle, viewscape and viewshed and vegetation metrics.
There are no mammals, reptile or amphibians recorded within the cell, but there are 30 bird species are recorded, including the state endangered Eastern Osprey and Fairy Tern.

Threat Analysis (GIS),

Threats total of 32.94 is low for this cell. The pattern of total values map is complex, but shows only small areas of moderate/high threat (for example a small area in the extreme NW corner of the cell, affected by rabbit numbers, ORV activity and dune instability; almost all the cell shows medium/low to low threat totals.
The main contributors to the total are viewshed and viewscape. Smaller, but notable, threat values are seen in dune instability, cliff instability, and proportion of exotic species

Adaptation to Climate Change Threats

(see also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	**Impacts and implications (for this cell)**	**Protect and manage habitat threats**	**Address landscape issues: fire, connectivity, refuges, hydrology**
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Rise in frequency of tidal flooding of salt marsh, threatening intertidal salt marsh species, and leading to marsh recession Small beaches fronting cliffs on west side of peninsula will reduce in size	Monitor salt marsh habitat change. Ensure salt marsh retreat where possible	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
2070: +c.80cm.	Sandy coast has marked recession: pocket beaches fronting cliffs lost. Erosion of calcarenite cliffs accelerated.		
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides	(Monitor salt marsh flooding – see above)	
Intensity of large storms increases	2070: Frequent flooding., and to an increasing extent.	Ensure salt marsh retreat where possible.	
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing vegetation is found in warmer conditions elsewhere)		Maintain N-S connectivity of vegetation within the peninsula
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune and salt marsh habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. All dunes show increased instability; invasion of dunes by grassy weeds.	Active weed control	Ensure dune vegetation is within the regional fire plan.
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Local impact on soil water within calcarenite limestone affects vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate		

TABLE 6.33 Recommended Actions and Priority for EP59 Calca Peninsula

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Climate change and sea level rise is having multiple effects within the cell	Ensure the establishment and maintenance of a time series of aerial photographs at an appropriate high resolution. Maintain connectivity between vegetation blocks to maximise resilience	Medium (cons)	DENR, EP NRM, community groups
	Areas within cell identified as being important for rare and endemic plant communities and as habitat for threatened species, including shorebirds and raptors, with potential disturbance from agricultural activities, recreational activities, land management practices, uncontrolled access, weeds and pest animals	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches, dogs on leashes, track management, pest animal and plant control, restrict access to sensitive locations. Work with private land owners to ensure that stock are restricted from sensitive coastal areas (eg. ensure fences are adequate and maintained) Work with Heritage Agreement owners to improve management and protection. Install interpretive/ educational signage. Community education programs.	High (cons/ threat)	DENR, private land owners, EP NRM, DC of Streaky Bay, community groups
	Potential impact on breeding habitat of the endangered Eastern Osprey, particularly during the breeding season.	Develop site management and monitoring strategy, including consideration to closure, relocation or seasonal closures of roads/walking tracks/car parks in the near vicinity. Ensure management/works programs are not undertaken during the breeding season. Community education.	High (cons/ threat)	DENR, EP NRM, community groups, DC of Streaky Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
	Existing and future development with potential impact on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Work with private land owners to minimise impact from existing development, including education and restoration where appropriate. Ensure future development is not located in areas of high conservation value or high sensitivity. Review development plan zoning to these areas to increase protection Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs, cats and ORV, etc	High (cons/ threat)	EP NRM, DC of Streaky Bay, DENR, DPLG, private land owners, community groups
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	Medium	DC of Streaky Bay, DENR, EP NRM, community groups
	Unrestricted access and multiple vehicle tracks around the coast impacting on the coastal dune and cliff top vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	Medium	DC of Streaky Bay, DTEI, DENR, EP NRM, SA Tourism, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	Medium (threat)	EP NRM, private land owners, DC of Streaky Bay, DENR, community
Salt marsh areas on east coast of peninsula	All salt marsh areas show the potential for acid sulfate soil following disturbance; in turn this would potentially threaten all life forms within the bay.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Medium	DC of Streaky Bay, DENR, EP NRM, community groups
	Salt marsh is threatened by on-going and accelerating sea level rise; sediment movement will continue to cause shoreline change in Baird Bay	Monitor salt marsh habitat change. Ensure salt marsh retreat where possible	Medium	EP NRM, DENR, DC of Streaky Bay, DPLG, EP LGA, private land owners, community
Beaches (Baird Bay)	Vehicles and dogs on beaches and beach boat launching with potential impact on meiofauna, shorebirds and intertidal species and/or habitat.	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Review beach boat launching locations with a view to rationalise. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	Medium	DC of Streaky Bay, EP NRM, DTEI, EP LGA, DENR, Tourism SA, Birds Australia, community

Component	Issue	Proposed Action	Priority of Action	Key Players
Dunes in extreme NW corner of cell	An isolated area of rabbit activity within a high value context (and EP60)	Undertake rabbit control program. Continue to monitor rabbit activity	Medium	EP NRM, DC of Streaky Bay, DENR, private land owners
Cliff tops	Some informal tracks and informal car parks close to potentially unstable cliff edge; safety hazard and impact from soil compaction, vegetation damage, weed introduction, fauna disturbance, soil stability and water runoff erosion	Review with a view to close or reroute tracks and car parks that are too close to cliff edge.	High (Hazard; cons/ threat)	DC of Streaky Bay, DENR, EP NRM, DTEI, community

BIOTA

Flora

Remnant vegetation area (ha)	1183.67 ha, 90.35% of cell area
# flora surveys / records	6 surveys, 2 herbarium record sites
# flora in cell	49
# conservation rated flora in cell	0
# non-indigenous flora in cell	2
Significant CDCS floristic community	*Triodia compacta* hummock grassland - <20 (13) sites recorded along SA coast, 100% of these in EP *Melaleuca lanceolata* / *Atriplex paludosa* ssp shrubland – 96% of SA records in EP *Olearia axillaris* / *Tetragonia implexicoma* shrubland – 75% of SA records in EP
Protected area	81% of remnant vegetation within vegetation Heritage Agreements

Weeds

Species	Common Name	Status	Study rating
Centaurea melitensis	Malta Thistle		1
Rostraria cristata	Annual Cat's-tail		2

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Acacia anceps			
Acacia anceps (NC)	Angled Wattle		
Acrotriche patula	Prickly Ground-berry		
Alyxia buxifolia	Sea Box		
Angianthus tomentosus	Hairy Angianthus		

Species	Common Name	Aus status	SA status
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Austrodanthonia setacea	Small-flower Wallaby-grass		
Austrostipa sp.	Spear-grass		
Carpobrotus rossii (NC)	Native Pigface		
Chrysocephalum apiculatum	Common Everlasting		
Comesperma volubile	Love Creeper		
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eremophila crassifolia	Thick-leaf Emubush		
Eremophila deserti	Turkey-bush		
Eucalyptus brachycalyx	Gilja		
Eucalyptus gracilis	Yorrell		
Eucalyptus oleosa (NC)	Red Mallee		
Eucalyptus rugosa	Coastal White Mallee		
Eutaxia microphylla	Common Eutaxia		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos syrticola	Coast Cherry		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Gahnia lanigera	Black Grass Saw-sedge		
Geijera linearifolia	Sheep Bush		
Gramineae sp.	Grass Family		
Helichrysum leucopsideum	Satin Everlasting		
Hemichroa diandra	Mallee Hemichroa		
Lawrencia squamata	Thorny Lawrencia		
Leucophyta brownii	Coast Cushion Bush		
Lomandra collina	Sand Mat-rush		
Lycium australe	Australian Boxthorn		
Maireana erioclada	Rosy Bluebush		
Melaleuca gibbosa	Slender Honey-myrtle		
Melaleuca lanceolata	Dryland Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Scaevola crassifolia	Cushion Fanflower		
Senecio pinnatifolius (NC)	Variable Groundsel		
Tetragonia implexicoma	Bower Spinach		
Thysanotus baueri	Mallee Fringe-lily		
Triodia compacta	Spinifex		
Westringia dampieri	Shore Westringia		
Zygophyllum billardierei	Coast Twinleaf		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	30 recorded – 30 birds, 0 butterflies, 0 mammals, 0 reptiles, 0 amphibians (an additional 25 reptiles and 27 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	7 opportune sites
# of threatened fauna in cell	10
# of non-indigenous fauna	1 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Sturnus vulgaris	Common Starling	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Pandion cristatus	Eastern Osprey	M	E
Sternula nereis	Fairy Tern		E
Cladorhynchus leucocephalus	Banded Stilt		V
Numenius madagascariensis	Eastern Curlew	M	V
Thinornis rubricollis	Hooded Plover		V
Biziura lobata	Musk Duck		R
Calidris alba	Sanderling	M	R
Falco peregrinus	Peregrine Falcon		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Neophema petrophila	Rock Parrot		R
Anthochaera carunculata	Red Wattlebird		
Apus pacificus	Fork-tailed Swift	M	
Charadrius ruficapillus	Red-capped Plover		
Chroicocephalus novaehollandiae	Silver Gull		
Colluricincla harmonica	Grey Shrike-thrush		
Egretta novaehollandiae	White-faced Heron		
Falco cenchroides	Nankeen Kestrel		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Morus serrator	Australasian Gannet		
Pelecanus conspicillatus	Australian Pelican		
Phalacrocorax carbo	Great Cormorant		
Phalacrocorax varius	Pied Cormorant		
Poliocephalus poliocephalus	Hoary-headed Grebe		
Thalasseus bergii	Crested Tern		
Tringa nebularia	Common Greenshank	M	
Vanellus miles	Masked Lapwing		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p

Species	Common Name	Status*	Record
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

No mammal species recorded

Reptiles

Species	Common Name	Aus status	SA status	Record
Amphibolurus norrisi	Mallee Tree-dragon			e
Christinus marmoratus	Marbled Gecko			e
Ctenophorus chapmani	Prickly Dragon			c
Ctenophorus fionni	Peninsula Dragon			c
Ctenophorus fordi	Mallee Dragon			c
Ctenotus euclae	Bight Coast Ctenotus			c
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Diplodactylus calcicolus	South Coast Gecko			c
Egernia stokesii	Gidgee Skink			e
Gehyra variegata	Tree Dtella			e
Hemiergis peronii	Four-toed Earless Skink			c
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			e
Morethia obscura	Mallee Snake-eye			c
Nephrurus milii	Barking Gecko			c
Parasuta spectabilis	Mallee Black-headed Snake			c
Pogona barbata	Eastern Bearded Dragon			c
Pseudechis australis	Mulga Snake			c
Pseudonaja affinis	Dugite			c
Pygopus lepidopodus	Common Scaly-foot			c
Tympanocryptis lineata	Five-lined Earless Dragon			c

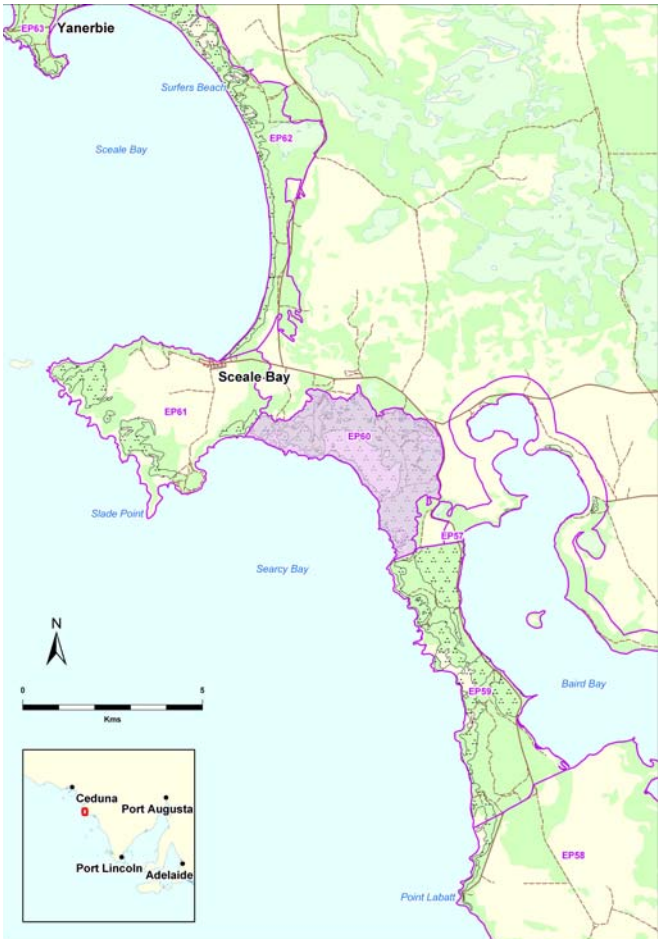
R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP60 Searcy Bay

Cell area 1,072 ha. Shoreline length 7.02 km.



Landforms

This cell is almost entirely made up of transgressive, Holocene, barrier dunes over calcarenite, that have trapped run off from the coastal plain in seasonal lakes. These wetlands have become saline over time. There are small areas of deflated dune above cliffs, and inland near Yanera Well. The shoreline is varied: in the western half there are low calcarenite cliffs behind coarse beaches of moderate exposure, protected by calcarenite reefs. A long sandy high energy beach with transgressive unstable dunes runs middle to south, with cliffs reefs and clifftop dunes in the south.

Benthic Habitat

This is mapped as entirely heavy limestone or calcarenite reef.

Biota

75% of the cell is remnant vegetation. Coastal sand dunes cover 89% of the cell. This cell is remarkable in that almost the whole area is covered with one coastal shrubland: *Olearia axillaris, Leucopogon parviflorus* tall open shrubland over *Threlkeldia diffusa, Tetragonia implexicoma, Rhagodia candolleana ssp. candolleana, Pimelea serpyllifolia ssp. serpyllifolia* low shrubs over *Muehlenbeckia adpressa, Dianella brevicaulis, Carpobrotus rossii, Clematis microphylla var. microphylla, Senecio pinnatifolius*. There are patches of *Gahnia lanigera* sedgeland on the inner parts of the dunes.
There are 3 BDBSA flora survey sites, 5 herbarium flora record sites and 3 opportune fauna sites.

Land Use/ Land Ownership

A small allotment on the southern boundary of this cell is under a Crown land Act reserve to the District Council of Streaky Bay, and a small area within a Heritage Agreement. To the north of this a narrow (c.30m) coastal reserve is backed by 5 large allotments all of unalloted Crown land, which include most of the Searcy Bay dunes and in areas extend landward beyond the study boundary (Note: these five allotments were recently purchased by the SA Government and were in private ownership at the time of analysis, thus the land ownership threat was identified as being higher during the process). The western portion of the cell contains a coastal reserve (c.70-250m) of unalloted Crown land backed by privately owned land.

West Coast Bays Marine Park offshore

FIGURE 6.37 Southern end of Searcy Bay cell; Baird Bay in background. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

Exposure to swell and many breaks on reefs make this shoreline attractive to surfing, with numerous tracks to access the surf breaks.
Recreation and tourism – fishing, ORV use
A couple of scattered dwellings, with holiday accommodation

Values (Field visits and local reports)

Much of this area has evidence of being sheoak heathy woodland in the past. Whilst it appears in good condition, the senescent sheoaks show a very different community in the recent past. Species observed, but not recorded within the BDBSA include the Drooping Sheoak *Allocasuarina verticillata* and sea-lavender *Limonium sp.*

Threats (Field visits and local reports)

Unmanaged vehicle access
Some infestations of rabbits in sand dune areas, foxes and cats also present (noted in spotlight surveys by EP NRM staff)
High numbers of native herbivores
Some stock access to coastal areas from adjacent areas.

Opportunities (Field visits and local reports)

Rationalise vehicle movement and track closure / re-alignment
Removal of stock and rabbits

Conservation Analysis (GIS)

Total priority 125.19 is high for the region. Other than bare unstable dunes and deflated areas, the dune shrubland shows medium to high totals. Endemic plant associations and floristics; views, vegetation metrics, and habitat for focal species make up the higher values contributing to this total; however several other threatened flora and fauna layers make some contribution, as does butterfly habitat.
Beach habitat for focal species Australian Pied Oystercatcher, habitat for focal species Eastern Osprey, White-bellied Sea-Eagle, Beach Slider, and Bight Coast Skink reflect the character and remoteness of this cell.
There are 5 reptile and 17 bird species recorded within the cell, including the state endangered Eastern Osprey, White-bellied Sea-Eagle and Fairy Tern.

Threat Analysis (GIS)

49.47 – this total of threat means is high for the region. The pattern of total threats is complex, although generally threats are medium to high. Major contributors to this total are dune instability, numbers of exotic species, (land ownership – changed since data gathered for analysis), and viewscape. Unstable dune areas used by ORV appear to be accessed by a small number of tracks, including the beach, raising the contribution of this threat.

Adaptation to Climate Change Threats

(see also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	**Impacts and implications (for this cell)**	**Protect and manage habitat threats**	**Address landscape issues: fire, connectivity, refuges, hydrology**
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Recession and some loss of beaches fronting cliffs and bluffs		
2070: +c.80cm.	Loss of beaches fronting cliffs and bluffs. Increase in cliff erosion. Loss of shorebird habitat Marked reduction of inter-tidal platform habitat		
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides		

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Intensity of large storms increases	2070: Frequent flooding., and to an increasing extent.		
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing vegetation is found in warmer conditions elsewhere)		Maintain N-S connectivity of vegetation within the peninsula
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune and salt marsh habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Dune instability and transgressive movement increases. Invasion of dunes by grassy weeds.	Active weed control Maintain aerial image time series to record dune changes	Ensure dune vegetation is within the regional fire plan.
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Local impact on soil water and vegetation survival, through increased saline groundwater pressure.	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate		

TABLE 6.34 Recommended Actions and Priority for EP60 Searcy Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Climate change and sea level rise is having multiple effects within the cell	Ensure the establishment and maintenance of a time series of aerial photographs at an appropriate high resolution. Maintain connectivity between vegetation blocks to maximise resilience	Medium (cons)	DENR, EP NRM, community groups

Component	Issue	Proposed Action	Priority of Action	Key Players
	Species identified that are not within the BDBSA	Identify records and surveys that are not in the BDBSA (eg. private surveys/records, government surveys not yet entered). Evaluate/verify data and enter into the BDBSA	High (cons)	DENR, EP NRM, community
	Areas within cell identified as being important for endemic plant communities and as habitat for threatened species, including raptors, with potential disturbance from agricultural activities, recreational activities, land management practices, uncontrolled access, weeds and pest animals	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches, track management, pest animal and plant control, restrict access to sensitive locations. Consideration to adding the unalloted Crown land to the reserve system. Install interpretive/ educational signage. Community education programs.	High (cons)	DENR, private land owners, EP NRM, DPLG, DC of Streaky Bay, community groups
	Potential impact on breeding habitat of the endangered Eastern Osprey, particularly during the breeding season.	Develop site management and monitoring strategy, including consideration to closure, relocation or seasonal closures of roads/walking tracks/car parks in the near vicinity. Ensure management/works programs are not undertaken during the breeding season. Community education	High (cons)	DENR, EP NRM, DC of Streaky Bay, community, private land owners
	Unrestricted access with multiple vehicle tracks and informal car parks throughout the cell impacting on the coastal dune and cliff top vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks and car parks with a view to rationalise unnecessary tracks and/or car parks. Block access (eg. fencing/rocks) to tracks/car parks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks/car parks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	High (cons/ threat)	DENR, DC of Streaky Bay, DTEI, EP NRM, private land owners, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required).	Medium	EP NRM, private land owners, DENR
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg rabbits, foxes, cats. Undertake a control program if required. Work with private land owners to ensure that stock are restricted from the coastal zone (eg. ensure fences are adequate and maintained)	Medium	EP NRM, DENR, DC of Streaky Bay, private land owners
All dunes	Climate change trend towards increasing dryness threatens to increase instability and transgression	Maintain priority of dune management measures, including weed control, to slow transgression.	Medium	DENR, EP NRM, land owners, community
North of cell >700m from coast	Mining exploration licence covers much of the northern extent of the cell area, with potential impact on sensitive areas and conservation values	Ensure any mining activities avoid areas of high conservation significance Investigate/ consider removal of licence in high conservation areas.	Medium	PIRSA, DENR, EP NRM, DC of Streaky Bay
Beaches	Vehicles and dogs on beaches a threat to meiofauna and shorebirds	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	Medium	DC of Streaky Bay, EP NRM, DTEI, EP LGA, DENR, Birds Australia, community

Component	Issue	Proposed Action	Priority of Action	Key Players
Dunes on southern boundary of cell	An isolated area of rabbit activity within a high value context (and EP59)	Undertake rabbit control program. Continue to monitor rabbit activity	High	EP NRM, DC of Streaky Bay, DENR, private land owners
Cliff tops	Numerous informal tracks appear to be close to potentially unstable cliff edge; safety hazard and impact from soil compaction, vegetation damage, weed introduction, fauna disturbance, soil stability and water runoff erosion	Review with a view to close or reroute tracks that are too close to cliff edge.	High (Hazard; cons/ threat)	DENR, private land owners, DC of Streaky Bay, EP NRM, community
Western end of cell	Existing development with potential impact on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Work with private land owners to minimise impact from existing development, including education and restoration where appropriate. Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs, cats and ORV, etc	Medium	EP NRM, DC of Streaky Bay, DENR, private land owners, community groups

BIOTA

Flora

Remnant vegetation area (ha)	804.88ha, 75.10% of cell area
# flora surveys / records	3 surveys, 5 herbarium record sites
# flora in cell	63
# conservation rated flora in cell	1
# non-indigenous flora in cell	19
Significant CDCS floristic community	*Olearia axillaris* / *Tetragonia implexicoma* shrubland – 75% of SA records in EP
Protected area	2 ha within a Heritage Agreement (0.25% of remnant vegetation)

Weeds

Species	Common Name	Status	Study rating
Polygala virgata		RA	7
Lycium ferocissimum	African Boxthorn	D, RA	8
Marrubium vulgare	Horehound	D, RA	5

Species	Common Name	Status	Study rating
Diplotaxis tenuifolia	Lincoln Weed	D	3
Ammophila arenaria	Marram Grass		2
Anagallis arvensis	Pimpernel		2
Avena barbata	Bearded Oat		2
Avena sp.	Oat		2
Brassica tournefortii	Wild Turnip		3
Bromus rubens	Red Brome		2
Bupleurum semicompositum	Hare's Ear		0
Centaurea melitensis	Malta Thistle		1
Erodium cicutarium	Cut-leaf Heron's-bill		0
Hordeum glaucum	Blue Barley-grass		1
Medicago minima var. minima	Little Medic		1
Minuartia mediterranea	Slender Sandwort		0
Moraea setifolia	Thread Iris		0
Rostraria cristata	Annual Cat's-tail		2
Schismus barbatus	Arabian Grass		0

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Austrodanthonia laevis	Smooth Wallaby-grass		R
Acrotriche patula	Prickly Ground-berry		
Aphanes australiana	Australian Piert		
Aphanes australiana (NC)	Australian Piert		
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrostipa exilis	Heath Spear-grass		
Calytrix tetragona	Common Fringe-myrtle		
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Comesperma volubile	Love Creeper		
Crassula colorata var. acuminata	Dense Crassula		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Eucalyptus yalatensis	Yalata Mallee		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Gahnia lanigera	Black Grass Saw-sedge		
Geijera linearifolia	Sheep Bush		
Gnaphalium indutum ssp. indutum	Tiny Cudweed		
Gramineae sp.	Grass Family		
Helichrysum leucopsideum	Satin Everlasting		
Hemichroa diandra	Mallee Hemichroa		
Hypoxis glabella var. glabella	Tiny Star		
Lasiopetalum discolor	Coast Velvet-bush		
Lepidosperma viscidum	Sticky Sword-sedge		
Leucophyta brownii	Coast Cushion Bush		
Lichen sp.			
Lomandra collina	Sand Mat-rush		
Lomandra effusa	Scented Mat-rush		
Maireana oppositifolia	Salt Bluebush		
Melaleuca lanceolata	Dryland Tea-tree		
Moss sp.			
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		

Species	Common Name	Aus status	SA status
Oxalis perennans	Native Sorrel		
Oxalis perennans (NC)	Native Sorrel		
Pittosporum angustifolium	Native Apricot		
Podotheca angustifolia	Sticky Long-heads		
Pomaderris paniculosa ssp. paniculosa	Mallee Pomaderris		
Rhagodia candolleana ssp.	Sea-berry Saltbush		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia crassifolia	Fleshy Saltbush		
Ruppia tuberosa	Widgeon Grass		
Santalum acuminatum	Quandong		
Senecio pinnatifolius (NC)	Variable Groundsel		
Tetragonia implexicoma	Bower Spinach		
Vittadinia australasica var.	Sticky New Holland Daisy		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	22 recorded - 17 birds, 0 butterflies, 0 mammals, 5 reptiles, 0 amphibians (an additional 21 reptiles and 27 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	3 opportune sites
# of threatened fauna in cell	7
# of non-indigenous fauna	0 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Sturnus vulgaris	Common Starling	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Pandion cristatus	Eastern Osprey	M	E
Sternula nereis	Fairy Tern		E
Cladorhynchus leucocephalus	Banded Stilt		V
Numenius madagascariensis	Eastern Curlew	M	V
Thinornis rubricollis	Hooded Plover		V
Falco peregrinus	Peregrine Falcon		R
Acanthiza chrysorrhoa	Yellow-rumped Thornbill		
Colluricincla harmonica	Grey Shrike-thrush		
Corvus mellori	Little Raven		
Eolophus roseicapillus	Galah		
Falco cenchroides	Nankeen Kestrel		
Lichenostomus virescens	Singing Honeyeater		
Manorina flavigula	Yellow-throated Miner		
Ocyphaps lophotes	Crested Pigeon		

Species	Common Name	Aus status	SA status
Todiramphus pyrrhopygius	Red-backed Kingfisher		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

No mammal species recorded

Reptiles

Species	Common Name	Aus status	SA status	Record
Amphibolurus norrisi	Mallee Tree-dragon			e
Christinus marmoratus	Marbled Gecko			e
Ctenophorus chapmani	Prickly Dragon			x
Ctenophorus fionni	Peninsula Dragon			c
Ctenophorus fordi	Mallee Dragon			c
Ctenotus euclae	Bight Coast Ctenotus			c
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Diplodactylus calcicolus	South Coast Gecko			c

Species	Common Name	Aus status	SA status	Record
Egernia stokesii	Gidgee Skink			e
Gehyra variegata	Tree Dtella			e
Hemiergis peronii	Four-toed Earless Skink			c
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			x
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			x
Morethia adelaidensis	Adelaide Snake-eye			e
Morethia obscura	Mallee Snake-eye			c
Nephrurus milii	Barking Gecko			x
Parasuta spectabilis	Mallee Black-headed Snake			c
Pogona barbata	Eastern Bearded Dragon			c
Pseudechis australis	Mulga Snake			c
Pseudonaja affinis	Dugite			c
Pygopus lepidopodus	Common Scaly-foot			c
Tiliqua occipitalis	Western Bluetongue			x
Tympanocryptis lineata	Five-lined Earless Dragon			c

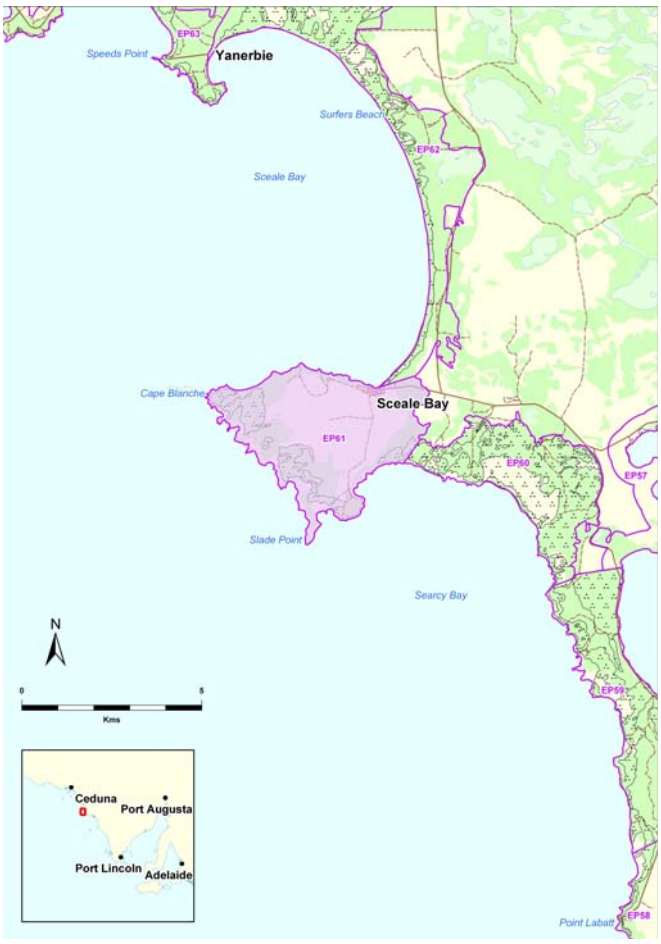
R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP61 Cape Blanche

Cell area 1,568 ha. Shoreline length 19.38 km.



Landforms

Cape Blanche and Slade Point are part of a large complex headland of Pleistocene calcarenite over bedrock, St Peters suite granite and adamellite. The bedrock is evident in the wide platforms at Slade Point and at the small headland immediately west. The calcarenite surface is low and gently undulating near Sceale Bay, and increases in height from east to west, to be seen at its highest at Cape Blanche, over 60m high. Degraded cliff top dunes <1 km wide are found above the cliffs at the SW facing end of the headland. At the eastern end of the cell are dunes linked to the beaches of Searcy Bay. The cliff top dunes have been deflated near the SW facing cliff edges, frequently to 200m from the cliff edge.

Benthic Habitat

This is mapped as entirely heavy limestone or calcarenite reef, but islands and reefs at the western end of the promontory are bedrock, granite.

Biota

The cliff tops (including vestigial cliff top dunes) are in low shrubland; the centre of the peninsula has been cleared and cultivated. The shrubland includes *Nitraria billardierei, +/-Olearia axillaris* mid open shrubland over *Threlkeldia diffusa, Tetragonia implexicoma, Rhagodia candolleana ssp. candolleana, Atriplex vesicaria ssp.* shrubs. Also areas of *Olearia axillaris, Leucopogon parviflorus* tall open shrubland over *Threlkeldia diffusa, Tetragonia implexicoma, Rhagodia candolleana ssp. candolleana, Pimelea serpyllifolia ssp. serpyllifolia* low shrubs over *Muehlenbeckia adpressa, Dianella brevicaulis, Carpobrotus rossii, Clematis microphylla var. microphylla, Senecio pinnatifolius. T*wo small areas of *Melaleuca lanceolata*, shrubland and one small area of *Eucalyptus Dumosa* low mallee woodland are also recorded. This cell contains 4 BDBSA flora survey sites, 8 herbarium flora record sites and 7 opportune fauna sites.

Land Use/ Land Ownership

A coastal reserve of unalloted Crown land varying in width from 30m- >350m extends around the whole cell, except for a small area in front of the Sceale Bay township. Much of the foreshore in front of the township is a Crown land Act Reserve under the care, control and management of the District Council of Streaky Bay. Four large allotments on the Cape Blanche headland, which make up a large proportion of the headland, are unalloted Crown land. (Note: these four allotments were recently purchased by the SA Government and were in private ownership at the time of analysis, thus the land ownership threat was identified as being higher during the process). Outside of these areas the land is privately owned.

West Coast Bays Marine Park offshore

FIGURE 6.38 Slade Point, looking towards Cape Blanche and Nicholas Baudin Island. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

There are a number of popular recreational beaches, used for sight seeing, day use/ picnicking, and fishing, etc, including Heart Bay on the Searcy Bay side of the Peninsula near Slade Point. Surf breaks are also located at various points along the coastline here. Nicolas Baudin Island (outside of the cell boundary) is a significant site for Australian Sea Lion and is a proclaimed Conservation Park. Cape Blanche was formerly an agricultural property, and recently purchased for conservation by DENR. The township of Sceale Bay is also located within this cell.

Threats (Field visits and local reports)

Unmanaged access to coastal cliff areas is a considerable threat to coastal vegetation and substrate stability in this cell, and includes use by unregistered vehicles such as quad bikes and trail bikes. Some stock access issues can also be seen periodically however most are resolved by the landholder. There are also issues with pest plants and animals particularly African Boxthorn and other pests like Horehound, foxes and rabbits. Closer to the township of Sceale Bay garden escape weeds like Gazania and Coast Daisy are a problem.
Eco-tourism / tourism ventures
Additional development
Day use area – picnics, car parks

Opportunities (Field visits and local reports)

A large Caring for Our Country project is currently operating in this area, which aims to undertake a number of priority actions to manage some of the threats listed above.

Conservation Analysis (GIS)

The total of conservation means is 96.53, medium for the region. The detailed map of summary means shows medium values throughout the vegetated areas, with medium to high values on the dunes.
The majority of the conservation values are from the totals for the priority as habitat for threatened plant species and threatened animal species, endemic plant communities (these three are medium to high through the whole cell), priority as habitat for threatened bird species (average throughout, but higher near the cliffs), priority as habitat for threatened mammal species (average throughout, but higher in the vegetated areas), habitat for the Eastern Osprey and the White-bellied Sea-Eagle (focal species – given the endangered status of these species, this may be the most significant value within this cell), viewscape and viewshed.
There is one mammal and 33 bird species recorded in this cell including the state endangered Eastern Osprey and White-bellied Sea-Eagle (focal species); and the state vulnerable Hooded Plover.

Threat Analysis (GIS)

The total of mean threats is 54.38, a high score for the region. The distribution of total threats is complex, but in general threats are medium to high, but higher in the eastern end of the cell than the west; only some SW cliff top areas show medium-low totals.
Threat priority values are highest for land ownership and land use (although land ownership threat would be lower now, with the purchase of land by the state), viewscape and viewshed, proportion of exotic species and distribution of invasive weeds, (notably African Boxthorn, and domestic escapes near Sceale Bay township). The round headland to the east of Slade Point shows a concentration of ORV activity. Cliff instability is a threat around the western cliffs. Mineral mining licence applications are recorded for the centre of the headland.

Adaptation to Climate Change Threats

(see also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Recession and some loss of beaches fronting cliffs		
2070: +c.80cm.	Loss of beaches fronting cliffs. Increase in cliff erosion. Marked reduction of inter-tidal platform habitat		

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides		
Intensity of large storms increases	2070: Frequent flooding., and to an increasing extent.		
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing vegetation is found in warmer conditions elsewhere)		Maintain N-S connectivity of vegetation within the peninsula
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune and salt marsh habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Dune instability and transgressive movement increases. Invasion of dunes by grassy weeds.	Active weed control Maintain aerial image time series to record dune changes	Ensure dune vegetation is within the regional fire plan.
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Local impact on soil water and vegetation survival, through increased saline groundwater pressure.	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate		

TABLE 6.35 Recommended Actions and Priority for EP61 Cape Blanche

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM

Component	Issue	Proposed Action	Priority of Action	Key Players
	Climate change and sea level rise is having multiple effects within the cell	Ensure the establishment and maintenance of a time series of aerial photographs at an appropriate high resolution. Maintain connectivity between vegetation blocks to maximise resilience	Medium (cons)	DENR, EP NRM, community groups
	Areas within cell identified as being important for endemic plant communities and as habitat for threatened species, including raptors and shorebirds, with potential disturbance from agricultural activities, recreational activities, development zoning, land management practices, uncontrolled access, weeds and pest animals	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. dogs on leashes, track management, pest animal and plant control, restrict access to sensitive locations. Review development plan zoning to these areas to increase protection Consideration to adding the unalloted Crown land to the reserve system. Install interpretive/ educational signage. Community education programs.	High (cons)	DENR, private land owners, EP NRM, DPLG, DC of Streaky Bay, community groups
	Potential impact on breeding habitats of the endangered Eastern Osprey and White-bellied Sea-Eagle, particularly during the breeding season.	Develop site management and monitoring strategy, including consideration to closure, relocation or seasonal closures of roads/walking tracks/car parks in the near vicinity. Ensure management works/programs are not undertaken near breeding sites during the breeding season. Community education.	High (cons)	DENR
	Unrestricted access, multiple vehicle tracks and informal car parks around the coast, with impact on coastal dune, salt marsh and cliff top vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	High	DENR, DC of Streaky Bay, DTEI, EP NRM, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg rabbits, foxes, cats. Undertake a control program if required. Work with private landowners to ensure that stock are restricted from the coastal zone (eg. ensure fences are adequate and maintained)	Medium	EP NRM, DENR, DC of Streaky Bay, private land owners
	Unregistered off-road vehicle use (eg. quad bikes, trail bikes): illegal, vegetation damage and potential dune destabilisation	Install educational signs on dune vegetation, stability and policy on unregistered vehicles e.g. quad bikes. Undertake compliance & education program	Medium (cons)	DENR, SAPOL, DC of Streaky Bay, DTEI, community
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	High (cons/ threat)	EP NRM, private land owners, DENR, DC of Streaky Bay, community
Cape Blanche / Slade Point headland	Informal day use / camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of day use/camping and car parks. Review locations, management and need for day use/camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage and maintain (eg. fencing, signs, weed management) areas where camping and car parks are permitted.	High	DENR, EP NRM, private land owners, community
Cliff tops	Numerous informal tracks and informal car parks close to potentially unstable cliff edge; safety hazard and impact from soil compaction, vegetation damage, weed introduction, fauna disturbance, soil stability and water runoff erosion	Review with a view to close or reroute tracks and car parks that are too close to cliff edge.	High (Hazard; cons/ threat)	DENR, private land owners, DC of Streaky Bay, EP NRM, community

Component	Issue	Proposed Action	Priority of Action	Key Players
Sceale Bay township and surrounds	Existing and future development with potential impact on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Work with private land owners to minimise impact from existing development, including education and restoration where appropriate. Ensure future development is not located in areas of high conservation value or high sensitivity. Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs and cats, etc	High (cons)	EP NRM, DC of Streaky Bay, DENR, DPLG, private land owners, community groups
Area > 800m from the coast	Mining exploration licence cover the area >800m from the coast, with potential impact on sensitive areas and conservation values	Ensure any mining activities avoid areas of high conservation significance. Investigate/ consider removal of licence in high conservation areas.	Medium	PIRSA, DENR, EP NRM, DC of Streaky Bay, private land owners

BIOTA

Flora

Remnant vegetation area (ha)	716.04ha, 45.65% of cell area
# flora surveys / records	4 surveys, 8 herbarium record sites
# flora in cell	61 (note: includes a marine species)
# conservation rated flora in cell	1
# non-indigenous flora in cell	7
Significant CDCS floristic community	*Melaleuca lanceolata* / *Tetragonia implexicoma* shrubland – 72% of SA records in EP
Protected area	No remnant vegetation protected

Weeds

Species	Common Name	Status	Study rating
Argyranthemum frutescens ssp.	Marguerite Daisy	RA	4
Gazania rigens	Gazania	RA	6
Pennisetum clandestinum	Kikuyu	RA	4
Lycium ferocissimum	African Boxthorn	D, RA	8
Marrubium vulgare	Horehound	D, RA	5
Diplotaxis tenuifolia	Lincoln Weed	D	3
Hordeum leporinum	Wall Barley-grass		1

D: Declared weed, RA: Red alert weed

Native flora*

Species	Common Name	Aus status	SA status
Prostanthera calycina	West Coast Mintbush	V	V
Acacia anceps			
Acacia anceps (NC)	Angled Wattle		
Acrotriche patula	Prickly Ground-berry		
Austrostipa acrociliata	Graceful Spear-grass		
Austrostipa sp.	Spear-grass		
Cassytha melantha	Coarse Dodder-laurel		
Cassytha peninsularis	Peninsula Dodder-laurel		
Comesperma volubile	Love Creeper		
Correa pulchella	Salmon Correa		
Danthonia sp. (NC)	Wallaby-grass		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Dodonaea baueri	Crinkled Hop-bush		
Eremophila glabra ssp. glabra	Tar Bush		
Eucalyptus calcareana	Nundroo Mallee		
Eucalyptus pileata	Capped Mallee		
Eutaxia microphylla	Common Eutaxia		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos syrticola	Coast Cherry		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Frankenia pauciflora var. gunnii	Southern Sea-heath		
Gahnia lanigera	Black Grass Saw-sedge		
Geijera linearifolia	Sheep Bush		
Goodenia varia	Sticky Goodenia		
Gramineae sp.	Grass Family		
Helichrysum leucopsideum	Satin Everlasting		
Lasiopetalum discolor	Coast Velvet-bush		
Lepilaena preissii	Slender Water-mat		
Leucophyta brownii	Coast Cushion Bush		
Lomandra effusa	Scented Mat-rush		
Maireana erioclada	Rosy Bluebush		
Maireana trichoptera	Hairy-fruit Bluebush		
Melaleuca gibbosa	Slender Honey-myrtle		
Melaleuca lanceolata	Dryland Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Melaleuca pauperiflora ssp. mutica	Boree		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pittosporum angustifolium	Native Apricot		
Ptilotus obovatus var. obovatus	Silver Mulla Mulla		
Rhagodia candolleana ssp.	Sea-berry Saltbush		
Rhagodia crassifolia	Fleshy Saltbush		
Riccia albida			
Samolus repens	Creeping Brookweed		
Scaevola crassifolia	Cushion Fanflower		
Senecio pinnatifolius (NC)	Variable Groundsel		
Spyridium phylicoides	Narrow-leaf Spyridium		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		

Species	Common Name	Aus status	SA status
Triodia compacta	Spinifex		
Westringia dampieri	Shore Westringia		
Westringia rigida	Stiff Westringia		

R: Rare, V: Vulnerable, E: Endangered
* note: includes a marine species

Fauna

# of fauna in cell	34 - 33 birds, 0 butterflies, 1 mammals, 0 reptiles (an additional 27 reptiles and 27 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	7 opportune sites
# of threatened fauna in cell	10
# of non-indigenous fauna	2 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Passer domesticus	House Sparrow	Aves	x
Sturnus vulgaris	Common Starling	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Pandion cristatus	Eastern Osprey	M	E
Sternula nereis	Fairy Tern		E
Cladorhynchus leucocephalus	Banded Stilt		V
Numenius madagascariensis	Eastern Curlew	M	V
Thinornis rubricollis	Hooded Plover		V
Arenaria interpres	Ruddy Turnstone	M	R
Calidris alba	Sanderling	M	R
Falco peregrinus	Peregrine Falcon		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Anthus novaeseelandiae	Australasian Pipit		
Ardenna tenuirostris	Short-tailed Shearwater		
Calidris ruficollis	Red-necked Stint	M	
Charadrius ruficapillus	Red-capped Plover		
Chroicocephalus novaehollandiae	Silver Gull		
Egretta novaehollandiae	White-faced Heron		
Eolophus roseicapillus	Galah		
Eudyptula minor	Little Penguin		
Falco cenchroides	Nankeen Kestrel		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Morus serrator	Australasian Gannet		

Species	Common Name	Aus status	SA status
Pelecanus conspicillatus	Australian Pelican		
Phalacrocorax fuscescens	Black-faced Cormorant		
Phalacrocorax varius	Pied Cormorant		
Pluvialis squatarola	Grey Plover	M	
Rhipidura leucophrys	Willie Wagtail		
Thalasseus bergii	Crested Tern		
Tringa nebularia	Common Greenshank	M	

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Cercartetus concinnus	Western Pygmy-possum		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Amphibolurus norrisi	Mallee Tree-dragon			e
Christinus marmoratus	Marbled Gecko			e
Ctenophorus chapmani	Prickly Dragon			c
Ctenophorus fionni	Peninsula Dragon			c
Ctenophorus fordi	Mallee Dragon			c
Ctenotus euclae	Bight Coast Ctenotus			c
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Diplodactylus calcicolus	South Coast Gecko			c
Egernia richardi	Western Tree Skink			c
Egernia stokesii	Gidgee Skink			e
Gehyra variegata	Tree Dtella			e
Hemiergis peronii	Four-toed Earless Skink			c
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			e
Morethia obscura	Mallee Snake-eye			c
Nephrurus milii	Barking Gecko			c
Parasuta spectabilis	Mallee Black-headed Snake			c
Pogona barbata	Eastern Bearded Dragon			c
Pseudechis australis	Mulga Snake			c
Pseudonaja affinis	Dugite			c
Pygopus lepidopodus	Common Scaly-foot			c
Tympanocryptis lineata	Five-lined Earless Dragon			c

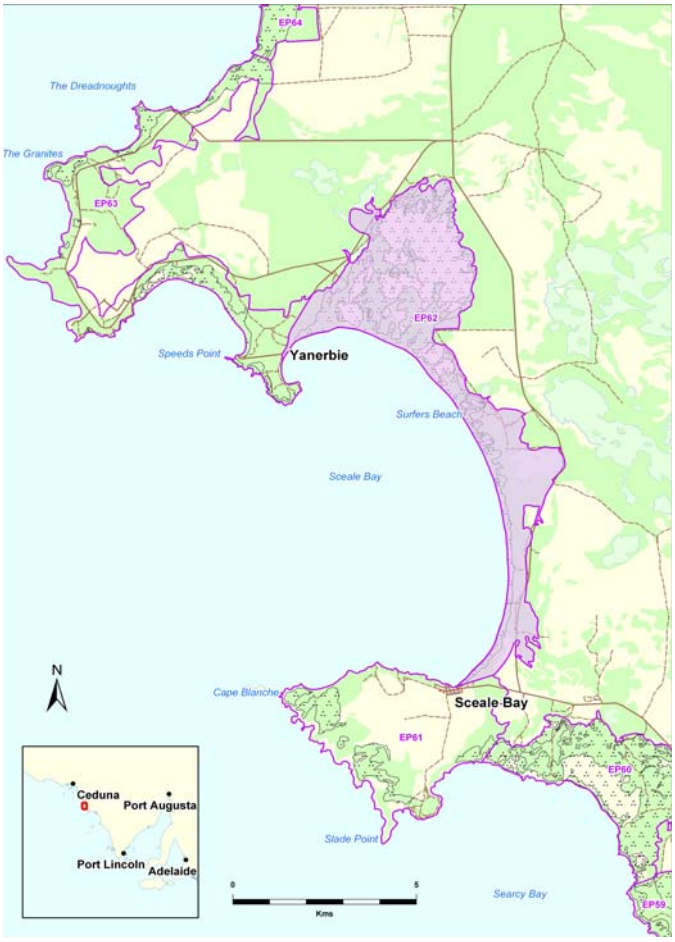
R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP62 Sceale Bay

Cell area 2,343ha. Shoreline length 14.54 km.



Landforms

A Holocene barrier embayment, generally medium wave energy (1 - 2m), with larger medium energy and dune accumulation towards the northern end of the bay; both ends of the bay are sheltered by large headlands, while in the centre there is a strong low tide bar. Approximately half the extensive dunes in the northern half of the bay are unstable; these transgressive dunes, the White Sands of Yanerbie, have extended < 5.5km inland. These mobile sands will in future threaten the Yanerbie Road. Inland from the Holocene sand barrier is a low undulating calcarenite plain; where this plain dips below the water table swamps, saline mudflats and lakes are seen, as at Seagull Lake.

Benthic Habitat

The entire bay mapped as bare sand.

Biota

1,581.21 ha, 67.49% of the cell is remnant vegetation, and 63% of the cell is coastal sand dunes. This cell is almost entirely coastal shrubland: *Olearia axillaris, Leucopogon parviflorus* tall open shrubland over *Threlkeldia diffusa, Tetragonia implexicoma, Rhagodia candolleana ssp. candolleana, Pimelea serpyllifolia ssp. serpyllifolia* low shrubs over *Muehlenbeckia adpressa, Dianella brevicaulis, Carpobrotus rossii, Clematis microphylla var. microphylla, Senecio pinnatifoliu*. Smaller areas of *Nitraria billardierei, +/-Olearia axillaris* mid open shrubland over *Threlkeldia diffusa, Tetragonia implexicoma, Rhagodia candolleana ssp. candolleana, Atriplex vesicaria ssp*. Shrubs are found, notably around Yanerbie. There are small areas of *Triodia compacta, Frankenia pauciflora var. fruticulosa, +/-Gahnia lanigera* low hummock grassland near the centre of the cell. There are 9 BDBSA flora survey sites, 5 opportune flora sites, 8 herbarium flora record sites, 1 threatened plant population record site and 23 opportune fauna record sites.

Land Use/ Land Ownership

Sceale Bay Conservation Park (22% cell area), (up graded from CR to CP July 2006; currently does not have a management plan).
"A long, sandy beach, backed by spectacular dunes and an associated coastal wetland, this park is relatively undisturbed. Adjoining the southern portion of the dunes, Seagull Lake provides an important habitat for many coastal birds including migratory waders that come from as far away as the Artic Circle. The endangered Bead Samphire is also present in this ecosystem" (Parks of the Far West brochure, 2007).

The whole of this cell, except for the Sceale Bay CP is fronted by a narrow (c.30m) coastal reserve of unalloted Crown land. In the south and north of the cell, the coastal reserve is backed by perpetual leasehold Crown land (60.6% of cell area). This includes the Yanerbie dunes which are under perpetual lease to the District Council of Streaky Bay. South of the Sceale Bay CP the coastal reserve is backed by privately owned land. This cell includes the Yanerbie shack settlement near the boundary with EP63.

West Coast Bays Marine Park offshore.

FIGURE 6.39 Seagull Lake, Sceale Bay Conservation Park. Photo: Coast Protection Board, 2007.

Uses (Field visits and local reports)

Sceale Bay CP accessible by road. Used as access point for Sceale Bay Beach/Yanerbie (through dune system) by recreational beach users, fishermen and surfers.
Yanerbie dunes used extensively by ORV
Fishing popular at Yanerbie and Speeds Point where boats are launched off the beach
Tourist Promotions promote Westall Way sites, including Yanerbie.
Shack settlement at Yanerbie
Conservation – Sceale Bay CP
Recreation and tourism: fishing, surfing, camping, ORV

Values (Field visits and local reports)

Important area for numerous resident and migratory shorebirds, including internationally significant numbers of Sanderling along the beach.
Species observed, but not recorded within the BDBSA include *Limonium companyonis*, *Alyxia buxifolia*, Rabbit and Fox

Threats (Field visits and local reports)

Eco-tourism / tourism ventures
Track creation
Uncontrolled camping
Collection of fire wood
Boat launching (public safety, hydrocarbon spills, disturbance to native fauna)
PCASS
Uncontrolled ORV usage
Water extraction from the Whirlpool
Vehicles along the whole beach
Development

Opportunities (Field visits and local reports)

The land immediately south of Sceale Bay CP contains high to medium-high total detailed conservation scores and at least one freshwater soak/ limestone spring. These privately owned allotments are largely well vegetated and adjacent to the CP; they are locally reported to have high habitat values, (in spite of an earlier grazing regime). This area should be considered for purchase as an extension of the park, if this is not possible other options should be investigated, such as the Nature Foundation as a means of moving to Heritage Agreement.
Rationalise vehicle movement and track closure
Increased protection for sensitive areas and species.

Conservation Analysis (GIS)

The total of conservation means, 135.49, is high for the region. The distribution of total priority scores shows high for all vegetated dune areas and moderate to high for the vegetated calcarenite plain. Low totals are shown for the cleared areas of the plain, the de-vegetated dunes (notably Yanerbie), and Seagull Lake.
Many conservation layers contribute to this high priority: the rarity of plant communities (whole cell); the threatened status of flora (high to medium for all vegetated parts of the cell); endemicity of vegetation communities shows high to medium for the whole cell; endemic floristic vegetation association; sand dune areas show moderate to high species richness. There are large areas of habitat for threatened mammal species, notably the Yanerbie Sands; values as habitat for all mammal species habitat are widespread; all vegetated areas have high values for butterfly larvae; the area of dune habitat for the Beach Slider and the Bight Coast Skink gives high cell values; viewscape analysis, vegetation metrics, and indigenous heritage (multiple sites within this cell) all contribute to the total.
There are five mammal, 15 reptile and 62 bird species recorded in this cell including the state endangered Fairy Tern, the state vulnerable Banded Stilt, Hooded Plover, and Australian Bustard. This area also provides habitat for the state endangered Eastern Osprey and White-bellied Sea-Eagle (focal species).
[Note: there appears to be a lack of information on the fauna values in the Sceale Bay CP, and in particular, Seagull Lake. There are 4 BDBSA flora survey sites and several opportunistic fauna sites, but no BDBSA fauna survey sites].

Threat Analysis (GIS)

Threat values for Sceale Bay sum to a low total, 36.52. The overall pattern is low; however, two areas have a high threat total – degraded low lying limestone surfaces adjacent to saline lakes, immediately north of Seagull Lake, and north-east of Lake Larsen.
Summary of threat layers shows scores for dune instability (notably the White Sands of Yanerbie), for viewshed and viewscape, and numbers of exotic plant species. Minor additions

come from mining exploration and ownership. Mining exploration license area stops 800m short of the coast in this area; however small parts of the coastal boundary include exploration license areas, notably north and south of Seagull Lake; immediately inland mining licenses for gypsum extraction exist.

Adaptation to Climate Change Threats

(see also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	**Impacts and implications (for this cell)**	**Protect and manage habitat threats**	**Address landscape issues: fire, connectivity, refuges, hydrology**
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Beach recession will occur due to sea level rise, and dune instability will increase due to foredune damage.	Establish beach profile in a central position in Sceale Bay, to monitor beach and dune change in form and habitat.	
2070: +c.80cm.	Beach and dune has marked recession; foredune blowouts lead to active dune transgression	Strategic management of dunes, to slow transgression	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides	Continue to monitor beach and dune recession to inform management response to trend as well as individual events.	
Intensity of large storms increases	2070: Foredunes damage and in places overtopped.	(as above)	
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing vegetation is found in warmer conditions elsewhere)		Maintain N-S connectivity of vegetation patches.
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune and saltmarsh habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Invasion of grassy weeds following damage	Active weed control in dune areas	Ensure dune vegetation is within the regional fire plan.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Local impact on soil water and vegetation survival; notably at Seagull Lake and freshwater springs.	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains sediment movement within the bay.	Monitor beaches, see above.	

TABLE 6.36 Recommended Actions and Priority for EP62 Sceale Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Climate change and sea level rise is having multiple effects within the cell	Ensure the establishment and maintenance of a time series of aerial photographs at an appropriate high resolution. Maintain connectivity between vegetation blocks to maximise resilience	Medium (cons)	DENR, EP NRM, community groups
	Species identified that are not within the BDBSA	Identify records and surveys that are not in the BDBSA (eg. private surveys/records, government surveys not yet entered). Evaluate/verify data and enter into the BDBSA	High (cons)	DENR, EP NRM, community
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	Medium	EP NRM, DC of Streaky Bay, private land owners, DENR, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Areas within cell identified as being important for rare and endemic plant communities and as habitat for threatened species, including shorebirds and raptors, with potential disturbance from agricultural activities, recreational activities, land management practices, uncontrolled access, weeds and pest animals	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches, dogs on leashes, track management, pest animal and plant control, restrict access to sensitive locations. Install interpretive/ educational signage. Community education programs.	High (cons)	DENR, private land owners, EP NRM, DC of Streaky Bay, community groups
	Informal camping and car parks occur throughout the cell, particularly near Yanerbie, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	Medium	DC of Streaky Bay, DENR, EP NRM, community groups
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg. rabbits foxes, cats. Undertake a control program if required.	Medium	DENR, EP NRM, DC of Streaky Bay, private land owners, community
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, DC of Streaky Bay, private land owners, community groups, EP NRM
	Maintenance of coastal access management infrastructure	Use the EP Coastal infrastructure audit to setup a maintenance program	Medium	DENR, DC of Streaky Bay, EP NRM, community groups

Component	Issue	Proposed Action	Priority of Action	Key Players
	Unrestricted access and multiple vehicle tracks around the coast impacting on the coastal dune vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	High (cons/ threat)	DC of Streaky Bay, DTEI, DENR, EP NRM, land holders, community
	Unregistered off-road vehicle use (eg. quad bikes, trail bikes): illegal, vegetation damage and potential dune destabilisation	Install educational signs on dune vegetation, stability and policy on unregistered vehicles e.g. quad bikes. Undertake compliance program	Medium (cons/ threat/ hazard)	DENR, SAPOL, DC of Streaky Bay, DTEI, community
	Accelerating sea level rise leading to beach recession, Foredune damage and dune transgression. Increase in dune activity in dunes	Monitor changes through the establishment of a profile near the southern boundary of the CP. Manage dunes to reduce transgression. Consider buffer zones within plans showing anticipated dune recession.	Medium	DENR, EP NRM, DC Streaky Bay
Lands immediately south of Sceale Bay CP	Reports of fauna values not matched by state survey	Undertake systematic fauna survey. Identify, collect and enter fauna records that has not been put into the BDBSA	High (cons)	DENR, EP NRM
	Total conservation values are high, especially on the dune areas	Review the management and protection of this valuable area, with consideration to prepare a local management plan including possible heritage agreement, improved management, joint management or purchase and include in Sceale Bay CP, etc.	High	Private land owner, DENR, EP NRM, Nature Foundation
All salt marsh and low lying areas (eg. Seagull Lake)	All salt marsh and low lying areas have the potential for acid sulfate soil following disturbance; in turn this would potentially threaten life forms in the surrounding area	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Medium	DENR, DC Streaky Bay, EP NRM, community groups, private land owners

Component	Issue	Proposed Action	Priority of Action	Key Players
Yanerbie dunes	This area has moderate / high conservation totals, but is threatened by lack of management, recreational activities (eg. ORV use, camping, fishing, etc), pest plants and animals (eg. pyp grass planting)	Develop a management plan for this area, to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches, dogs on leashes, track management, pest animal and plant control, restrict access to sensitive locations, consideration for addition to adjacent park. Install interpretive/ educational signage. Community education programs.	High (cons/ threat)	DC of Streaky Bay, DENR, EP NRM, community
Beaches, sandflats and wetland areas	Significant shorebird breeding, feeding and resting habitat, with disturbance from people, vehicles, dogs and pest animals. (Vehicles on beaches and beach boat launching also a threat to meiofauna and shorebirds)	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Review beach boat launching locations with a view to rationalise. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Community education and awareness programs, eg. "chicks on beach".	High (cons/ threat)	DC of Streaky Bay, EP NRM, DTEI, EP LGA, DENR, Tourism SA, Birds Australia, community
Whirlpool, wetlands and springs	Water extraction from Whirlpool and surrounding land management practices with potential impact on sedimentation, the hydrology and native species by removing water from the system.	Investigate the impact of removing water from this system. Find alternate water source and restrict water from being extracted from this site.	High (cons/ threat)	EP NRM, DENR, DFW, DC of Streaky Bay, universities
		Encourage and support research into the hydrology and biology of the marine spring and adjacent wetland, impacts occurring on it and possible improved management eg. road grading	Medium	DENR, EP NRM, DFW

Component	Issue	Proposed Action	Priority of Action	Key Players
	Accelerating sea level rise and climate change aridity increases salt pressure on groundwaters within the dunes and calcarenite	Monitor (see above) water table levels and salinity within the calcarenite and habitat changes to inform management	Medium	DENR, EP NRM, DFW
Yanerbie shack settlement	Existing development impacting on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Work with private land owners to minimise impact from existing development, including education, restoration where appropriate and ensure the developments do not encroach on the coastal Crown reserve Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs, cats and ORV, etc	Medium	EP NRM, DC of Cleve, DENR, community groups
Sceale Bay CP	The CP has high conservation values throughout. Potential impact on conservation values, including from weeds, pest animals and recreational activities.	Review the management of this valuable area. Prepare a management plan for the conservation park.	High	DENR
		Ensure threatened plant & animal species (eg. *Tecticornia flabelliformis* and *prostanthera calycina*, shorebirds) within the park are protected from disturbance. Investigate opportunity to fence along Sceale Bay Road.	High	DENR
		The wetland and adjacent spring be nominated as a significant geological feature	Low	DENR, GSA SA branch
Area > 800m from the coast	Mining exploration licence cover the area >800m from the coast, with potential impact on sensitive areas and conservation values	Ensure any mining activities avoid areas of high conservation significance. Investigate/ consider removal of licence in high conservation areas.	Medium	PIRSA, DENR, EP NRM, DC of Streaky Bay, private land owners

BIOTA

Flora

Remnant vegetation area (ha)	1581.21 ha, 67.49% of cell area
# flora surveys / records	9 surveys, 5 opportune sites, 8 herbarium record sites, 1 threatened plant population record site.
# flora in cell	139
# conservation rated flora in cell	4
# non-indigenous flora in cell	23
Significant CDCS floristic community	*Triodia compacta* hummock grassland - <20 (13) sites recorded along SA coast, 100% of these in EP *Olearia axillaris* /*Lasiopetalum discolour* shrubland – 52% of SA records in EP *Olearia axillaris* / *Tetragonia implexicoma* shrubland – 75% of SA records in EP
Protected area	22% of remnant vegetation protected by Sceale Bay CP

Weeds

Species	Common Name	Status	Study rating
Arctotheca populifolia	Beach Daisy	RA	7
Avena fatua	Wild Oat	RA	5
Carrichtera annua	Ward's Weed	RA	4
Ehrharta villosa var. maxima	Pyp Grass	RA	8
Euphorbia paralias	Sea Spurge	RA	5
Mesembryanthemum crystallinum	Common Iceplant	RA	4
Lycium ferocissimum	African Boxthorn	D, RA	8
Marrubium vulgare	Horehound	D, RA	5
Asphodelus fistulosus	Onion Weed	D	3
Diplotaxis tenuifolia	Lincoln Weed	D	3
Anagallis arvensis	Pimpernel		2
Avena barbata	Bearded Oat		2
Brassica tournefortii	Wild Turnip		3
Cakile maritima ssp. maritima	Two-horned Sea Rocket		1
Carpobrotus chilensis	Angled Pigface		0
Catapodium rigidum	Rigid Fescue		1
Cerastium balearicum	Chickweed		1
Galium murale	Small Bedstraw		0
Hordeum glaucum	Blue Barley-grass		1
Hornungia procumbens	Oval Purse		0
Melilotus indicus	King Island Melilot		1
Mesembryanthemum sp.	Iceplant		3
Silene nocturna	Mediterranean Catchfly		1

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Prostanthera calycina	West Coast Mintbush	V	V
Tecticornia flabelliformis	Bead Samphire	V	V
Caladenia bicalliata ssp. bicalliata	Western Daddy-long-legs		R
Poa fax	Scaly Poa		R

Species	Common Name	Aus status	SA status
Acacia anceps			
Acacia anceps (NC)	Angled Wattle		
Acacia cupularis	Cup Wattle		
Acacia hakeoides	Hakea Wattle		
Acacia halliana	Hall's Wattle		
Acacia ligulata	Umbrella Bush		
Acacia longifolia ssp. sophorae	Coastal Wattle		
Acacia spinescens	Spiny Wattle		
Acacia triquetra	Mallee Wreath Wattle		
Acrotriche patula	Prickly Ground-berry		
Amyema melaleucae	Tea-tree Mistletoe		
Atriplex cinerea	Coast Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrodanthonia setacea	Small-flower Wallaby-grass		
Austrostipa drummondii	Cottony Spear-grass		
Austrostipa elegantissima	Feather Spear-grass		
Austrostipa flavescens	Coast Spear-grass		
Austrostipa sp.	Spear-grass		
Brachyscome ciliaris var. ciliaris	Variable Daisy		
Bromus arenarius	Sand Brome		
Caladenia clavula	Brown-club Spider Orchid		
Calandrinia eremaea	Dryland Purslane		
Carpobrotus rossii (NC)	Native Pigface		
Cassytha melantha	Coarse Dodder-laurel		
Cassytha peninsularis	Peninsula Dodder-laurel		
Chrysocephalum apiculatum	Common Everlasting		
Comesperma volubile	Love Creeper		
Correa pulchella	Salmon Correa		
Crassula colorata var. acuminata	Dense Crassula		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Daucus glochidiatus	Native Carrot		
Dianella brevicaulis	Short-stem Flax-lily		
Dianella revoluta var.			
Dianella revoluta var. divaricata	Broad-leaf Flax-lily		
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eremophila crassifolia	Thick-leaf Emubush		
Eucalyptus calcareana	Nundroo Mallee		
Eucalyptus dumosa	White Mallee		
Eucalyptus gracilis	Yorrell		
Eucalyptus rugosa	Coastal White Mallee		
Eucalyptus socialis (NC)	Beaked Red Mallee		
Eucalyptus yalatensis	Yalata Mallee		
Eutaxia microphylla	Common Eutaxia		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos syrticola	Coast Cherry		
Ficinia nodosa	Knobby Club-rush		
Frankenia pauciflora var.	Southern Sea-heath		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Frankenia pauciflora var. gunnii	Southern Sea-heath		
Frankenia sessilis	Small-leaf Sea-heath		

Species	Common Name	Aus status	SA status
Gahnia lanigera	Black Grass Saw-sedge		
Geijera linearifolia	Sheep Bush		
Goodenia varia	Sticky Goodenia		
Gramineae sp.	Grass Family		
Helichrysum leucopsideum	Satin Everlasting		
Hemichroa diandra	Mallee Hemichroa		
Hemichroa pentandra	Trailing Hemichroa		
Lasiopetalum discolor	Coast Velvet-bush		
Lawrencia squamata	Thorny Lawrencia		
Lepidosperma viscidum	Sticky Sword-sedge		
Leucopogon parviflorus	Coast Beard-heath		
Lomandra collina	Sand Mat-rush		
Maireana erioclada	Rosy Bluebush		
Maireana oppositifolia	Salt Bluebush		
Melaleuca acuminata ssp. acuminata	Mallee Honey-myrtle		
Melaleuca halmaturorum	Swamp Paper-bark		
Melaleuca lanceolata	Dryland Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Microtis arenaria	Notched Onion-orchid		
Myoporum brevipes	Warty Boobialla		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Parietaria cardiostegia	Mallee Smooth-nettle		
Pelargonium littorale	Native Pelargonium		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pittosporum angustifolium	Native Apricot		
Podotheca angustifolia	Sticky Long-heads		
Poranthera triandra	Three-petal Poranthera		
Rhagodia candolleana ssp.	Sea-berry Saltbush		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia crassifolia	Fleshy Saltbush		
Rhagodia sp.	Saltbush		
Rhagodia spinescens	Spiny Saltbush		
Ruppia tuberosa	Widgeon Grass		
Salsola tragus	Buckbush		
Samolus repens	Creeping Brookweed		
Santalum acuminatum	Quandong		
Sarcocornia quinqueflora	Beaded Samphire		
Scaevola crassifolia	Cushion Fanflower		
Senecio glossanthus (NC)	Annual Groundsel		
Senecio pinnatifolius (NC)	Variable Groundsel		
Spinifex hirsutus (NC)	Rolling Spinifex		
Tecticornia arbuscula	Shrubby Samphire		
Tecticornia halocnemoides ssp. halocnemoides	Grey Samphire		
Tecticornia indica ssp.	Brown-head Samphire		
Tecticornia pterygosperma ssp. pterygosperma	Winged-seed Samphire		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Triglochin trichophora			
Triodia compacta	Spinifex		
Triodia irritans	Spinifex		
Triodia irritans var. (NC)			

Species	Common Name	Aus status	SA status
Vittadinia australasica var. australasica	Sticky New Holland Daisy		
Vittadinia megacephala	Giant New Holland Daisy		
Wilsonia backhousei	Narrow-leaf Wilsonia		
Wilsonia humilis	Silky Wilsonia		
Zostera sp.	Grass-wrack		
Zygophyllum billardierei	Coast Twinleaf		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	82 - 62 birds, 0 butterflies, 5 mammals, 15 reptiles (an additional 12 reptiles and 27 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	23 opportune sites
# of threatened fauna in cell	10
# of non-indigenous fauna	2 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Pieris rapae rapae	Cabbage White	Invertebrate	p
Felis catus	Cat (Feral Cat)	Mammalia	x
Mus musculus	House Mouse	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Sternula nereis	Fairy Tern		E
Ardeotis australis	Australian Bustard		V
Cladorhynchus leucocephalus	Banded Stilt		V
Numenius madagascariensis	Eastern Curlew	M	V
Thinornis rubricollis	Hooded Plover		V
Arenaria interpres	Ruddy Turnstone	M	R
Calidris alba	Sanderling	M	R
Charadrius mongolus	Lesser Sand Plover	M	R
Haematopus longirostris	Australian Pied Oystercatcher		R
Neophema petrophila	Rock Parrot		R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Acanthiza apicalis	Inland Thornbill		
Acanthiza uropygialis	Chestnut-rumped Thornbill		
Anas castanea	Chestnut Teal		
Anas gracilis	Grey Teal		
Anthus novaeseelandiae	Australasian Pipit		
Aquila audax	Wedge-tailed Eagle		
Calidris acuminata	Sharp-tailed Sandpiper	M	
Calidris ferruginea	Curlew Sandpiper	M	
Calidris ruficollis	Red-necked Stint	M	
Charadrius ruficapillus	Red-capped Plover		
Chroicocephalus novaehollandiae	Silver Gull		

Species	Common Name	Aus status	SA status
Colluricincla harmonica	Grey Shrike-thrush		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Corvus coronoides	Australian Raven		
Corvus mellori	Little Raven		
Coturnix pectoralis	Stubble Quail		
Cracticus torquatus	Grey Butcherbird		
Cygnus atratus	Black Swan		
Egretta novaehollandiae	White-faced Heron		
Elseyornis melanops	Black-fronted Dotterel		
Epthianura albifrons	White-fronted Chat		
Erythrogonys cinctus	Red-kneed Dotterel		
Falco cenchroides	Nankeen Kestrel		
Glyciphila melanops	Tawny-crowned Honeyeater		
Himantopus himantopus	Black-winged Stilt		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Lichenostomus leucotis	White-eared Honeyeater		
Lichenostomus virescens	Singing Honeyeater		
Malurus lamberti	Variegated Fairy-wren		
Manorina flavigula	Yellow-throated Miner		
Mirafra javanica	Horsfield's Bushlark		
Ocyphaps lophotes	Crested Pigeon		
Pardalotus punctatus	Spotted Pardalote		
Pelecanus conspicillatus	Australian Pelican		
Petrochelidon nigricans	Tree Martin		
Phalacrocorax sulcirostris	Little Black Cormorant		
Phaps elegans	Brush Bronzewing		
Poliocephalus poliocephalus	Hoary-headed Grebe		
Pomatostomus superciliosus	White-browed Babbler		
Purnella albifrons	White-fronted Honeyeater		
Recurvirostra novaehollandiae	Red-necked Avocet		
Rhipidura albiscapa	Grey Fantail		
Rhipidura leucophrys	Willie Wagtail		
Sericornis frontalis	White-browed Scrubwren		
Smicrornis brevirostris	Weebill		
Tadorna tadornoides	Australian Shelduck		
Taeniopygia guttata	Zebra Finch		
Tringa nebularia	Common Greenshank	M	
Vanellus miles	Masked Lapwing		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p

Species	Common Name	Status*	Record
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Macropus robustus	Euro		
Pseudocheirus peregrinus	Common Ringtail Possum		
Rattus fuscipes	Bush Rat		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Amphibolurus norrisi	Mallee Tree-dragon			x
Christinus marmoratus	Marbled Gecko			x
Ctenophorus chapmani	Prickly Dragon			x
Ctenophorus fionni	Peninsula Dragon			x
Ctenophorus fordi	Mallee Dragon			x
Ctenotus euclae	Bight Coast Ctenotus			x
Ctenotus orientalis	Spotted Ctenotus			x
Delma australis	Barred Snake-lizard			x
Delma butleri	Spinifex Snake-lizard			x
Diplodactylus calcicolus	South Coast Gecko			x
Egernia richardi	Western Tree Skink			x
Egernia stokesii	Gidgee Skink			x
Gehyra variegata	Tree Dtella			x
Hemiergis peronii	Four-toed Earless Skink			x
Lerista dorsalis	Southern Four-toed Slider			x
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			e

Species	Common Name	Aus status	SA status	Record
Morethia adelaidensis	Adelaide Snake-eye			e
Morethia obscura	Mallee Snake-eye			c
Nephrurus milii	Barking Gecko			c
Parasuta spectabilis	Mallee Black-headed Snake			c
Pogona barbata	Eastern Bearded Dragon			c
Pseudechis australis	Mulga Snake			c
Pseudonaja affinis	Dugite			c
Pygopus lepidopodus	Common Scaly-foot			c
Tympanocryptis lineata	Five-lined Earless Dragon			c

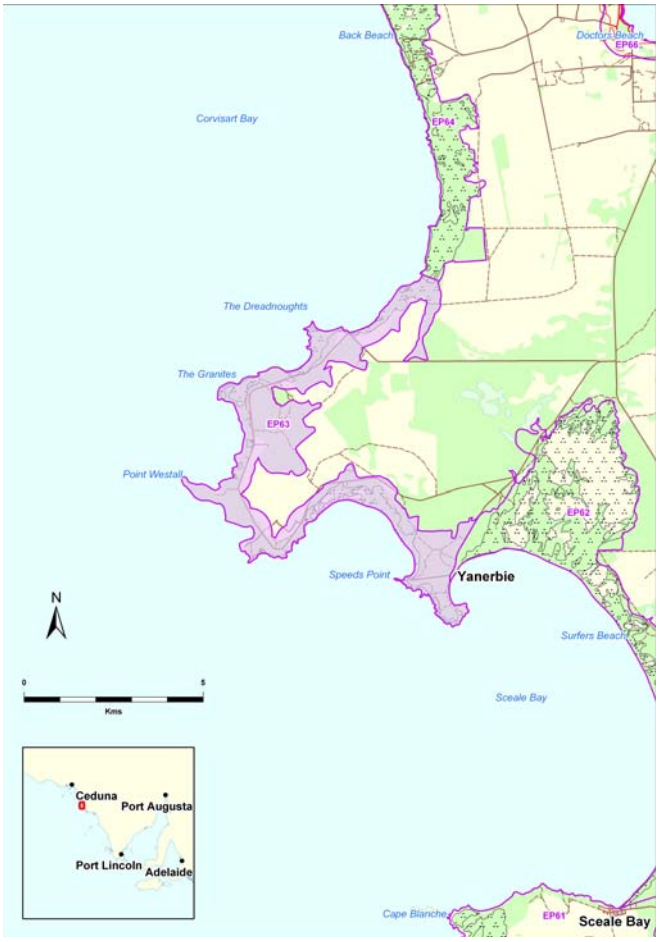
R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP63 Yanerbie Beach – The Granites

Cell area 1,737 ha. Shoreline length 30.37 km.



Landforms

The Point Westall peninsula is a complex of headlands with intervening beaches. The coastal boundary does not widely differ from the default 500 m margins and it encloses a low, undulating calcarenite surface, with small dunes. The headlands are calcarenite at High Cliff (the Dreadnaughts are two large stacks), and calcarenite over granite at The Granites, Point Westall and Smooth Pool. The granite shore platforms/ ramps are spectacular and, on the southern side, extensive. Where the basement rocks reduce high tide wave action, calcarenite cliff slopes have been degraded to low angle slopes. In places there are small steep, coarse sand beaches with ramped Holocene dunes. At Smooth Pool there is a lagoon within the granite platform refilled with seawater at high tide.

Benthic Habitat

Heavy limestone reef inshore, with the exception of the Point Westall/Granites area that has granite reef, and the bay west of Speeds Point that has bare sand.

Biota

Within this small cell there is 1,523.78 ha (88%) remnant vegetation. This a complex pattern of small areas of shrubland associations: low shrubland of *Nitraria billardierei, +/-Olearia axillaris* mid open shrubland and *Leucophyta brownii, +/-Austrostipa stipoides* low sparse shrubland; also tall shrubland of *Olearia axillaris, Leucopogon parviflorus* tall open shrubland, and *Melaleuca lanceolata, +/-Olearia axillaris, +/-Leucopogon parviflorus* tall open shrubland. Vegetation cover thins at cliff edges. There are 11 BDBSA flora survey sites, 1 opportune flora site, 4 herbarium flora record sites and 11 opportune fauna sites.

Land Use/ Land Ownership

The Crown land coastal reserve in the north and south of the cell is a very narrow strip, approximately 30m wide, with Crown land perpetual leasehold land adjacent the coastal reserve. Around the rest of the Westall Peninsula the coastal reserve extends to the Westall Way Road, with privately owned land on the landward side of the road. There is also some privately owned land inland of Yanerbie Beach.

West Coast Bays Marine Park offshore south of Point Westall.

FIGURE 6.40 Smooth Pool, Point Westall. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

Walking, ORV, surfing, fishing, sight seeing, tourists, diving near Smooth Pool, camping at Speeds Point and around the coast (Yanerbie, Fisherman's Paradise, Smooth Pool, Granites, Tractor Beach), beach boat launching at Tractor Beach.
Trail Bay whaling station, established in the early 19th century, occurs at Yanerbie just west of the boat-launching area.
Scattered dwellings, and residential development at Fisherman's Paradise

Values (Field visits and local reports)

Bight Coast Skink has been found here, but not yet entered into database
One of the smallest known species of live-bearing sea star *Parvulastra parvivipara* is found at Granites and Smooth Pool.

Threats (Field visits and local reports)

Heavy foot and vehicle traffic to cliff tops impacting vegetation
Vehicle access to beaches
Informal and formal camping areas, with increased fire and weed risk, human waste and rubbish impact.
Safety hazard of tracks – car parks / tracks cliff edge
Development
Eco-tourism / tourism ventures
Uncontrolled vehicle usage

Opportunities (Field visits and local reports)

Previous works have been undertaken in this area to control access, eg. fencing, boardwalks etc. Some of this work has not been maintained and is in disrepair.

Opportunities to work with Council to rationalise tracks at sites on Westall Loop (Fisherman's Paradise, Smooth Pool, Point Westall, Granites, High Cliff, Tractor Beach), as it is promoted as a tourist loop. Rehabilitation of large blow out at Fisherman's Paradise, used as access point to dune system, as a camping area and also access to the beach (Fisherman's to Speeds Point). Samphire sub-coastal wetlands are also found in some areas along the main road (Westall Way Loop) without culverts or linkages to ensure appropriate water movement throughout the system. Protection of these wetlands from vehicles and their promotion as a refuge for some water/shorebird species and to maintain hydrological regimes should be a priority.

Conservation Analysis (GIS)

127.82: this total of conservation means is high for the region. The pattern of high total scores is complex, but generally the higher values are found on the dune areas; and moderate to high values on the shrub covered calcarenite surface. De-vegetated dunes and cleared land by the inner coastal boundary show low totals.
Individual conservation layers showing high values include: plant community rarity (widespread); endemic plant communities (widespread); endemic floristic habitat (a complex distribution, but with many high scoring areas); habitat for butterfly larvae is high throughout all vegetated areas; habitat for the Eastern Osprey (focal species); sea views and scenic amenity; and vegetation metrics. There are also a number of registered indigenous heritage sites within the cell.
There is one mammal and 53 bird species within this cell, including the state endangered White-bellied Sea-Eagle, Eastern Osprey, and Fairy Tern.

Threat Analysis (GIS)

Threat summary means total 46.22, moderate for the region. The distribution of total threats is a complex pattern of high, low and moderate scores; however a combination of several threats (ownership, country township zoning, existing development, ORV, rabbit activity) occur at Fisherman's Paradise, which has a high total. Inland, directly east from the Granites headland, ORV, weeds, ownership, zoning, and land use also give a high total.
Threat scores fall mainly in the development area, including development zoning, land ownership and land use, viewshed and viewscape; in addition vegetation block degradation and dune instability add scores for the cell. ORV activity is shown throughout the cell.

Adaptation to Climate Change Threats

(see also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Sea level rise: 2030 : +c.20cm	Beach recession will occur due to sea level rise, and dune instability will increase due to foredune damage.	Monitor beach and dune recession to inform management response to trend as well as individual events.	
2070: +c.80cm.	Beach and dune show marked recession; foredune blowouts lead to active dune transgression. Loss of small pocket beaches and some shore platform habitats. Increase in cliff erosion and steepening of calcarenite bluffs.	As above	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides		
Intensity of large storms increases	2070:		
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing vegetation is found in warmer conditions elsewhere)		Maintain N-S connectivity of vegetation patches.
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Invasion of grassy weeds following damage	Active weed control in all dune areas, including cliff top dunes	Ensure dune vegetation is within the regional fire plan.
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Local impact on soil water and vegetation survival;	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate		

TABLE 6.37 Recommended Actions and Priority for EP63 Yanerbie Beach – The Granites

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal fauna (and flora) surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Climate change and sea level rise is having multiple effects within the cell	Ensure the establishment and maintenance of a time series of aerial photographs at an appropriate high resolution. Maintain connectivity between vegetation blocks to maximise resilience	Medium (cons)	DENR, EP NRM, community groups
	Areas within cell identified as being important for rare and endemic plant communities and as habitat for threatened species, including shorebirds and raptors, with potential disturbance from agricultural activities, development zoning, recreational activities, land management practices, uncontrolled access, weeds and pest animals	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches, dogs on leashes, track management, pest animal and plant control, restrict access to sensitive locations. Install interpretive/ educational signage. Community education programs. Review development plan zoning to these areas to increase protection	High	DENR, private land owners, EP NRM, DPLG, DC of Streaky Bay, community groups
	Potential impact on rare and endemic flora communities.	Identify and facilitate protection of coastal heath with *Triodia compacta*	Medium	DENR, EP NRM, DC of Streaky Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
	Potential impact on breeding habitats of the endangered Eastern Osprey, particularly during the breeding season.	Develop site management and monitoring strategy, including consideration to closure, relocation or seasonal closures of roads/walking tracks/car parks in the near vicinity. Ensure management/works programs are not undertaken during the breeding season. Community education.	High (cons)	DENR, DC Streaky Bay, EP NRM, community
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, private land owners, DC of Streaky Bay, community groups, EP NRM
	Existing and future development with potential impact on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Work with private land owners to minimise impact from existing development, including education and restoration where appropriate. Ensure future development is not located in areas of high conservation value or high sensitivity. Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs, cats, and ORV, etc	High (cons/ threat)	EP NRM, DC of Streaky Bay, DENR, DPLG, private land owners, community groups
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg. rabbits foxes, cats. Undertake a control program if required.	Medium	EP NRM, private land owners, DC of Streaky Bay, DENR
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	Medium	EP NRM, DC of Streaky Bay, private land owners, DENR. community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate and sign areas inappropriate for camping and car parks. Formalise & manage (eg. include in above mentioned camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	High (cons/ threat)	DC of Streaky Bay, DENR, EP NRM, community groups private land owners
	Unrestricted pedestrian access on cliff top area with impact soil erosion, stability and compaction, safety hazard, vegetation damage, weed introduction, fauna disturbance and water runoff erosion	Review with a view to rationalise unnecessary and unsafe tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade and/or maintain previous management works, eg. fencing, boardwalks, etc Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education		DC of Streaky Bay, DENR, EP NRM, community
	Unrestricted access and multiple vehicle tracks around the coast impacting on the coastal dune and cliff top vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade and/or maintain previous management works, eg. fencing, etc Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	High (cons/ threat)	DC of Streaky Bay, DENR, EP NRM, community
	Unregistered off-road vehicle use (eg. quad bikes, trail bikes): illegal, vegetation damage and potential dune destabilisation	Install educational signs on dune vegetation, stability and policy on unregistered vehicles e.g. quad bikes. Undertake compliance program	Medium (cons)	DC of Streaky Bay, SAPOL, DENR, DTEI, EP NRM, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Formal camping area with impact from multiple tracks, weeds, soil compaction, vegetation trampling and removal, local impact from visitors	Develop camping management plan, including actions to minimise visitor impacts, eg. Install and/or maintain barriers/fencing to prevent spread and informal tracks. Provision of appropriate amenities. Develop weed management strategy to manage and control. Install and/or maintain signage.	Medium	DC of Streaky Bay, EP NRM, DENR, community groups
	Coastal reserve being impacted by agricultural activities, development zoning, recreational activities, land management practices, uncontrolled access, weeds and pest animals	Develop a management plan for the coastal reserve to minimise threats and protect sensitive features and species	Medium	DENR, DC of Streaky Bay, EP NRM, community
Dunes	Widespread degradation of dunes through ORV, informal camping, foot traffic and weed incursion, notably near Fisherman's Paradise and Point Westall, threatens valuable plant associations and reptile and butterfly habitat. Dunes further stressed by climate change aridity and increased weed pressure	Review strategic protection of these dune areas. Rehabilitate blow outs where appropriate.	High (cons/ threat)	DC of Streaky Bay, EP NRM, DENR
Cliff tops	Numerous informal tracks and informal car parks very close to potentially unstable cliff edge; safety hazard and impact from soil compaction, vegetation damage, weed introduction, fauna disturbance, soil stability and water runoff erosion	Review with a view to close or reroute tracks and car parks that are too close to cliff edge.	High (Hazard; cons/ threat)	DC of Streaky Bay, DENR, EP NRM, community
Shore platforms	Removal of inter-tidal life forms	Interpretive signage	Medium	PIRSA, EP NRM, DENR

Component	Issue	Proposed Action	Priority of Action	Key Players
Samphire and low lying wetland areas	High importance as a refuge for numerous bird species with potential impact from altered hydrological regimes, uncontrolled vehicle access, little or no protection.	Review strategic protection of these samphire and wetland areas. Implement actions to protect and/or maintain the hydrological regimes and refuge area for native species, eg. install culverts or linkages where required, restrict vehicle access, etc.	High (cons/ threat)	DC of Streaky Bay, DENR, EP NRM, DFW, private land owners, community
Beaches	Significant shorebird feeding, nesting and fledging habitat threatened by vehicles, people, dogs and pest animals. Vehicles on beaches also a threat to meiofauna.	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Community education and awareness programs, eg. "chicks on beach".	High (con/ threat)	DC of Streaky Bay, DTEI, EP NRM, DENR, EP LGA. Tourism SA, Birds Australia, community
Yanerbie	Non-indigenous coastal heritage site identified – Sceale Bay whaling station - but not included on any statutory heritage register, with potential impact from recreational activities	Consider including onto heritage register eg. local heritage lists. Ensure sites managed to protect from damage. Install interpretive educational signage.	Medium	DENR, DC of Streaky Bay, EP NRM, SA Heritage Council, community
Smooth Pool	Significant geological feature present– GSA reference E36 (see section 3.4.1)	Interpretive signage	Medium	GSA SA branch, DC of Streaky Bay, EP NRM, DENR

BIOTA

Flora

Remnant vegetation area (ha)	1523.78 ha, 87.73% of cell area
# flora surveys / records	11 surveys, 1 opportune sites, 4 herbarium sites
# flora in cell	98 (note: includes some marine species)
# conservation rated flora in cell	3
# non-indigenous flora in cell	19
Significant CDCS floristic community	*Triodia compacta* hummock grassland - <20 (13) sites recorded along SA coast, 100% of these in EP *Leucophyta brownie* shrubland– 56% of SA records in EP *Maireana oppositifolia* shrubland – 50%of SA records in EP *Nitraria billardierei* shrubland – 54% of SA records in EP *Olearia axillaris / Tetragonia implexicoma* shrubland – 75% of SA records in EP
Protected area	No remnant vegetation protected

Weeds

Species	Common Name	Status	Study rating
Argyranthemum frutescens ssp.	Marguerite Daisy	RA	4
Argyranthemum frutescens ssp. foeniculaceum	Teneriffe Daisy	RA	4
Ehrharta villosa var. maxima	Pyp Grass	RA	8
Euphorbia paralias	Sea Spurge	RA	5
Gazania rigens	Gazania	RA	6
Mesembryanthemum crystallinum	Common Iceplant	RA	4
Lycium ferocissimum	African Boxthorn	D, RA	8
Marrubium vulgare	Horehound	D, RA	5
Oxalis pes-caprae	Soursob	D, RA	5
Asphodelus fistulosus	Onion Weed	D	3
Diplotaxis tenuifolia	Lincoln Weed	D	3
Echium plantagineum	Salvation Jane	D	2
Anagallis arvensis	Pimpernel		2
Avena sp.	Oat		2
Brassica tournefortii	Wild Turnip		3
Bupleurum semicompositum	Hare's Ear		0
Mesembryanthemum sp.	Iceplant		3
Parapholis incurva	Curly Ryegrass		1
Sonchus oleraceus (NC)	Common Sow-thistle		0

D: Declared weed, RA: Red alert weed

Native flora*

Species	Common Name	Aus status	SA status
Prasophyllum catenemum			E
Austrodanthonia laevis	Smooth Wallaby-grass		R
Poa drummondiana	Knotted Poa		R
Acacia anceps (NC)	Angled Wattle		
Acacia longifolia ssp. sophorae	Coastal Wattle		
Acacia oswaldii	Umbrella Wattle		
Acrotriche patula	Prickly Ground-berry		
Angianthus preissianus	Salt Angianthus		

Species	Common Name	Aus status	SA status
Asperococcus bullosus			
Atriplex paludosa ssp.	Marsh Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Atriplex vesicaria ssp.	Bladder Saltbush		
Austrostipa acrociliata	Graceful Spear-grass		
Austrostipa drummondii	Cottony Spear-grass		
Austrostipa elegantissima	Feather Spear-grass		
Austrostipa scabra ssp. falcata	Slender Spear-grass		
Beyeria lechenaultii	Pale Turpentine Bush		
Botryocladia sonderi			
Brachyscome ciliaris var. ciliaris	Variable Daisy		
Cassytha peninsularis	Peninsula Dodder-laurel		
Clematis microphylla var. microphylla (NC)	Old Man's Beard		
Coeloclonium umbellula			
Comesperma volubile	Love Creeper		
Compositae sp.	Daisy Family		
Dianella revoluta var.			
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Dodonaea baueri	Crinkled Hop-bush		
Eremophila crassifolia	Thick-leaf Emubush		
Eutaxia microphylla	Common Eutaxia		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos syrticola	Coast Cherry		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Frankenia pauciflora var. gunnii	Southern Sea-heath		
Gahnia lanigera	Black Grass Saw-sedge		
Geijera linearifolia	Sheep Bush		
Goodenia gibbosa			
Goodenia varia	Sticky Goodenia		
Gramineae sp.	Grass Family		
Helichrysum leucopsideum	Satin Everlasting		
Hemichroa diandra	Mallee Hemichroa		
Heterosiphonia gunniana			
Lasiopetalum discolor	Coast Velvet-bush		
Lawrencia squamata	Thorny Lawrencia		
Leucophyta brownii	Coast Cushion Bush		
Lomandra collina	Sand Mat-rush		
Lycium australe	Australian Boxthorn		
Maireana erioclada	Rosy Bluebush		
Maireana oppositifolia	Salt Bluebush		
Melaleuca gibbosa	Slender Honey-myrtle		
Melaleuca lanceolata	Dryland Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Melaleuca pauperiflora ssp. mutica	Boree		
Minuria leptophylla	Minnie Daisy		
Myriodesma harveyanum			
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Olearia lanuginosa	Woolly Daisy-bush		
Oxalis perennans (NC)	Native Sorrel		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pittosporum angustifolium	Native Apricot		

Species	Common Name	Aus status	SA status
Podotheca angustifolia	Sticky Long-heads		
Ptilotus obovatus var. obovatus	Silver Mulla Mulla		
Rhagodia candolleana ssp.	Sea-berry Saltbush		
Rhagodia crassifolia	Fleshy Saltbush		
Salsola tragus	Buckbush		
Samolus repens	Creeping Brookweed		
Scaevola crassifolia	Cushion Fanflower		
Senecio pinnatifolius (NC)	Variable Groundsel		
Sphacelaria novae-caledoniae			
Spyridium phylicoides	Narrow-leaf Spyridium		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Triodia compacta	Spinifex		
Vittadinia sp.	New Holland Daisy		
Westringia dampieri	Shore Westringia		
Westringia eremicola	Slender Westringia		
Zygophyllum billardierei	Coast Twinleaf		
Zygophyllum billardierei (NC)	Coast Twinleaf		

R: Rare, V: Vulnerable, E: Endangered
* note: includes some marine species

Fauna

# of fauna in cell	54 recorded – 53 birds, 0 butterflies, 1 mammals, 0 reptiles & amphibians (an additional 27 reptiles and 26 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	11 opportune sites
# of threatened fauna in cell	12
# of non-indigenous fauna	1 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Sturnus vulgaris	Common Starling	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Pandion cristatus	Eastern Osprey	M	E
Sternula nereis	Fairy Tern		E
Cladorhynchus leucocephalus	Banded Stilt		V
Numenius madagascariensis	Eastern Curlew	M	V
Thinornis rubricollis	Hooded Plover		V
Actitis hypoleucos	Common Sandpiper	M	R
Arenaria interpres	Ruddy Turnstone	M	R
Calidris alba	Sanderling	M	R

Species	Common Name	Aus status	SA status
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Neophema petrophila	Rock Parrot		R
Lichenostomus cratitius	Purple-gaped Honeyeater		ssp
Strepera versicolor	Grey Currawong		ssp
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Acanthiza apicalis	Inland Thornbill		
Acanthiza chrysorrhoa	Yellow-rumped Thornbill		
Anthochaera carunculata	Red Wattlebird		
Anthus novaeseelandiae	Australasian Pipit		
Calidris ferruginea	Curlew Sandpiper	M	
Calidris ruficollis	Red-necked Stint	M	
Charadrius ruficapillus	Red-capped Plover		
Chroicocephalus novaehollandiae	Silver Gull		
Cincloramphus cruralis	Brown Songlark		
Colluricincla harmonica	Grey Shrike-thrush		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Corvus mellori	Little Raven		
Cracticus tibicen	Australian Magpie		
Egretta novaehollandiae	White-faced Heron		
Eolophus roseicapillus	Galah		
Epthianura albifrons	White-fronted Chat		
Falco cenchroides	Nankeen Kestrel		
Hieraaetus morphnoides	Little Eagle		
Hirundo neoxena	Welcome Swallow		
Larus pacificus	Pacific Gull		
Lichenostomus leucotis	White-eared Honeyeater		
Lichenostomus virescens	Singing Honeyeater		
Manorina flavigula	Yellow-throated Miner		
Ocyphaps lophotes	Crested Pigeon		
Pardalotus punctatus	Spotted Pardalote		
Phalacrocorax fuscescens	Black-faced Cormorant		
Phalacrocorax varius	Pied Cormorant		
Phylidonyris novaehollandiae	New Holland Honeyeater		
Pomatostomus superciliosus	White-browed Babbler		
Rhipidura leucophrys	Willie Wagtail		
Sericornis frontalis	White-browed Scrubwren		
Smicrornis brevirostris	Weebill		
Thalasseus bergii	Crested Tern		
Tringa nebularia	Common Greenshank	M	
Vanellus tricolor	Banded Lapwing		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p

Species	Common Name	Status*	Record
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Macropus robustus	Euro		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Hemiergis peronii	Four-toed Earless Skink			c
Morethia obscura	Mallee Snake-eye			c
Parasuta spectabilis	Mallee Black-headed Snake			c
Pseudechis australis	Mulga Snake			c
Pseudonaja affinis	Dugite			c
Pygopus lepidopodus	Common Scaly-foot			c
Ctenophorus chapmani	Prickly Dragon			c
Ctenophorus fionni	Peninsula Dragon			c
Ctenophorus fordi	Mallee Dragon			c
Ctenotus euclae	Bight Coast Ctenotus			c
Diplodactylus calcicolus	South Coast Gecko			c
Egernia richardi	Western Tree Skink			c
Nephrurus milii	Barking Gecko			c
Pogona barbata	Eastern Bearded Dragon			c
Tympanocryptis lineata	Five-lined Earless Dragon			c
Amphibolurus norrisi	Mallee Tree-dragon			e
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e

Species	Common Name	Aus status	SA status	Record
Egernia stokesii	Gidgee Skink			e
Gehyra variegata	Tree Dtella			e
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			e
Christinus marmoratus	Marbled Gecko			e

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP64 Corvisart Bay

Cell area is 2,262 ha. Shoreline length totals 20.08 km.

Landforms

Corvisart Bay is an open embayment, facing west; the land within the coastal boundary is an undulating plateau of Pleistocene calcarenite. The calcarenite forms cliffs to 4 km south of Cape Bauer, with clifftop dunes. Long narrow beaches of fine/medium sand are backed by dunes and bluffs, cliffs, and cliff top dunes form Back Beach. The dunes store moderate amounts of Holocene carbonate sands in dune fields <800m wide. Dune areas are sparsely vegetated, with many blowout areas. The beaches are medium to steep, exposed and fronted by reefs and sand bars; and moderate energy is experienced at the shoreline.

Benthic Habitat

Limestone reefs front the south side of Cape Bauer and the southern half of the Bay; sand fronts the central northern half of the bay - Back Beach.

Biota

2,156.59 ha of the cell is covered by remnant vegetation, 95% by area; this almost entirely coastal shrubland. Mainly *Nitraria billardierei, +/-Olearia axillaris* mid open shrubland over *Threlkeldia diffusa, Tetragonia implexicoma, Rhagodia candolleana ssp. candolleana, Atriplex vesicaria ssp.* A smaller area, approximately from Back Beach to Hallys Beach, is mapped as *Olearia axillaris, Leucopogon parviflorus* tall open shrubland over *Threlkeldia diffusa, Tetragonia implexicoma, Rhagodia candolleana ssp. candolleana,* and *Pimelea serpyllifolia ssp. serpyllifolia* low shrubs over *Muehlenbeckia adpressa, Dianella brevicaulis, Carpobrotus rossii, Clematis microphylla var. microphylla, Senecio pinnatifolius.*
This shrubland appears to be recovering from previous grazing pressure.
This cell contains 4 BDBSA flora survey sites, 6 herbarium flora record sites, 1 opportune flora site and 5 opportune fauna sites.

Land Use/ Land Ownership

The shoreline is part of the Streaky Bay Wetland of National Importance.
The Crown land coastal reserve from Cape Bauer to Hallys Beach is approximately 250-600m wide and extends to the Cape Bauer loop road. The land east of the Cape Bauer loop road is privately owned. South of Hallys Beach, there is only a very narrow (approximately 30m) unalloted Crown land coastal reserve. There are two areas held under Crown land perpetual leases, these include the land from Hallys Beach to 1.5km south of Back Beach which extends approximately 100m – 1.4km inland from the coastal reserve, and the southern approximate 1.5km of the cell. The remainder of the area is privately owned.

FIGURE 6.41 Corvisart Bay at Back Beach. Clifftop dunes over calcarenite plateau. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

Surf breaks at Back Beach, Hally's (weather permitting) Razorbacks.
Fishing at Hally's and Back Beach
Dog walking is popular at Back Beach and Hally's with signage designating an off-leash walking area at Back Beach. Off-leash dogs accompany fishers and surfers and motoring tourists who need an open space to exercise their dogs.
Being close to town and on the heavily promoted Cape Bauer Loop Road, the area is also popular with sightseers and visitors. Boardwalks and/or viewing platforms are present at Whistling Rocks, Hally's and Back Beach making access easier.
Sand mine between Back Beach and Hally's Beach, backing onto farm land (mixed farming stock and grain production.

Values (Field visits and local reports)

Additional species recorded within this cell by Jane Cooper since 1980: Pied Oystercatcher, Sooty Oystercatcher, Red-capped Plover, Red-necked Stint, Common Greenshank, Australian Raven, Brown Falcon, Swamp Harrier, Brown Songlark, Crested Tern, Caspian Tern, Galah, Australian Hobby, Black-shouldered Kite, White-backed Swallow, Australasian Gannet, Cape Barren Goose, Pied Cormorant, Little Pied Cormorant, Great Cormorant, Crested Pigeon, Eastern Reef Egret, Stubble Quail, White-browed Scrubwren, Yellow-rumped Thornbill, Rock Parrot, Australian Ringneck, White-browed Babbler, Crimson Chat, Orange Chat, Pied Honeyeater, Silvereye, White-fronted Honeyeater, Spiny-cheeked Honeyeater, Grey Butcher-bird.
Euro – regularly recorded near Cape Bauer by Jane Cooper and Peter Needle

Threats (Field visits and local reports)

Back Beach and Hallys Beach threatened by shorebird disturbance, and ORV impact on coastal shrubland and habitat for reptiles and butterflies.
Increased pedestrian access to Hally's Beach with the completion of the boardwalk has put extreme pressure on one of the Hooded Plover breeding pairs. The boardwalk meets the beach within the Hooded Plover breeding territory and 200m from its regular nesting site.
Sand mine at Back Beach
Foxes and cats on the beach and in dunes at Hally's Beach and Back Beach (Cooper & Graham 2010) Goats and other significant feral animals are also found in the coastal areas, including rabbits. Roaming livestock is also common in this area.
Severe infestation of African Boxthorn in private property at northern end of cell, which has largely gone unchecked, with landholders apparently not undertaking the control work required. This is considered one of the most infested areas in the region, and a source of seed for new infestations in adjacent areas.
Eco-tourism / tourism ventures
Development – including a proposed major development that is likely to increase the visitation, threats and pressure on the coastal areas within the cell if it goes ahead.

Opportunities (Field visits and local reports)

Build on current access control measures, especially where recently implemented control measures have been vandalised and ignored.
Interpretation of shorebird nesting and feeding.
Management of dog access – DC of Streaky Bay Dog and Cat Management Plan is due for review soon; opportunity to contribute.
Proposed access management and revegetation of coastal areas at Back Beach to minimise effect of pedestrian and motorcycle access to coastal dune areas.
Scoping the Shoreline Project 2006-2010 – survey sites at Back Beach and Hally's Beach; 4 visits per year for 5 years (Cooper & Graham 2010).
Birds Australia's Hooded Plover Breeding Pair Monitoring Program 2010-2011 – Four sites/minimum 10 visits per breeding season.
Enter private fauna survey/ record information into the BDBSA.

Conservation Analysis (GIS)

The total of conservation summary means is 120.08, high for the region. The distribution of detailed totals shows medium to high values for the dune areas that cover 65.7% of the cell; low totals occur for the de-vegetated, de-flated dune areas and for two areas of remnant vegetation inland from the dunes.
Many conservation scores contribute to the high total, but few are outstandingly high. Values are relatively high for endemic plant communities (notably in the southern half of the cell); endemic floristic vegetation; habitat for butterflies (widespread), and Beach Slider and Bight Coast Skink (focal species) habitat within the dune areas. There are 17 bird species recorded in this cell, including the state endangered Eastern Osprey, White-bellied Sea-Eagle and Fairy Tern and the state vulnerable Hooded Plover. (There are no reptiles or mammals recorded). There is a registered Indigenous Heritage site within the cell. The cell is notably low for species richness – total number of species, which reflects the low number of survey records.

Threat Analysis (GIS)

The total, 49.0 is high for the region. Values are generally high to moderate across the cell, with the exception of the middle of the cell. This is the leasehold Crown land that runs from Back Beach Road to some 2 kilometres to the north, which has low to moderate totals.

The main contributors to the high threat total are land ownership and land use, viewshed and dune instability, vegetation block degradation (% of exotic species) and weeds.
There is some impact of ORV in the cell and a sand mine and a quarry: these are not major contributors for the whole cell, but are locally significant.

Adaptation to Climate Change Threats

(see also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	**Impacts and implications (for this cell)**	**Protect and manage habitat threats**	**Address landscape issues: fire, connectivity, refuges, hydrology**
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Beach recession	Monitor beach and dune recession to inform management response to trend as well as individual events. Active management of dune blowouts. Review planning implications of dunes moving landward.	
2070: +c.80cm.	Beaches and dunes show marked recession. Some existing pocket beaches lost. Beaches fronting cliffs and bluffs much reduced or lost.	(as above)	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides	Foredune damage	
Intensity of large storms increases	2070: Frequent flooding, and to an increasing extent. Frequent damage to foredunes.	.Foredune damage. Erosion of calcarenite cliffs.	
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing vegetation is found in warmer conditions elsewhere)		Maintain N-S connectivity of vegetation within the peninsula

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune and salt marsh habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Invasion of dunes by grassy weeds	Active weed control	Ensure dune vegetation is within the regional fire plan.
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate	Monitor beaches, see above.	

TABLE 6.38 Recommended Actions and Priority for EP64 – Corvisart Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly reptiles & mammals.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Species identified that are not within the BDBSA	Identify records and surveys that are not in the BDBSA (eg. private surveys/records, government surveys not yet entered). Evaluate/verify data and enter into the BDBSA	High (cons)	DENR, EP NRM, community
	Potential impact on breeding habitats of the endangered Eastern Osprey, particularly during the breeding season.	Develop site management and monitoring strategy, including consideration to closure, relocation or seasonal closures of roads/walking tracks/car parks in the near vicinity. Ensure management/ works programs are not undertaken during the breeding season. Community education.	High (cons)	DENR, DC Streaky Bay, EP NRM, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Climate change and sea level rise is having multiple effects within the cell	Ensure the establishment and maintenance of a time series of aerial photographs at an appropriate high resolution. Maintain connectivity between vegetation blocks to maximise resilience	Medium (cons)	DENR, EP NRM, community groups
	ORV activity throughout cell, damaging vegetation, causing soil instability and weed introduction. Some previous works to block tracks have been vandalised and/or reopened.	Develop access/traffic management plan – including review of existing access with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Maintain and repair previous and future access control measures. Install directional /educational signage. Community education. Work with landholders where unrestricted access occurs on private property.	Medium	DC Streaky Bay, EP NRM, DENR, SA Tourism, private landholders
	Significant resident shorebird (Hooded Plover) breeding habitat, with potential disturbance from people, dogs and pest animals	Develop and implement site management and monitoring strategies to protect these valuable, eg. interpretive signage, fencing off nests, use of chick shelters, temporary signage in breeding territories, restricting vehicles and off-leash dogs during breeding season, undertake yearly fox baiting programs from Hally's to Tractor Beach. Support ongoing shorebird breeding monitoring programs, particularly Hooded Plover breeding pairs at Hally's and Back Beach. Community education and awareness programs, eg. "chicks on beach".	High (cons/ threat)	DC of Streaky Bay, EP NRM, EP LGA, DENR, PIRSA, Tourism SA, Birds Australia, community
	Maintenance of coastal access management infrastructure	Use the EP Coastal infrastructure audit to setup a maintenance program	High (cons/ threat)	DENR, DC of Streaky Bay, EP NRM, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg rabbits, foxes, goats, cats. Undertake a control program as required. Work with private landowners to ensure that stock are restricted from the coastal zone (eg. ensure fences are adequate and maintained)	Medium	EP NRM, DENR, DC of Streaky Bay, private land owners
	Climate change aridity and rising sea level increase saline ground water on all porous rock areas threatening all vegetation associations	Monitor water table and salinity within the calcarenite	Medium	EP NRM, DFW
	Areas within cell identified as being important for endemic plant communities and as habitat for threatened species, including shorebirds and raptors, with potential disturbance from agricultural activities, development zoning, recreational activities, land management practices, uncontrolled access, weeds and pest animals	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches, dogs on leashes, track management, pest animal and plant control, restrict access to sensitive locations. Install interpretive/ educational signage. Community education programs. Review development plan zoning to these areas to increase protection	High (cons/ threat)	DENR, private land owners, EP NRM, DPLG, DC of Streaky Bay, community groups
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, private land owners, community groups, EP NRM, DC of Streaky Bay
	Coastal reserve being impacted by agricultural activities, development zoning, recreational activities, land management practices, uncontrolled access, weeds and pest animals	Develop a management plan for the coastal reserve to minimise threats and protect sensitive features and species	Medium	DENR, DC of Streaky Bay, EP NRM, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Weed species identified throughout cell, particularly in northern 1/3 of cell.	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Work with private land owners to ensure appropriate weed control is undertaken. Undertake education program on impact of garden escape plants and weed control program.	Medium	EP NRM, private land owners, DENR, DC of Streaky Bay
All dunes	Some weed invasion, relatively high dune instability, areas of sparse vegetation coverage and with low species diversity, suggests a lack of resilience.	Strategic weed control and planting to increase resilience.	High (cons/ threat)	EP NRM, DC Streaky Bay, DENR, private landholders.
	Accelerating sea level rise leading to beach recession. Foredune damage and dune transgression. Increase in weed activity in dunes	Monitor changes through aerial image time series. Manage dunes to reduce transgression. Consider buffer zones within plans, showing anticipated dune recession.	Medium	DENR, EP NRM, DC of Streaky Bay, land holders
	Management of dune areas	Work with leaseholders to improve management and protection to these areas	Moderate	DENR, EP NRM, DC of Streaky Bay, lease holders, community
	Vehicle and pedestrian access incursion into dune habitats near coastal visitation points, including at Back Beach and Hally's Beach where dune access is through Hooded Plover breeding territories.	Review with a view to rationalise unnecessary tracks and car parks. Block access to tracks and car parks to be closed, particularly at Back Beach and Hally's Beach Multiple access points over fence line on Loop road requires signage especially concerning off leash dogs. Directional and interpretive signage.	High (cons/ threat)	DC Streaky Bay, EP NRM, DENR
Hallys Beach to Back Beach	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg foxes, cats, goats and rabbits. Undertake a control program as required.	Medium	EP NRM, DENR, DC Streaky Bay, private landholders

Component	Issue	Proposed Action	Priority of Action	Key Players
Back Beach	Disturbance to 4 pairs of breeding Hooded Plover from dogs off-leash and unregulated access	Review management eg. dogs on leashes (or areas where dogs must be on leashes, etc). Shorebird interpretation required at Back Beach car park and along the cliff 1.2 km south near regular surf break access point.	High (cons/ threat)	EP NRM, DC of Streaky Bay, DENR, community
	High conservation area with potential impact from land management practices and recreational activities	Review management and land management practices of this valuable and sensitive area with a view to minimise damage and disturbance and increase protection. Investigate and implement actions to improve, protect and mitigate threats to these areas.	High	DENR, DTEI, EP NRM, DC of Streaky Bay, Crown lease holder
	Sand mining occurs with potential impact on sensitive areas, coastal vegetation, soil stability, soil compaction and erosion, weed introduction and disturbance to native fauna species	Investigate sustainability and environmental effects of mining sand in this location. Ensure any mining activities avoid areas of high conservation significance and management practices are in place to minimise potential impacts and ensure areas utilised are appropriately rehabilitated. Investigate/ consider removal of tenements from high conservation areas.	Medium	PIRSA, mine operator/ owner, DENR, EP NRM, DC of Streaky Bay

BIOTA

Flora

Remnant vegetation area (ha)	2156.59 ha, 95.35% of the cell
# flora surveys / records	4 surveys, 1 opportune site, 6 herbarium sites
# flora in cell	84
# conservation rated flora in cell	1
# non-indigenous flora in cell	28
Significant CDCS floristic community	*Leucophyta brownie* shrubland– 56% of SA records in EP *Olearia axillaris* / *Tetragonia implexicoma* shrubland – 75% of SA records in EP
Protected area	No remnant vegetation protected

Weeds

Species	Common Name	Status	Study rating
Argyranthemum frutescens ssp.	Marguerite Daisy	RA	4

Species	Common Name	Status	Study rating
Argyranthemum frutescens ssp. foeniculaceum	Teneriffe Daisy	RA	4
Carrichtera annua	Ward's Weed	RA	4
Ehrharta villosa var. maxima	Pyp Grass	RA	8
Euphorbia paralias	Sea Spurge	RA	5
Lycium ferocissimum	African Boxthorn	D, RA	8
Marrubium vulgare	Horehound	D, RA	5
Oxalis pes-caprae	Soursob	D, RA	5
Echium plantagineum	Salvation Jane	D	2
Anagallis arvensis	Pimpernel		2
Avena barbata	Bearded Oat		2
Avena sp.	Oat		2
Brassica tournefortii	Wild Turnip		3
Bromus diandrus	Great Brome		2
Bromus rubens	Red Brome		2
Bupleurum semicompositum	Hare's Ear		0
Centaurea melitensis	Malta Thistle		1
Erodium cicutarium	Cut-leaf Heron's-bill		0
Hordeum glaucum	Blue Barley-grass		1
Medicago minima var. minima	Little Medic		1
Medicago polymorpha var. polymorpha	Burr-medic		1
Medicago truncatula	Barrel Medic		1
Melilotus indicus	King Island Melilot		1
Parapholis incurva	Curly Ryegrass		1
Rostraria cristata	Annual Cat's-tail		2
Rostraria pumila	Tiny Bristle-grass		2
Sonchus oleraceus	Common Sow-thistle		0
Vulpia myuros f. myuros	Rat's-tail Fescue		2

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Brachyscome xanthocarpa	Yellow-fruit Daisy		R
Acacia anceps			
Angianthus preissianus	Salt Angianthus		
Angianthus tomentosus	Hairy Angianthus		
Apium annuum	Annual Celery		
Atriplex cinerea	Coast Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Atriplex vesicaria ssp.	Bladder Saltbush		
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrostipa exilis	Heath Spear-grass		
Austrostipa sp.	Spear-grass		
Beyeria lechenaultii	Pale Turpentine Bush		
Brachyscome cuneifolia	Wedge-leaf Daisy		
Brachyscome goniocarpa	Dwarf Daisy		
Brachyscome lineariloba	Hard-head Daisy		
Callitris canescens	Scrubby Cypress Pine		
Carpobrotus rossii (NC)	Native Pigface		
Crassula colorata var. acuminata	Dense Crassula		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Daucus glochidiatus	Native Carrot		

Species	Common Name	Aus status	SA status
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Eremophila deserti	Turkey-bush		
Exocarpos syrticola	Coast Cherry		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Frankenia sessilis	Small-leaf Sea-heath		
Gnaphalium indutum ssp. indutum	Tiny Cudweed		
Hemichroa diandra	Mallee Hemichroa		
Lawrencia squamata	Thorny Lawrencia		
Leucophyta brownii	Coast Cushion Bush		
Lichen sp.			
Lycium australe	Australian Boxthorn		
Maireana oppositifolia	Salt Bluebush		
Melaleuca acuminata ssp. acuminata	Mallee Honey-myrtle		
Minuria leptophylla	Minnie Daisy		
Moss sp.			
Muehlenbeckia adpressa	Climbing Lignum		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Parietaria cardiostegia	Mallee Smooth-nettle		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Podotheca angustifolia	Sticky Long-heads		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Samolus repens	Creeping Brookweed		
Scaevola crassifolia	Cushion Fanflower		
Sclerolaena diacantha	Grey Bindyi		
Sclerolaena uniflora	Small-spine Bindyi		
Senecio pinnatifolius (NC)	Variable Groundsel		
Spinifex hirsutus	Rolling Spinifex		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Thysanotus baueri	Mallee Fringe-lily		
Triglochin centrocarpum (NC)	Dwarf Arrowgrass		
Triglochin trichophora			
Vittadinia megacephala	Giant New Holland Daisy		
Westringia dampieri	Shore Westringia		
Zygophyllum billardierei	Coast Twinleaf		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	17 recorded – 17 birds, 0 butterflies, 0 mammals, 0 reptiles & amphibians (an additional 26 reptiles and 26 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	4 opportune sites
# of threatened fauna in cell	7
# of non-indigenous fauna	0 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Pieris rapae rapae	Cabbage White	Invertebrate	p

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Pandion cristatus	Eastern Osprey	M	E
Sternula nereis	Fairy Tern		E
Cladorhynchus leucocephalus**	Banded Stilt**		V
Numenius madagascariensis**	Eastern Curlew**	M	V
Thinornis rubricollis	Hooded Plover		V
Falco peregrinus	Peregrine Falcon		R
Anthus novaeseelandiae	Australasian Pipit		
Aquila audax	Wedge-tailed Eagle		
Ardenna tenuirostris	Short-tailed Shearwater		
Coturnix pectoralis	Stubble Quail		
Epthianura albifrons	White-fronted Chat		
Falco cenchroides	Nankeen Kestrel		
Hirundo neoxena	Welcome Swallow		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Pluvialis squatarola	Grey Plover	M	

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

** note: Eastern Curlew and Banded Stilt have been included, but are unlikely to occur here as this cell does not provide suitable habitat. It is likely that the survey data for these records has a low spatial accuracy (eg. older records) or they have been mis-identified.

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p

Species	Common Name	Status*	Record
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

No mammal species recorded

Reptiles

Species	Common Name	Aus status	SA status	Record
Hemiergis peronii	Four-toed Earless Skink			c
Morethia obscura	Mallee Snake-eye			c
Parasuta spectabilis	Mallee Black-headed Snake			c
Pseudechis australis	Mulga Snake			c
Pseudonaja affinis	Dugite			c
Pygopus lepidopodus	Common Scaly-foot			c
Ctenophorus chapmani	Prickly Dragon			c
Ctenophorus fionni	Peninsula Dragon			c
Ctenophorus fordi	Mallee Dragon			c
Ctenotus euclae	Bight Coast Ctenotus			c
Diplodactylus calcicolus	South Coast Gecko			c
Egernia richardi	Western Tree Skink			c
Nephrurus milii	Barking Gecko			c
Pogona barbata	Eastern Bearded Dragon			c
Tympanocryptis lineata	Five-lined Earless Dragon			c
Amphibolurus norrisi	Mallee Tree-dragon			e
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Egernia stokesii	Gidgee Skink			e
Gehyra variegata	Tree Dtella			e
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			e
Christinus marmoratus	Marbled Gecko			e

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP65 Pt Gibson

Cell area 1,360.4 ha. Shoreline length 45.04 km.

Landforms

This peninsula is composed of Pleistocene calcarenite, with low cliffs and slopes at the shore. Cape Bauer has calcarenite cliffs <40m, with small clifftop dunes. Sand is being transported W -> E within nearshore waters into the bay, both along the seafloor and along the shore. Short et al 1986, p.110, describes sand moving in nearshore sand waves, constructing re-curved spits. While the wave energy is low, the sediment movement is considerable as can be seen on time series aerial photography; currently the spit is mis-aligned with the cadastral survey because of the dynamic nature of landform change here. The growth of Point Gibson threatens to eventually cut off the Port Blanche embayment; and behind this spit mangroves and samphire are extending.

Benthic Habitat

Nearshore sandflats in low rises, with seagrass patches.

Biota

791.01 ha, or 58.15% of the cell contains remnant vegetation. There are 4 BDBSA flora survey sites, 4 herbarium flora record sites and 14 opportune fauna sites within this cell.
Clifftop and shoreline dunes along the north facing shore from Cape Bauer to Point Gibson are *Olearia axillaris, Leucopogon parviflorus* tall open shrubland. The low calcarenite slopes show *Melaleuca lanceolata, +/-Olearia axillaris, +/-Leucopogon parviflorus* tall open shrubland and *Nitraria billardierei, +/-Olearia axillaris* mid open shrubland. A 5km stand of highly productive temperate Grey Mangrove and associated salt marsh, macro-algae and seagrass meadows occur along the eastern shore of Gibson Peninsula and extend 500m to 1km inland.

Land Use/ Land Ownership

Most of Point Gibson and adjacent mangrove and samphire area are held under a perpetual Crown lease, with only a very narrow (c.30m) coastal reserve of unalloted Crown land around the seaward edge. Cape Bauer and the neighbouring northern shore have a somewhat larger coastal reserve (c.70-400m) of unalloted Crown land which extends from to the Cape Bauer loop road. The cleared agricultural land south of the Cape Bauer loop road is privately owned.

The shoreline of Cape Bauer and the intertidal sandflats, tidal creeks and salt marshes of the northern shoreline of Gibson Peninsula, including Point Gibson, comprise the southern section of the Streaky Bay Wetland of National Importance, SA 016.

FIGURE 6.42 Point Gibson, sand spit, mangroves and salt marsh. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

Recreation and tourism – ORV use, sight seeing, very popular for fishing, boating, walking, camping
Oyster leases offshore
Agriculture
Beach boat launching

Values (Field visits and local reports)

Internationally significant numbers of some shorebird species occur here.
The bare sandflats and bars of northern Gibson Peninsula are a rich source of macrobenthic invertebrates and meiofauna.
Northern Gibson Peninsula and Point Gibson are two of the four count areas for the Streaky Bay Shorebird Area which has been regularly monitored as a significant shorebird site for 32 years (Blancheport (EP66) and Acraman Creek (EP69) are the other two sites within this shorebird area). The Northern Gibson Peninsula and Point Gibson area has a high species diversity with 30 shorebird species recorded, including 22 listed migratory species and 8 resident species, and contains nationally significant populations of Grey Plover, Common Greenshank, Red-necked Stint. The whole shorebird area regularly supports 2,000 – 3,000 shorebirds.
133 bird species recorded within this cell (not all have been recorded within the BDBSA)

Threats (Field visits and local reports)

There is visitation damage to clifftop dunes at Cape Bauer, with many tracks, informal camping and car parks.
Extensive areas of potential acid sulfate soil occur near Point Gibson.
Eco-tourism / tourism ventures
Development – including a proposed major development that is likely to increase the visitation, threats and pressure on the coastal areas within the cell if it goes ahead.
Beach boat launching (public safety, hydrocarbon spills)
Dogs off leash
Feral animals – cats, foxes and rabbits
Vehicles on beaches
Unrestricted access (walking, vehicles, etc) throughout cell
Uncontrolled camping
Oyster leases offshore a source of marine debris or potential marine pests (pacific oyster)
Unregulated beach boat launching from the northern shoreline of Gibson Peninsula at The Bushes within one of the Streaky Bay Aquaculture Zone exclusion zones (excluded for boat access)

Opportunities (Field visits and local reports)

Improved management of Point Gibson area, including access management to minimise damage to coastal vegetation and landforms and disturbance to native fauna species, particularly shorebirds.
Pedestrian and vehicle access management and rationalisation throughout cell area
Build on previous access control measures, especially where recently implemented control measures have been vandalised and ignored.
Interpretation of shorebird nesting and feeding.
Management of dog access – DC of Streaky Bay Dog and Cat Management Plan is due for review soon; opportunity to contribute.

Conservation Analysis (GIS)

The total of summary conservation means is 115.16, a medium score within the region. These values are concentrated in the dunes, salt marsh and remnant shrublands along the shore. The cleared land, which comprises nearly half the cell, has low total values. The highest totals are in the dune shrublands of the Point Gibson dunes.
Layers contributing most to the conservation total are: threatened flora (high through all vegetated areas); numbers of threatened species (Point Gibson spit and salt marsh); species richness (sand dune areas); bird habitat (Point Gibson spit and salt marsh); habitat for the Eastern Osprey and the Australian Pied Oystercatcher, viewscape; indigenous heritage and wetland value. There are no mammals or reptiles recorded within this cell, but there are 104 bird species recorded, including the state endangered Eastern Osprey, White-bellied Sea-Eagle and Fairy Tern; also the state vulnerable Banded Stilt and Hooded Plover.

Threat Analysis (GIS)

Total of threat summary means is 52.90, which is high for the region. Totals are high throughout for the cleared land and the high conservation land of Point Gibson and associated wetland. While the dunes and cliffs of the Cape Bauer Peninsula do not sum to high totals. The threat totals accumulate from ORV activity (not intense but throughout the cell); land ownership and land use, visibility analysis, vegetation block degradation and the distribution of invasive weeds. Boxthorn is reported at the spit and Cape Bauer, iceplant and boxthorn at Point Gibson. Any

disturbance of the salt marsh area could potentially be faced with difficulties from the development of acid sulfate soils.

Adaptation to Climate Change Threats

(see also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	**Impacts and implications (for this cell)**	**Protect and manage habitat threats**	**Address landscape issues: fire, connectivity, refuges, hydrology**
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline and wetland change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Rise in frequency of tidal flooding of salt marsh, threatening intertidal salt marsh species, and leading to marsh recession, (possibly accompanied by shoreline advance due to the ingress and accumulation of marine sediments). Dune instability will increase due to foredune damage	Monitor salt marsh flooding and salt marsh habitat through the establishment of a profile line survey. Ensure salt marsh retreat where possible- review planning implications of retreat Monitor dune movement and shoreline instability with aerial photographic time series.	
2070: +c.80cm.	Sandy coast has marked recession; both tidal heights and sediment accumulation significant for salt marsh (see above)	Active management of dune blowouts	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides	Monitor salt marsh flooding (see above)	
Intensity of large storms increases	2070: Frequent flooding, and to an increasing extent. Frequent damage to foredunes.	(see above)	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing vegetation is found in warmer conditions elsewhere)		Maintain N-S connectivity of vegetation patches
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune and salt marsh habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Invasion of dunes by grassy weeds	Active weed control	Ensure dune vegetation is within the regional fire plan.
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains sediment movement, extending Point Gibson	Monitor beaches, see above.	

TABLE 6.39 Recommended Actions and Priority for EP65 – Pt Gibson

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Very inadequate data on biodiversity and habitat values, particularly flora, reptiles & mammals. (No reptiles or mammals recorded)	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Climate change and sea level rise is having multiple effects within the cell	Ensure the establishment and maintenance of a time series of aerial photographs at an appropriate high resolution. Maintain connectivity between vegetation blocks to maximise resilience	Medium (cons)	DENR, EP NRM, land holders, community groups

Component	Issue	Proposed Action	Priority of Action	Key Players
	Species identified that are not within the BDBSA	Identify records and surveys that are not in the BDBSA (eg. private surveys/records, government surveys not yet entered). Evaluate/verify data and enter into the BDBSA	High (cons)	DENR, EP NRM, community
	Areas within cell identified as being important for threatened species, including shorebirds and raptors, with potential disturbance from agricultural activities, development zoning, recreational activities, land management practices, uncontrolled access, weeds and pest animals	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches, dogs on leashes, track management, pest animal and plant control, restrict access to sensitive locations. Install interpretive/ educational signage. Community education programs. Review development plan zoning to these areas to increase protection	High (cons/ threat)	DENR, private land owners, EP NRM, DPLG, DC of Streaky Bay, community groups
	Significant shorebird feeding, breeding and roosting sites, with disturbance from people, vehicles, dogs, pest animals, etc	Develop and implement site management and monitoring strategies to protect these valuable, eg. interpretive signage, fencing off nests, use of chick shelters, temporary signage in breeding territories, restricting vehicles and off-leash dogs during breeding/migratory season. Undertake and/or support ongoing shorebird monitoring programs. Community education and awareness programs, eg. "chicks on beach".	High (cons)	DC of Streaky Bay, EP NRM, DTEI, EP LGA, DENR, Tourism SA, Birds Australia, community, private land owners
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg. rabbits foxes, cats. Undertake control program as required.	Medium (cons/ threat)	EP NRM, DENR, DC Streaky Bay, private landholders

Component	Issue	Proposed Action	Priority of Action	Key Players
	Coastal reserve being impacted by agricultural activities, recreational activities, land management practices, uncontrolled access, weeds and pest animals	Develop a management plan for the coastal reserve to minimise threats and protect sensitive features and species	Medium	DENR, DC of Streaky Bay, EP NRM, community
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, private land owners, community groups, EP NRM, DC of Streaky Bay
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	Medium (cons/ threat)	DC of Streaky Bay, DENR, EP NRM, community
	Unrestricted vehicle and pedestrian access with multiple tracks around the coast impacting on the intertidal sandflats, salt marsh, coastal dune and cliff top vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Formalise and maintain pedestrian access. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	High (threat)	DC of Streaky Bay, DTEI, DENR, EP NRM, SA Tourism, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	Medium (cons/ threat)	EP NRM, private land owners, DENR, DC of Streaky Bay
Privately owned land (outside coastal reserve)	Potential future development with possible impact on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Ensure future development is not located in areas of high conservation value or high sensitivity. Review development plan zoning to these areas to increase protection. Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs, cats, ORV, etc	Medium	EP NRM, DC of Streaky Bay, DENR, DPLG, EP LGA, private land owners, developers, community groups
Point Gibson sandspit and salt marsh	Very high conservation values are indicated for flora, numbers of threatened species, and notably bird species. Current status uncertain due to lack of alignment of area of cadastre and the dynamic landforms. There are potential acid sulfate soils in this area.	Review the management and protection of this valuable and sensitive area, with consideration to prepare a local management plan including improved management, joint management, etc Review cadastre, due to current inaccuracy.	High (cons/ threat)	DENR, DTEI, EP NRM, DC of Streaky Bay, Crown lease holder
	Shoreline sand spit and beaches highly mobile due to both accelerating sea level rise and sediment movement	Monitor shoreline change through maintaining aerial photographic time series	Medium	EP NRM, DENR
	Invasive weeds in a high value area need control	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required).	High (cons/ threat)	DENR, EP NRM, DC Streaky Bay, Crown lease holder
	ORV activity damaging vegetation, causing soil instability, weed introduction and disturbing shorebirds	Review with a view to rationalise unnecessary tracks and install clear directional signage on any tracks to remain.	High (cons/ threat)	DC of Streaky Bay, DTEI, DENR, EP NRM, community

Component	Issue	Proposed Action	Priority of Action	Key Players
All salt marsh and low lying areas	All salt marsh and low lying areas show the potential for acid sulfate soil following disturbance; in turn this would potentially threaten life forms offshore	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Medium	DC of Streaky Bay, DENR, EP NRM, developers, community groups
Beaches and sand flats	Vehicles and dogs on beaches and beach boat launching with potential impact on meiofauna, shorebirds and intertidal species and/or habitat.	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Review beach boat launching locations with a view to rationalise. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas (include in Council Dog and Cat Management Plan). Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	Medium	Council, EP NRM, DTEI, EP LGA, DENR, PIRSA, Tourism SA, Birds Australia, community, private land owners
	Marine debris with potential impact on native fauna species	Investigate opportunities for, and/or support, ongoing marine debris cleanup programs. Undertake education program targeting fishers, campers, aquaculture operators	Medium	PIRSA, EP NRM, DENR, aquaculture operators, community, DC of Streaky Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
Cape Bauer cliffs and clifftop dunes	ORV activity, car parks and informal camping damaging vegetation, cliff top dunes, soil compaction, soil instability, fauna disturbance, weed introduction and causing runoff erosion. Some informal car parks, vehicle and pedestrian tracks close to potentially unstable cliff edge; safety hazard.	Review with a view to rationalise unnecessary tracks and car parks. Close or reroute tracks and car parks close to cliff edge. Block access (eg. fencing/rocks) to tracks and car parks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks or car parks that are not well defined, or are causing water run-off erosion. Formalise and maintain pedestrian access. Install directional / educational signage where required.	High (hazard; cons/ threat)	DC of Streaky Bay, DENR, EP NRM, community

BIOTA

Flora

Remnant vegetation area (ha)	791.01 ha, 58.15% of the cell
# flora in cell	62
# flora surveys / records	4 surveys, 4 herbarium record sites.
# conservation rated flora in cell	3
# non-indigenous flora in cell	19
Significant CDCS floristic community	Nil
Protected area	Nil

Weeds

Species	Common Name	Status	Study rating
Carrichtera annua	Ward's Weed	RA	4
Euphorbia paralias	Sea Spurge	RA	5
Mesembryanthemum crystallinum	Common Iceplant	RA	4
Lycium ferocissimum	African Boxthorn	D, RA	8
Marrubium vulgare	Horehound	D, RA	5
Oxalis pes-caprae	Soursob	D, RA	5
Asphodelus fistulosus	Onion Weed	D	3
Diplotaxis tenuifolia	Lincoln Weed	D	3
Avena barbata	Bearded Oat		2
Brassica tournefortii	Wild Turnip		3
Bromus rigidus	Rigid Brome		2
Bromus rubens	Red Brome		2
Cerastium glomeratum	Common Mouse-ear Chickweed		1
Erodium cicutarium	Cut-leaf Heron's-bill		0
Lolium rigidum	Wimmera Ryegrass		1

Species	Common Name	Status	Study rating
Melilotus indicus	King Island Melilot		1
Mesembryanthemum sp.	Iceplant		3
Minuartia mediterranea	Slender Sandwort		0
Rostraria cristata	Annual Cat's-tail		2

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Prostanthera calycina	West Coast Mintbush	V	V
Tecticornia flabelliformis	Bead Samphire	V	V
Poa fax	Scaly Poa		R
Acacia longifolia ssp. sophorae	Coastal Wattle		
Acacia sp. Winged (C.R.Alcock 4936)	Angled Wattle		
Acrotriche patula	Prickly Ground-berry		
Amyema melaleucae	Tea-tree Mistletoe		
Avicennia marina ssp. marina	Grey Mangrove		
Calandrinia eremaea	Dryland Purslane		
Carpobrotus rossii (NC)	Native Pigface		
Crassula colorata var. acuminata	Dense Crassula		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Daucus glochidiatus	Native Carrot		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Hemichroa pentandra	Trailing Hemichroa		
Maireana oppositifolia	Salt Bluebush		
Melaleuca lanceolata	Dryland Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Moss sp.			
Myoporum insulare	Common Boobialla		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Parietaria debilis	Smooth-nettle		
Parietaria debilis (NC)	Smooth-nettle		
Podotheca angustifolia	Sticky Long-heads		
Ptilotus obovatus var. obovatus	Silver Mulla Mulla		
Rhagodia candolleana ssp.	Sea-berry Saltbush		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Salsola tragus	Buckbush		
Samolus repens	Creeping Brookweed		
Santalum acuminatum	Quandong		
Sarcocornia quinqueflora	Beaded Samphire		
Suaeda australis	Austral Seablite		
Tecticornia arbuscula	Shrubby Samphire		
Tecticornia halocnemoides ssp.	Grey Samphire		
Tecticornia halocnemoides ssp. halocnemoides	Grey Samphire		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Westringia dampieri	Shore Westringia		
Wurmbea dioica ssp. dioica	Early Nancy		
Zygophyllum billardierei	Coast Twinleaf		
Zygophyllum simile	White Twinleaf		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	104 – 104 birds, 0 butterflies, 0 mammals, 0 reptiles & amphibians (an additional 26 reptiles and 26 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	14 opportunistic sites
# of threatened fauna in cell	26
# of non-indigenous fauna	3 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Passer domesticus	House Sparrow	Aves	x
Sturnus vulgaris	Common Starling	Aves	x
Turdus merula	Common Blackbird	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Pandion cristatus	Eastern Osprey	M	E
Sternula nereis	Fairy Tern		E
Ardeotis australis	Australian Bustard		V
Cladorhynchus leucocephalus	Banded Stilt		V
Numenius madagascariensis	Eastern Curlew	M	V
Thinornis rubricollis	Hooded Plover		V
Ardenna carneipes	Flesh-footed Shearwater		R
Arenaria interpres	Ruddy Turnstone	M	R
Biziura lobata	Musk Duck		R
Calidris alba	Sanderling	M	R
Calidris tenuirostris	Great Knot	M	R
Cereopsis novaehollandiae	Cape Barren Goose		R
Charadrius leschenaultii	Greater Sand Plover	M	R
Charadrius mongolus	Lesser Sand Plover	M	R
Egretta garzetta	Little Egret		R
Egretta sacra	Eastern Reef Egret		R
Falco peregrinus	Peregrine Falcon		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Limosa lapponica	Bar-tailed Godwit	M	R
Neophema petrophila	Rock Parrot		R
Numenius phaeopus	Whimbrel	M	R
Pluvialis fulva	Pacific Golden Plover	M	R
Podiceps cristatus	Great Crested Grebe		R
Tringa brevipes	Grey-tailed Tattler	M	R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Acanthiza apicalis	Inland Thornbill		
Acanthiza chrysorrhoa	Yellow-rumped Thornbill		

Species	Common Name	Aus status	SA status
Accipiter cirrocephalus	Collared Sparrowhawk		
Anas castanea	Chestnut Teal		
Anas gracilis	Grey Teal		
Anas superciliosa	Pacific Black Duck		
Anthus novaeseelandiae	Australasian Pipit		
Aquila audax	Wedge-tailed Eagle		
Ardea modesta	Eastern Great Egret		
Ardenna tenuirostris	Short-tailed Shearwater		
Artamus cyanopterus	Dusky Woodswallow		
Barnardius zonarius	Australian Ringneck, (Ring-necked Parrot)		
Cacomantis flabelliformis	Fan-tailed Cuckoo		
Cacomantis pallidus	Pallid Cuckoo		
Calidris acuminata	Sharp-tailed Sandpiper	M	
Calidris canutus	Red Knot	M	
Calidris ferruginea	Curlew Sandpiper	M	
Calidris ruficollis	Red-necked Stint	M	
Chalcites basalis	Horsfield's Bronze-cuckoo		
Charadrius bicinctus	Double-banded Plover		
Charadrius ruficapillus	Red-capped Plover		
Charadrius veredus	Oriental Plover		
Cheramoeca leucosterna	White-backed Swallow		
Chlidonias hybrida	Whiskered Tern		
Chroicocephalus novaehollandiae	Silver Gull		
Cincloramphus cruralis	Brown Songlark		
Circus assimilis	Spotted Harrier		
Colluricincla harmonica	Grey Shrike-thrush		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Corvus coronoides	Australian Raven		
Coturnix pectoralis	Stubble Quail		
Cracticus torquatus	Grey Butcherbird		
Cygnus atratus	Black Swan		
Egretta novaehollandiae	White-faced Heron		
Elanus axillaris	Black-shouldered Kite		
Eolophus roseicapillus	Galah		
Epthianura albifrons	White-fronted Chat		
Falco berigora	Brown Falcon		
Falco cenchroides	Nankeen Kestrel		
Falco longipennis	Australian Hobby		
Gallinago stenura	Pintail Snipe	M	
Glyciphila melanops	Tawny-crowned Honeyeater		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Malurus pulcherrimus	Blue-breasted Fairy-wren		
Megalurus gramineus	Little Grassbird		
Merops ornatus	Rainbow Bee-eater		
Microcarbo melanoleucos	Little Pied Cormorant		
Mirafra javanica	Horsfield's Bushlark		
Morus serrator	Australasian Gannet		
Ocyphaps lophotes	Crested Pigeon		
Pardalotus striatus	Striated Pardalote		

Species	Common Name	Aus status	SA status
Pelecanus conspicillatus	Australian Pelican		
Petrochelidon nigricans	Tree Martin		
Petroica goodenovii	Red-capped Robin		
Phalacrocorax fuscescens	Black-faced Cormorant		
Phalacrocorax sulcirostris	Little Black Cormorant		
Phalacrocorax varius	Pied Cormorant		
Pluvialis squatarola	Grey Plover	M	
Poliocephalus poliocephalus	Hoary-headed Grebe		
Purnella albifrons	White-fronted Honeyeater		
Recurvirostra novaehollandiae	Red-necked Avocet		
Rhipidura albiscapa	Grey Fantail		
Rhipidura leucophrys	Willie Wagtail		
Sericornis frontalis	White-browed Scrubwren		
Smicrornis brevirostris	Weebill		
Stiltia isabella	Australian Pratincole		
Thalasseus bergii	Crested Tern		
Todiramphus sanctus	Sacred Kingfisher		
Tringa nebularia	Common Greenshank	M	
Vanellus miles	Masked Lapwing		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes albocincta	Bitter-bush Blue		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom

x: recorded, p: possibly there as suggested by R. Grund

Mammals

No mammal species recorded

Reptiles

Species	Common Name	Aus status	SA status	Record
Hemiergis peronii	Four-toed Earless Skink			c
Morethia obscura	Mallee Snake-eye			c
Parasuta spectabilis	Mallee Black-headed Snake			c
Pseudechis australis	Mulga Snake			c
Pseudonaja affinis	Dugite			c
Pygopus lepidopodus	Common Scaly-foot			c
Ctenophorus chapmani	Prickly Dragon			c
Ctenophorus fionni	Peninsula Dragon			c
Ctenophorus fordi	Mallee Dragon			c
Ctenotus euclae	Bight Coast Ctenotus			c
Diplodactylus calcicolus	South Coast Gecko			c
Egernia richardi	Western Tree Skink			c
Nephrurus milii	Barking Gecko			c
Pogona barbata	Eastern Bearded Dragon			c
Tympanocryptis lineata	Five-lined Earless Dragon			c
Amphibolurus norrisi	Mallee Tree-dragon			e
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Egernia stokesii	Gidgee Skink			e
Gehyra variegata	Tree Dtella			e
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			e
Christinus marmoratus	Marbled Gecko			e

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP69 Acraman Creek

Cell area is 3,487 ha. Shoreline length is 74.28 km.

Landforms

This small cell consists of a large composite sandspit, from Point De Mole to Point Lindsay that shelters mangrove and salt marsh. Short et al (1986, p.114) describe the salt marshes of Acraman Creek CP as forming behind beach foredune ridges along spits prograding from the W, during the marine retreat (6000 - 2000BP) following the Holocene stillstand. One beach ridge on the landward side of the salt marsh has been dated at c.5800BP. Some beach sands include granite fragments from Point Brown. The sandspit prograding from near Point DeMole has cut off the marine connection to a large area of stranded inter-tidal samphire.

Benthic Habitat/

Dense and medium seagrass is found to close inshore. Low profile inshore reef at the eastern end of the cell. Patchy seagrass at western end of cell.

Biota

3,341 ha, or 96% of this cell, is remnant vegetation. There are 13 flora survey sites, 6 opportune survey sites, 5 herbarium record sites, 2 fauna survey sites, and 16 opportune fauna survey sites. There is one DENR profile (330008) transect of the salt marsh.
Sand dune areas at the shore and landward of the salt marsh are in shrubland *Olearia axillaris*, *Leucopogon parviflorus* tall open shrubland over *Threlkeldia diffusa, Tetragonia implexicoma, Rhagodia candolleana ssp. candolleana, Pimelea serpyllifolia ssp. serpyllifolia* low shrubs over *Muehlenbeckia adpressa, Dianella brevicaulis, Carpobrotus rossii, Clematis microphylla var. microphylla, Senecio pinnatifolius.*
78% of the remnant vegetation is salt marsh (see Figure 3.52), mainly inter-tidal saltmarsh: low shrubland *Tecticornia arbuscula, +/-Sarcocornia quinqueflora, +/-Lycium australe* low shrubland over *+/-Suaeda australis.* Mangroves are found along the Acraman Creek tidal inlet. Stranded inter-tidal samphire covers a wide extent from near Edrilpa to the coast (see Figure 3.52): *Tecticornia indica ssp., +/-Maireana oppositifolia, +/-Atriplex paludosa ssp., +/-Atriplex vesicaria ssp.* low open shrubland over *+/-Carpobrotus rossii* (NC).
Adjacent inland slopes show *Melaleuca lanceolata* shrubland over *Olearia axillaris* and *Leucopogon parviflorus.* There is a small area of woodland along the eastern shore of Cape De Mole including *Eucalyptus gracilis, Eucalyptus dumosa* mid mallee woodland over *Melaleuca lanceolata, Melaleuca acuminata ssp. acuminata* mid shrubs

FIGURE 6.43 Point Lindsay, Acraman Creek. Photo: Coast Protection Board, 2007

Land Use/ Land Ownership

Acraman Creek Conservation Park is 83% of the area of the cell. Small areas in the north-east, west and north-west of the cell, behind or adjacent the Park are privately owned. The area in the south west of the cell, which abuts the CP is largely perpetual Crown leasehold land fronted by a narrow (c.50m) coastal reserve of unalloted Crown land.

The Parks of the Far West brochure, 2007 describes Acraman Creek CP as "Protected from the full force of the Southern Ocean, this mangrove estuary, samphire and mallee area provides an important feeding ground for many coastal birds. In particular, it supports migratory waders such as sandpipers and stilts that come from as far away as the Arctic Circle. The long, white sandy beach, backed by dunes, is accessible to conventional vehicles. Small boats can be launched from the beach. The creek and Point Lindsay can only be reached by four-wheel drive vehicles. A shipwreck, from past whaling activity, lies offshore."
Much of the CP is a Wetland of National Importance, SA016.

Uses (Field visits and local reports)

Popular spot for recreational camping and fishing
Day visitation and separate camping areas have been developed
Boat launching from beach and creek system
Professional fishing, boat mooring, ocean side
Recreation and tourism – ORV use, beach driving, sight seeing, boating, nature observation
Shorebird surveys
Conservation

Values (Field visits and local reports)

Acraman Creek is part of the count area for the Streaky Bay Shorebird Area which has been regularly monitored as a significant shorebird site, which regularly supports 2,000 – 3,000 shorebirds.

Threats (Field visits and local reports)

Extensive PCASS recorded
Boat launching around day visitation area (public safety, hydrocarbon spills)
Informal camping
Vehicles on beach
Creek bank erosion due to boating wake action
Introduction of feral animals / illegal entry of dogs in park
Unregistered vehicles (quad bikes etc)
Uncontrolled ORV usage / track creation
Wildfire
Collection of fire wood
Waste management

Opportunities (Field visits and local reports)

Park infrastructure includes; interpretation and directional signage, shelter and picnic tables, low level fencing, camp grounds
This valuable park lacks a management plan. Acraman Creek is part (together with Point Gibson peninsula) of the listing of Streaky Bay in the Directory of Wetlands of Importance in Australia, EYB013SA. The wetland is included as it supports bird species at a vulnerable period of life, and a refuge in drought conditions; it also includes Commonwealth listed plant species (*Tecticornia flabelliformis*).
Acraman Creek is part of the Streaky Bay Shorebird Area which has been regularly monitored as a significant shorebird site for 32 years.
Rationalise vehicle movement and track closure / re-alignment
Re-instate fox bating program
Improved and continued campground development
Interpretation of shorebird nesting and feeding.

Conservation Analysis (GIS)

The sum of conservation means is high - 134.76 – the 11th highest in the region. High to medium – high values are widely distributed with only small cleared areas below average. Some Melaleuca open shrubland on dunes inland and adjacent to the salt marsh has very high total values; the intertidal samphire and mangroves, as well as all other sand dunes all have medium high totals, with the stranded samphire only a little lower.
Many conservation layers have higher than average values within this cell: sites with threatened flora (whole cell); sites with a high number of all threatened species (inter-tidal salt marsh – not stranded); plant communities with high endemicity (whole cell above average); sites with high endemic floristic composition (salt marsh and dunes); sites with a high total number of species (mainly average with scattered areas above average); habitat for threatened bird species (inter-tidal salt marsh); total number of bird species (inter-tidal salt marsh); habitat for threatened mammals; butterfly habitat (all vegetated areas, higher in sedgelands), viewscape and viewshed, vegetation block metrics, and wetland value. Habitat for the focal species Australian Pied Oystercatcher is found in the inter-tidal salt marsh; and for the Beach Slider and Bight Coast Skink in the dune areas.

There are 3 mammal, 15 reptile and 63 bird species recorded in this cell; including the state endangered White-bellied Sea-Eagle, Eastern Osprey, and Fairy Tern; also the state vulnerable Hooded Plover; and the state rare Beach Slider.

Threat Analysis (GIS)

The threat total is 34.02, which is low for the region. Only the small cleared areas, and parts of the dunes show higher than average total threat scores (notably near to Point De Mole). Totals are lowest in the inter-tidal salt marsh.
Within the cell statistics only viewshed and viewscape, proportion of exotic plants, and the area of potential acid sulphate soils have higher than average totals.
Off road tracks are concentrated on the supra-tidal samphire, chenier and dune ridges NE of the tidal inlet (near the road link to the Flinders Highway), then to the beach and dune at the eastern end of the cell. ORV activity is also concentrated near Point De Mole.

Adaptation to Climate Change Threats

(see also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	**Impacts and implications (for this cell)**	**Protect and manage habitat threats**	**Address landscape issues: fire, connectivity, refuges, hydrology**
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, dune and lake change by establishing a rectified aerial photographic record at an appropriate resolution	
Sea level rise: 2030 : +c.20cm	Rise in frequency of tidal flooding, threatens tide connected salt marsh areas.	Use salt marsh profile (DENR 330008) as a baseline for monitoring salt marsh changes. Establish buffer for salt marsh retreat on land use and development plans.	
2070: +c.80cm.	Increase in storm foredune damage and beach and dune recession	Establish new profile NW of Point Lindsay to track beach and dune changes. Active dune management, to slow recession. Maintain aerial photographic record to track shoreline and habitat changes.	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides.		
Intensity of large storms increases.	2070: Flooding will affect all swamps and adjacent low lying areas. Frequent storm damage to foredunes.	Active management of dune blowouts	
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere). There will be an increased risk for species that are already vulnerable. Invasive species may become more dominant.		Maintain connectivity of vegetation within the region.
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune vegetation adapts well to drier conditions, but recovers more slowly from fire, disease and storm damage: dune mobilization becomes more likely.	Active weed control within dunes, together with management of blowouts.	
'Flashy' run off: Drier creeks, but larger rare floods	Drains and creeks may increase sediment load to coastal swamps, (this depends on land management practices).	Maintain watching brief on sedimentation of high value salt marsh.	
Groundwater lowering; saline incursion:	The potential fall in groundwater pressure, and freshwater lens in dunes, a significant threat to vegetation survival	Adaptive management of plant assets	
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Maintenance of swell wave climate will continue shoreline sand transport along spits.		

TABLE 6.40 Recommended Actions and Priority for EP69 Acraman Creek

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	Medium	DENR, EP NRM
	Significant shorebird breeding/ feeding / habitat, with potential disturbance from people, vehicles, beach boat launching, dogs, pest animals	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Review beach boat launching locations with a view to rationalise. Develop and implement site management and monitoring strategies to protect these valuable areas, including consideration to various permanent, temporary and seasonal options for site protection such as interpretive signage, fencing off nests, use of chick shelters, temporary signage in breeding territories, feral animal control program, restricting vehicles, boat launching and off-leash dogs during breeding/migratory season. Undertake and/or support ongoing shorebird monitoring programs. Community education and awareness programs, eg. "chicks on beach".	High (cons/ threat)	DENR, EP NRM, DC of Ceduna, EP LGA, Tourism SA, Birds Australia, community
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	Medium (cons/ threat)	DENR, EP NRM, DC of Ceduna, private land owners

Component	Issue	Proposed Action	Priority of Action	Key Players
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, land owners, DC Ceduna, community groups, EP NRM
	Unrestricted access and multiple vehicle tracks around the coast impacting on the coastal dune and salt marsh vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	Medium (cons/ threat)	DENR, private land owners, DC of Ceduna, DTEI, EP NRM, SA Tourism
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg rabbits, foxes, cats. Undertake control program as required.	Medium	EP NRM, DENR, DC of Ceduna, private land owners
	Weed species a potential threat throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	Low	EP NRM, private land owners, DENR, DC of Ceduna, community
South-west area of cell	Existing development with potential impact on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Work with private land owners to minimise impact from existing development, including education, restoration where appropriate and/or negotiation/enforcement to ensure the developments do not encroach on the coastal Crown reserve Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs and cats, ORV etc	Medium	EP NRM, DC of Cleve, DENR, private land owners, community groups

Component	Issue	Proposed Action	Priority of Action	Key Players
Beaches and dunes	More frequent storm damage, with slow plant recovery in drier conditions	Establish profile to monitor changes. Active dune management	Medium (cons/ threat)	DENR, EP NRM, DC of Ceduna, private land holders, community
	ORV activity in the northern part of the cell, near the road access to the Flinders Highway, threatens supra-tidal samphire and dune ridges.	Review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	High (cons/ threat)	DENR, private land owners, DC of Ceduna, DTEI, EP NRM, SA Tourism
Salt marsh	Salt marshes with marine connection are of high conservation value and are threatened by climate change induced sea level rise.	Monitor changes using existing profile as baseline. Prepare for salt marsh retreat through creation of buffer zones in the land use and development plans	High (cons/ threat)	DENR, EP NRM, DC of Ceduna, DPLG, EP LGA
	All salt marsh areas show the potential for acid sulfate soil following disturbance; in turn this would potentially threaten life forms in the surrounding area.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	High (cons/ threat)	DENR, DC of Ceduna, EP NRM, developers, private land owners
Acraman Creek CP	The CP has high conservation values throughout. Potential impact on conservation values, including from recreational activities such as off-road vehicles and camping.	Review the management of this valuable area. Prepare a management plan for the conservation park.	High (cons/ threat)	DENR
	Formal camping area with impact from multiple tracks, weeds, soil compaction, vegetation trampling and removal, local impact from visitors	Continue to manage and maintain formal camping areas to minimise impacts eg. barriers/ fencing to prevent spread and informal tracks, signage, provision of appropriate amenities, weed management, maintenance of facilities/ infrastructure.	Medium (cons/ threat)	DENR

Component	Issue	Proposed Action	Priority of Action	Key Players
	Unregistered off-road vehicle use (eg. quad bikes, trail bikes): illegal, vegetation damage and potential dune destabilisation	Install educational signs on dune vegetation, stability and policy on unregistered vehicles e.g. quad bikes. Undertake compliance program	Medium (cons)	DENR, SAPOL, community

BIOTA

Flora

Remnant vegetation area (ha)	3,341.32 ha, 95.81% of cell area
# flora surveys / records	13 surveys, 6 opportune sites, 5 herbarium record sites, 1 threatened plant population record site, 1 reserve database record site
# flora in cell	170
# conservation rated flora in cell	2
# non-indigenous flora in cell	21
Significant CDCS floristic community	*Melaleuca lanceolata* / *Atriplex paludosa* ssp shrubland – 96% of SA records in EP *Melaleuca lanceolata* / *Tetragonia implexicoma* shrubland – 72% of SA records in EP *Olearia axillaris* / *Tetragonia implexicoma* shrubland – 75% of SA records in EP
Protected area	83% of remnant vegetation protected by Acraman Creek CP

Weeds

Species	Common Name	Status	Study rating
Anagallis arvensis	Pimpernel		2
Avena barbata	Bearded Oat		2
Brassica tournefortii	Wild Turnip		3
Bromus rubens	Red Brome		2
Bupleurum semicompositum	Hare's Ear		0
Cakile maritima ssp. maritima	Two-horned Sea Rocket		1
Catapodium rigidum	Rigid Fescue		1
Erodium cicutarium	Cut-leaf Heron's-bill		0
Hordeum glaucum	Blue Barley-grass		1
Hordeum leporinum	Wall Barley-grass		1
Hornungia procumbens	Oval Purse		0
Medicago polymorpha var. polymorpha	Burr-medic		1
Minuartia mediterranea	Slender Sandwort		0
Moraea setifolia	Thread Iris		0
Parapholis incurva	Curly Ryegrass		1
Rostraria cristata	Annual Cat's-tail		2
Rostraria pumila	Tiny Bristle-grass		2
Sonchus oleraceus (NC)	Common Sow-thistle		0
Spergularia diandra	Lesser Sand-spurrey		0
Vulpia myuros f. megalura	Fox-tail Fescue		2
Vulpia myuros f. myuros	Rat's-tail Fescue		2

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Caladenia tensa	Inland Green-comb Spider-orchid	E	
Tecticornia flabelliformis	Bead Samphire	V	V
Acacia anceps			
Acacia anceps (NC)	Angled Wattle		
Acacia cupularis	Cup Wattle		
Acacia ligulata	Umbrella Bush		
Acacia sp. Winged (C.R.Alcock 4936)	Angled Wattle		
Acrotriche patula	Prickly Ground-berry		
Alyxia buxifolia	Sea Box		
Atriplex cinerea	Coast Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Atriplex paludosa ssp. paludosa	Marsh Saltbush		
Atriplex vesicaria ssp.	Bladder Saltbush		
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrostipa acrociliata	Graceful Spear-grass		
Austrostipa drummondii	Cottony Spear-grass		
Austrostipa elegantissima	Feather Spear-grass		
Austrostipa eremophila	Rusty Spear-grass		
Austrostipa exilis	Heath Spear-grass		
Austrostipa flavescens	Coast Spear-grass		
Austrostipa sp.	Spear-grass		
Avicennia marina ssp. marina	Grey Mangrove		
Beyeria lechenaultii	Pale Turpentine Bush		
Brachyscome ciliaris var. ciliaris	Variable Daisy		
Brachyscome exilis	Slender Daisy		
Brachyscome lineariloba	Hard-head Daisy		
Brachyscome perpusilla	Tiny Daisy		
Brachyscome sp.	Native Daisy		
Bromus arenarius	Sand Brome		
Calandrinia eremaea	Dryland Purslane		
Callitris canescens	Scrubby Cypress Pine		
Carpobrotus rossii	Native Pigface		
Carpobrotus rossii (NC)	Native Pigface		
Cassytha melantha	Coarse Dodder-laurel		
Cassytha peninsularis	Peninsula Dodder-laurel		
Comesperma volubile	Love Creeper		
Convolvulus erubescens (NC)	Australian Bindweed		
Crassula colligata ssp. lamprosperma			
Crassula colorata var. acuminata	Dense Crassula		
Crassula colorata var. colorata	Dense Crassula		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Danthonia sp. (NC)	Wallaby-grass		
Daucus glochidiatus	Native Carrot		
Dianella brevicaulis	Short-stem Flax-lily		
Dianella revoluta var. divaricata	Broad-leaf Flax-lily		
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Dodonaea viscosa ssp. angustissima	Narrow-leaf Hop-bush		

Species	Common Name	Aus status	SA status
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eremophila deserti	Turkey-bush		
Eucalyptus calcareana	Nundroo Mallee		
Eucalyptus diversifolia (NC)	Coastal White Mallee		
Eucalyptus gracilis	Yorrell		
Eucalyptus yalatensis	Yalata Mallee		
Eutaxia microphylla	Common Eutaxia		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos syrticola	Coast Cherry		
Ficinia nodosa	Knobby Club-rush		
Frankenia pauciflora var.	Southern Sea-heath		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Frankenia serpyllifolia	Thyme Sea-heath		
Frankenia sessilis	Small-leaf Sea-heath		
Gahnia lanigera	Black Grass Saw-sedge		
Geijera linearifolia	Sheep Bush		
Gnaphalium indutum ssp. indutum	Tiny Cudweed		
Goodenia pinnatifida	Cut-leaf Goodenia		
Goodenia varia	Sticky Goodenia		
Gramineae sp.	Grass Family		
Halosarcia sp. (NC)	Samphire		
Helichrysum leucopsideum	Satin Everlasting		
Hemichroa diandra	Mallee Hemichroa		
Hydrocotyle capillaris	Thread Pennywort		
Hydrocotyle sp.	Pennywort		
Hypoxis glabella var. glabella	Tiny Star		
Isoetopsis graminifolia	Grass Cushion		
Lasiopetalum discolor	Coast Velvet-bush		
Lawrencia squamata	Thorny Lawrencia		
Leptorhynchos waitzia	Button Immortelle		
Lomandra collina	Sand Mat-rush		
Lycium australe	Australian Boxthorn		
Maireana erioclada	Rosy Bluebush		
Maireana oppositifolia	Salt Bluebush		
Maireana trichoptera	Hairy-fruit Bluebush		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Melaleuca pauperiflora ssp. mutica	Boree		
Millotia major			
Minuria leptophylla	Minnie Daisy		
Myoporum insulare	Common Boobialla		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Olearia minor	Heath Daisy-bush		
Oxalis perennans (NC)	Native Sorrel		
Parietaria australis	Smooth-nettle		
Parietaria debilis	Smooth-nettle		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pittosporum angustifolium	Native Apricot		
Plantago sp. B (R.Bates 44765)	Little Plantain		
Podolepis rugata var. rugata	Pleated Copper-wire Daisy		
Podotheca angustifolia	Sticky Long-heads		
Pogonolepis muelleriana	Stiff Cup-flower		
Pterostylis mutica	Midget Greenhood		

Species	Common Name	Aus status	SA status
Ptilotus obovatus var. obovatus	Silver Mulla Mulla		
Ptilotus seminudus	Rabbit-tails		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia crassifolia	Fleshy Saltbush		
Rhodanthe pygmaea	Pigmy Daisy		
Salsola tragus	Buckbush		
Samolus repens	Creeping Brookweed		
Santalum acuminatum	Quandong		
Sarcocornia blackiana	Thick-head Samphire		
Sarcocornia quinqueflora	Beaded Samphire		
Sclerolaena diacantha	Grey Bindyi		
Sclerolaena uniflora	Small-spine Bindyi		
Senecio glossanthus	Annual Groundsel		
Senecio glossanthus (NC)	Annual Groundsel		
Senecio pinnatifolius (NC)	Variable Groundsel		
Senna artemisioides ssp. petiolaris (NC)	Flat-stalk Senna		
Senna artemisioides ssp. X coriacea	Broad-leaf Desert Senna		
Spinifex hirsutus (NC)	Rolling Spinifex		
Stenopetalum lineare (NC)	Narrow Thread-petal		
Suaeda australis	Austral Seablite		
Tecticornia arbuscula	Shrubby Samphire		
Tecticornia halocnemoides ssp.	Grey Samphire		
Tecticornia halocnemoides ssp. halocnemoides	Grey Samphire		
Tecticornia indica ssp.	Brown-head Samphire		
Tecticornia indica ssp. leiostachya	Brown-head Samphire		
Tecticornia pruinosa	Bluish Samphire		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Teucrium sessiliflorum	Mallee Germander		
Threlkeldia diffusa	Coast Bonefruit		
Thysanotus baueri	Mallee Fringe-lily		
Thysanotus patersonii	Twining Fringe-lily		
Trichanthodium skirrophorum	Woolly Yellow-heads		
Triglochin centrocarpum (NC)	Dwarf Arrowgrass		
Triglochin mucronata	Prickly Arrowgrass		
Triglochin nanum/sp. C (J.Z.Weber 6793)			
Triglochin sp.	Arrowgrass/Water-ribbons		
Triodia irritans	Spinifex		
Vittadinia megacephala	Giant New Holland Daisy		
Westringia dampieri	Shore Westringia		
Westringia rigida	Stiff Westringia		
Wurmbea dioica ssp. brevifolia	Early Nancy		
Wurmbea sp.	Nancy		
Zygophyllum angustifolium	Scrambling Twinleaf		
Zygophyllum aurantiacum ssp. aurantiacum (NC)	Shrubby Twinleaf		
Zygophyllum billardierei	Coast Twinleaf		
Zygophyllum billardierei (NC)	Coast Twinleaf		
Zygophyllum ovatum	Dwarf Twinleaf		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	81 recorded – 63 birds, 0 butterflies, 3 mammals, 15 reptiles, 0 amphibians (an additional 17 reptiles and 26 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	2 fauna surveys, 16 opportune sites, 1 reserve database record site
# of threatened fauna in cell	16
# of non-indigenous fauna	2 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Sturnus vulgaris	Common Starling	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p
Mus musculus	House Mouse	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Pandion cristatus	Eastern Osprey	M	E
Sternula nereis	Fairy Tern		E
Numenius madagascariensis	Eastern Curlew	M	V
Thinornis rubricollis	Hooded Plover		V
Ardenna carneipes	Flesh-footed Shearwater		R
Arenaria interpres	Ruddy Turnstone	M	R
Biziura lobata	Musk Duck		R
Calidris alba	Sanderling	M	R
Cereopsis novaehollandiae	Cape Barren Goose		R
Falco peregrinus	Peregrine Falcon		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Neophema petrophila	Rock Parrot		R
Podiceps cristatus	Great Crested Grebe		R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Acanthiza apicalis	Inland Thornbill		
Anthochaera carunculata	Red Wattlebird		
Anthus novaeseelandiae	Australasian Pipit		
Aquila audax	Wedge-tailed Eagle		
Ardea modesta	Eastern Great Egret		
Artamus cinereus	Black-faced Woodswallow		
Barnardius zonarius	Australian Ringneck, (Ring-necked Parrot)		
Cacomantis pallidus	Pallid Cuckoo		
Calidris ruficollis	Red-necked Stint	M	
Chalcites basalis	Horsfield's Bronze-cuckoo		
Chroicocephalus novaehollandiae	Silver Gull		
Circus approximans	Swamp Harrier		
Colluricincla harmonica	Grey Shrike-thrush		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Corvus mellori	Little Raven		

Species	Common Name	Aus status	SA status
Cracticus torquatus	Grey Butcherbird		
Cygnus atratus	Black Swan		
Egretta novaehollandiae	White-faced Heron		
Eolophus roseicapillus	Galah		
Epthianura albifrons	White-fronted Chat		
Falco cenchroides	Nankeen Kestrel		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Larus pacificus	Pacific Gull		
Lichenostomus ornatus	Yellow-plumed Honeyeater		
Lichenostomus virescens	Singing Honeyeater		
Malurus pulcherrimus	Blue-breasted Fairy-wren		
Manorina flavigula	Yellow-throated Miner		
Megalurus gramineus	Little Grassbird		
Melithreptus brevirostris	Brown-headed Honeyeater		
Microcarbo melanoleucos	Little Pied Cormorant		
Pardalotus striatus	Striated Pardalote		
Pelecanus conspicillatus	Australian Pelican		
Petroica goodenovii	Red-capped Robin		
Phalacrocorax fuscescens	Black-faced Cormorant		
Phalacrocorax sulcirostris	Little Black Cormorant		
Phalacrocorax varius	Pied Cormorant		
Phaps elegans	Brush Bronzewing		
Poliocephalus poliocephalus	Hoary-headed Grebe		
Pomatostomus superciliosus	White-browed Babbler		
Rhipidura leucophrys	Willie Wagtail		
Sericornis frontalis	White-browed Scrubwren		
Smicrornis brevirostris	Weebill		
Tribonyx ventralis	Black-tailed Native-hen		
Tringa nebularia	Common Greenshank	M	
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p

Species	Common Name	Status*	Record
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Macropus fuliginosus	Western Grey Kangaroo		
Rattus fuscipes	Bush Rat		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Lerista arenicola	Beach Slider		R	x
Pseudemoia baudini	Bight Coast Skink		R	c
Amphibolurus norrisi	Mallee Tree-dragon			x
Christinus marmoratus	Marbled Gecko			e
Ctenophorus chapmani	Prickly Dragon			c
Ctenophorus fordi	Mallee Dragon			c
Ctenotus euclae	Bight Coast Ctenotus			x
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Delma petersoni	Painted Snake-lizard			x
Diplodactylus calcicolus	South Coast Gecko			c
Egernia richardi	Western Tree Skink			c
Egernia stokesii	Gidgee Skink			e
Gehyra lazelli	Southern Rock Dtella			c
Gehyra variegata	Tree Dtella			e
Hemiergis initialis	Western Earless Skink			c
Hemiergis peronii	Four-toed Earless Skink			c
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			x
Lerista terdigitata	Southern Three-toed Slider			x
Menetia greyii	Dwarf Skink			x
Morethia adelaidensis	Adelaide Snake-eye			x
Morethia obscura	Mallee Snake-eye			x
Nephrurus milii	Barking Gecko			c
Parasuta spectabilis	Mallee Black-headed Snake			x
Pogona barbata	Eastern Bearded Dragon			c
Pseudonaja affinis	Dugite			x
Pseudonaja aspidorhyncha	Patch-nosed Brown Snake			c
Pygopus lepidopodus	Common Scaly-foot			x

Species	Common Name	Aus status	SA status	Record
Ramphotyphlops bituberculatus	Rough-nosed Blind Snake			x
Simoselaps bertholdi	Desert Banded Snake			x
Tiliqua rugosa	Sleepy Lizard			x

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP70 Pt Brown

Cell area 2,282 ha. Shoreline length 22.6 km.

Landforms

The undulating coastal plain is substantially a Pleistocene calcarenite surface, with degraded red sands, and with large areas of Holocene sands. The two headlands at Point Dillon and south to Point Brown, then east to Edward Bay are underlain by St Peters Suite granite, forming sloping shore platform ramps and nearshore reefs; these headlands have 30 to 40m cliffs. Bays are backed with low bluffs and dunes. Extensive dunes back St Mary's Bay and Gascoigne Bay. Extreme low energy characterises much of this shore, due to low offshore gradients and protection by numerous islands and reefs. However, there are areas of higher energy particularly near some of the headlands.

Benthic Habitat

There is offshore dense seagrass and inshore patchy seagrass, bare sand and low profile reef. Granite reefs at Point Dillon and Point Brown; the small bay NE of Point Collinson shows nearshore sands (being driven into the bay from the SW); Gascoigne Bay has seagrass to low tide, mixed with reefs and sandflats.

Biota

This cell has 19 flora survey sites, 5 herbarium record sites, 1 fauna survey site and 6 opportunistic fauna sites. There is 2,072 ha of remnant vegetation, 91% of the cell area.
This is coastal shrubland, and several different varieties show a complex distribution across the dunes and the calcarenite. The most extensive are *Olearia axillaris, Leucopogon parviflorus* tall open shrubland and *Myoporum insulare, +/-Olearia axillaris* mid open shrubland; smaller areas of *Melaleuca lanceolata, +/-Olearia axillaris, +/-Leucopogon parviflorus* tall open shrubland and *Nitraria billardierei, +/-Olearia axillaris* mid open shrubland are also widespread through the cell.

Land Use/ Land Ownership

The majority of this cell has a narrow (c.50m) coastal reserve of unalloted Crown land, backed by perpetual Crown leasehold land, approximately 15m – 1.3km wide (93.3% of cell), which is then backed by privately owned land. Two small areas of wider (200-600m) unalloted Crown land coastal reserves occur at the boundary with EP69 and approximately 2km north of Point Collinson. A small miscellaneous Crown lease occurs within the coastal reserve within Gascoigne Bay.
Nuyts Archipelago Marine Park offshore, north of Point Dillon.

FIGURE 6.44 Shoreline of Edward Bay, looking west towards Point Brown. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

Recreation and tourism – surfing, camping, ORV use, hunting / shooting, sight seeing, boating
Recreational and professional fishing
Shacks
Agriculture
Beach boat launching

Threats (Field visits and local reports)

Unauthorised development of shacks /caravans on clifftops for surfers / fishermen
Wondering stock / introduced animals (fox, cats, rabbits)
Uncontrolled ORV usage / track creation
Destruction of native wildlife
Uncontrolled camping
Boat launching (public safety, hydrocarbon spills)
Vehicles on beach
Collection of fire wood
Waste management
Eco-tourism / tourism ventures
Development

Opportunities (Field visits and local reports)

Rationalise vehicle movement and track closure / re-alignment
Campground development

Conservation Analysis (GIS)

137.43: this is high for the region. Medium-high to high values are widespread, they are found throughout most of the cell; only small areas of de-vegetated or de-flated dune and some degraded shrubland over calcarenite areas give medium-low to low totals. The highest totals are found on well vegetated Holocene dunes.
Several conservation layers contribute to the high total score, including: rarity of the plant community within SA (whole cell); distribution of sites with threatened fauna (a complex pattern of sites with high to medium values); distribution of sites with regionally endemic communities (widespread); numbers of endemic species (high in vegetated dunes); habitat for threatened bird species and habitat for threatened mammal species (both average, with small areas above); butterfly habitat (medium high to high in all vegetated areas); habitat for the White-bellied Sea-Eagle (focal species); viewscape and viewshed; vegetation metrics; Aboriginal heritage; and European heritage (Port Collinson Whaling Station). There are modest scores among all the conservation layers, contributing further to a very high total score for the west coast of the region.
There are three mammal, five reptile and 31 bird species recorded in this cell, including the state endangered White-bellied Sea-Eagle, Eastern Osprey, and Fairy Tern; also the state vulnerable Hooded Plover.
At Point Brown exposure of St Peters Suite fine-medium granodiorite/adamellite dykes is classified as a significant geological feature (geological monument).

Threat Analysis (GIS)

46.86: this is a moderate threat total for the region. The distribution of total threat values is a complex pattern, with many above average areas, but a full range of totals. Higher values cluster around St Mary's Bay, Point De Mole and the centre of Gascoigne Bay.
Some threat values stand out: off road vehicle tracks cluster at St Mary's Bay, Point Brown and Point De Mole, but are also significant through the majority of the cell; land use, viewscape and viewshed, and the distribution of invasive weeds are also notable. Unstable dunes, informal parking and camping and the presence of rabbits reported at St Mary's Bay add to the overall threat total.
This cell has significantly high conservation values: however, individual threats – notably ORV – are leading to major degradation of the cell.

Adaptation to Climate Change Threats

(see also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, dune and lake change by establishing a rectified aerial photographic record at an appropriate resolution.	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Sea level rise: 2030 : +c.20cm	Beach recession and dune instability due to foredune damage. Increase in dune mobility	Active management of dunes	
2070: +c.80cm.	Beaches in front of cliffs and bluffs reduced or lost. Dune instability and movement further increased		
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides; damage to foredunes	Continue to monitor shoreline movement. Active management of dunes	
Intensity of large storms increases.			
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere. There will be an increased risk for species that are already vulnerable. Invasive species may become more dominant.		Maintain connectivity of vegetation within the coastal boundary
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Opportunity created for more frequent weed invasion, notably of dune grasses. Dune and calcarenite shrubland become more susceptible to fire.	Active dune management, including weed control	Ensure that coastal vegetation blocks are part of the regional fire plan
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes. Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains sediment movement Local movement of large quantities of sand in the nearshore zone may be accelerated as sea levels rise.	Monitor beaches, see above.	

TABLE 6.41 Recommended Actions and Priority for EP70 Pt Brown

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly mammals and reptiles.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Unauthorised development (eg. shacks/ caravans) along the coast with impact on high conservation values of surrounding area (eg. native vegetation destruction, native animal disturbance, soil compaction, weed escapes, increased tracks, etc).	Enforce the removal and rehabilitation of unauthorised development.	High (cons/ threat)	DC of Ceduna, DPLG/ DAC, private land holder, DENR, community
	Areas within cell identified as being important for rare and endemic plant communities and as habitat for threatened species, including shorebirds and raptors, with potential disturbance from agricultural activities, recreational activities, land management practices, uncontrolled access, weeds and pest animals	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches, dogs on leashes, track management, pest animal and plant control, restrict access to sensitive locations. Install interpretive/ educational signage. Community education programs.	High (cons/ threat)	DENR, private land holders, EP NRM, DC of Ceduna, community groups

Component	Issue	Proposed Action	Priority of Action	Key Players
	Potential impact on breeding habitats of the endangered White-bellied Sea-Eagle, particularly during the breeding season.	Develop site management and monitoring strategy, including closure, relocation or seasonal closures of roads/walking tracks/car parks in the near vicinity. Ensure management/works programs are not undertaken during the breeding season. Community education	High (cons)	Private land holders, DENR, DC of Ceduna, community
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, DC of Ceduna, private land holders, community groups, EP NRM
	Unrestricted access and multiple vehicle tracks around the coast impacting on areas of high conservation value, resulting in damage/ destruction to coastal dune and cliff top vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing erosion. Install directional /educational signage. Community education	High (cons/ threat)	Private land holders, DC of Ceduna, DTEI, DENR, EP NRM, SA Tourism, community
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg rabbits, foxes, cats. Undertake control program as required. Work with private landowners to ensure that stock are restricted from the coastal zone (eg. ensure fences are adequate and maintained)	Medium (cons/ threat)	EP NRM, DENR, DC of Ceduna, private land holders
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	Medium	EP NRM, private land holders, DENR, DC of Ceduna, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	High (cons/ threat)	DENR, EP NRM, DC of Ceduna, private land holders, community
Dunes	Gradual drying of the climate increases opportunities for weed invasion of dune areas	Maintain weed management. Maintain connectivity of vegetated areas	Medium	EP NRM, private land holders, DENR, community
	Gradual drying and increase in the number of very hot days increases probability of fire	Include dune areas in regional fire plans.	Medium	DENR, EP NRM, private land holders, community
Cliff tops	Numerous informal tracks and informal car parks close to potentially unstable cliff edge; safety hazard and impact from soil compaction, vegetation damage, weed introduction, fauna disturbance, soil stability and water runoff erosion	Review with a view to close or reroute tracks and car parks that are too close to cliff edge.	High (hazard; cons/ threat)	DENR, DC of Ceduna, private land holders, EP NRM, community
Point Brown	Significant geological feature present – GSA reference E33 (see section 3.4.1)	Interpretive signage	Low	GSA SA branch, DC of Ceduna, EP NRM, DENR
Point Collinson	Registered non-indigenous heritage site – Point Collinson whaling station site – with potential impact from recreational activities	Ensure sites managed to protect from damage. Install interpretive educational signage where appropriate.	Medium	DC of Ceduna, DENR, community

Component	Issue	Proposed Action	Priority of Action	Key Players
Point Collinson to Point De Mole	Existing development impacting on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Work with private land owners to minimise impact from existing development, including education, restoration where appropriate and/or negotiation/enforcement to ensure the developments do not encroach on the coastal Crown reserve Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs and cats, ORV, etc	Medium (cons/ threat)	EP NRM, DC of Ceduna, DENR, land holders, community groups
	Vehicles and dogs on beaches and beach boat launching with potential impact on meiofauna, shorebirds and intertidal species and/or habitat.	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Review beach boat launching locations with a view to rationalise. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	Medium	DC of Ceduna, EP NRM, DTEI, EP LGA, DENR, PIRSA, Tourism SA, Birds Australia, community

BIOTA

Flora

Remnant vegetation area (ha)	2,071.93 ha, 90.81% of cell area
# flora surveys / records	19 surveys, 5 herbarium record sites
# flora in cell	119
# conservation rated flora in cell	1
# non-indigenous flora in cell	20
Significant CDCS floristic community	*Triodia compacta* hummock grassland - <20 (13) sites recorded along SA coast, 100% of these in EP *Halosarcia indica* ssp shrubland – <20 (6) sites recorded along SA coast, 83% (5) of these in EP *Maireana oppositifolia* shrubland – 50% of SA records in EP *Melaleuca lanceolata* / *Atriplex paludosa* ssp shrubland – 96% of SA records in EP *Melaleuca lanceolata* / *Senecio lautus* shrubland – 97% of SA records in EP *Nitraria billardierei* shrubland – 54% of SA records in EP *Olearia axillaris* / *Tetragonia implexicoma* shrubland – 75% of SA records in EP
Protected area	No remnant vegetation protected

Weeds

Species	Common Name	Status	Study rating
Euphorbia paralias	Sea Spurge	RA	5
Lycium ferocissimum	African Boxthorn	D, RA	8
Anagallis arvensis	Pimpernel		2
Avellinia michelii	Avellinia		0
Brassica tournefortii	Wild Turnip		3
Bromus rigidus	Rigid Brome		2
Bromus rubens	Red Brome		2
Bupleurum semicompositum	Hare's Ear		0
Cakile maritima ssp. maritima	Two-horned Sea Rocket		1
Centaurea melitensis	Malta Thistle		1
Parapholis incurva	Curly Ryegrass		1
Reichardia tingitana	False Sowthistle		3
Rostraria cristata	Annual Cat's-tail		2
Rostraria pumila	Tiny Bristle-grass		2
Schismus barbatus	Arabian Grass		0
Silene nocturna	Mediterranean Catchfly		1
Silene tridentata			0
Sonchus oleraceus (NC)	Common Sow-thistle		0
Vulpia myuros f. megalura	Fox-tail Fescue		2
Vulpia myuros f. myuros	Rat's-tail Fescue		2

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Poa drummondiana	Knotted Poa		R
Acacia anceps			

Species	Common Name	Aus status	SA status
Acacia anceps (NC)	Angled Wattle		
Acacia oswaldii	Umbrella Wattle		
Acrotriche patula	Prickly Ground-berry		
Agrostis avenacea var. avenacea (NC)	Common Blown-grass		
Amyema melaleucae	Tea-tree Mistletoe		
Atriplex cinerea	Coast Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Austrodanthonia setacea	Small-flower Wallaby-grass		
Austrostipa acrociliata	Graceful Spear-grass		
Austrostipa elegantissima	Feather Spear-grass		
Austrostipa exilis	Heath Spear-grass		
Austrostipa flavescens	Coast Spear-grass		
Austrostipa puberula	Fine-hairy Spear-grass		
Austrostipa sp.	Spear-grass		
Beyeria lechenaultii	Pale Turpentine Bush		
Brachyscome ciliaris var. ciliaris	Variable Daisy		
Brachyscome lineariloba	Hard-head Daisy		
Calandrinia eremaea	Dryland Purslane		
Callitris canescens	Scrubby Cypress Pine		
Carpobrotus rossii (NC)	Native Pigface		
Cassytha peninsularis	Peninsula Dodder-laurel		
Chrysocephalum apiculatum	Common Everlasting		
Comesperma volubile	Love Creeper		
Crassula colligata ssp. lamprosperma			
Crassula colorata var. acuminata	Dense Crassula		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Danthonia sp. (NC)	Wallaby-grass		
Daucus glochidiatus	Native Carrot		
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Dodonaea baueri	Crinkled Hop-bush		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eremophila crassifolia	Thick-leaf Emubush		
Eremophila deserti	Turkey-bush		
Eucalyptus dumosa complex	White Mallee		
Eucalyptus oleosa (NC)	Red Mallee		
Eutaxia microphylla	Common Eutaxia		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos syrticola	Coast Cherry		
Ficinia nodosa	Knobby Club-rush		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Frankenia sessilis	Small-leaf Sea-heath		
Gahnia lanigera	Black Grass Saw-sedge		
Geijera linearifolia	Sheep Bush		
Gnaphalium indutum ssp. indutum	Tiny Cudweed		
Gramineae sp.	Grass Family		
Helichrysum leucopsideum	Satin Everlasting		
Hemichroa diandra	Mallee Hemichroa		
Hydrocotyle capillaris	Thread Pennywort		
Hypoxis glabella var. glabella	Tiny Star		
Kippistia suaedifolia	Fleshy Kippistia		
Lasiopetalum discolor	Coast Velvet-bush		
Lawrencia squamata	Thorny Lawrencia		

Species	Common Name	Aus status	SA status
Leptorhynchos waitzia	Button Immortelle		
Leucophyta brownii	Coast Cushion Bush		
Lomandra collina	Sand Mat-rush		
Lycium australe	Australian Boxthorn		
Maireana eriocladа	Rosy Bluebush		
Maireana oppositifolia	Salt Bluebush		
Melaleuca lanceolata	Dryland Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Moss sp.			
Myoporum insulare	Common Boobialla		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Olearia minor	Heath Daisy-bush		
Oxalis perennans	Native Sorrel		
Parietaria debilis (NC)	Smooth-nettle		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pittosporum angustifolium	Native Apricot		
Plantago hispida	Hairy Plantain		
Podotheca angustifolia	Sticky Long-heads		
Ptilotus obovatus var. obovatus	Silver Mulla Mulla		
Pultenaea elachista	Limestone Bush-pea		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia crassifolia	Fleshy Saltbush		
Santalum acuminatum	Quandong		
Scaevola crassifolia	Cushion Fanflower		
Schenkia australis	Spike Centaury		
Sclerolaena uniflora	Small-spine Bindyi		
Senecio pinnatifolius (NC)	Variable Groundsel		
Spinifex hirsutus (NC)	Rolling Spinifex		
Spyridium phylicoides	Narrow-leaf Spyridium		
Tecticornia arbuscula	Shrubby Samphire		
Tecticornia indica ssp. leiostachya	Brown-head Samphire		
Tecticornia tenuis	Slender Samphire		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Thysanotus baueri	Mallee Fringe-lily		
Triglochin centrocarpum (NC)	Dwarf Arrowgrass		
Triodia compacta	Spinifex		
Triodia irritans	Spinifex		
Westringia dampieri	Shore Westringia		
Westringia rigida	Stiff Westringia		
Zygophyllum angustifolium	Scrambling Twinleaf		
Zygophyllum billardierei (NC)	Coast Twinleaf		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	41 recorded – 33 birds, 0 butterflies, 3 mammals, 5 reptiles, 0 amphibians (an additional 22 reptiles and 26 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	1 survey, 6 opportune sites
# of threatened fauna in cell	5
# of non-indigenous fauna	3 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Columba livia	Rock Dove	Aves	x
Sturnus vulgaris	Common Starling	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p
Mus musculus	House Mouse	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Pandion cristatus	Eastern Osprey	M	E
Sternula nereis	Fairy Tern		E
Thinornis rubricollis	Hooded Plover		V
Haematopus fuliginosus	Sooty Oystercatcher		R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Anthus novaeseelandiae	Australasian Pipit		
Artamus cyanopterus	Dusky Woodswallow		
Calidris ruficollis	Red-necked Stint	M	
Chalcites basalis	Horsfield's Bronze-cuckoo		
Charadrius ruficapillus	Red-capped Plover		
Cheramoeca leucosterna	White-backed Swallow		
Chroicocephalus novaehollandiae	Silver Gull		
Colluricincla harmonica	Grey Shrike-thrush		
Cracticus torquatus	Grey Butcherbird		
Egretta novaehollandiae	White-faced Heron		
Epthianura albifrons	White-fronted Chat		
Falco cenchroides	Nankeen Kestrel		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Malurus lamberti	Variegated Fairy-wren		
Melithreptus brevirostris	Brown-headed Honeyeater		
Morus serrator	Australasian Gannet		
Pardalotus punctatus	Spotted Pardalote		
Phalacrocorax varius	Pied Cormorant		
Sericornis frontalis	White-browed Scrubwren		
Smicrornis brevirostris	Weebill		
Thalasseus bergii	Crested Tern		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Macropus fuliginosus	Western Grey Kangaroo		
Notomys mitchellii	Mitchell's Hopping-mouse		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Lerista arenicola	Beach Slider		R	c
Pseudemoia baudini	Bight Coast Skink		R	c
Amphibolurus norrisi	Mallee Tree-dragon			x
Christinus marmoratus	Marbled Gecko			e
Ctenophorus chapmani	Prickly Dragon			c
Ctenotus euclae	Bight Coast Ctenotus			c
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e

Species	Common Name	Aus status	SA status	Record
Diplodactylus calcicolus	South Coast Gecko			c
Egernia richardi	Western Tree Skink			c
Egernia stokesii	Gidgee Skink			e
Gehyra lazelli	Southern Rock Dtella			c
Gehyra variegata	Tree Dtella			e
Hemiergis initialis	Western Earless Skink			c
Hemiergis peronii	Four-toed Earless Skink			x
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			x
Lerista terdigitata	Southern Three-toed Slider			x
Menetia greyii	Dwarf Skink			x
Morethia adelaidensis	Adelaide Snake-eye			e
Morethia obscura	Mallee Snake-eye			c
Nephrurus milii	Barking Gecko			c
Parasuta spectabilis	Mallee Black-headed Snake			c
Pogona barbata	Eastern Bearded Dragon			c
Pseudonaja affinis	Dugite			c
Pygopus lepidopodus	Common Scaly-foot			c
Tiliqua rugosa	Sleepy Lizard			c

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP 71 Cape Missiessey

Cell area 2,660 ha. Shoreline length 76.71 km.

Landforms

Short et al 1986, describe this as the southern half of a broad shallow embayment, slowly accumulating Holocene calcareous sands of local biogenic origin and from shelf sediments. These sediments are moving ashore across a Pleistocene calcarenite slope, and constructing offshore features such as Eyre Island and Little Eyre Island; and onshore spits and beach ridges at Cape Missiessey. These provided the protection to allow sediment accumulation immediately east in the Smoky Bay flood tide delta at the southern end of the bay; here extensive mangrove and samphire areas have developed in the last 2 - 3,000 years. Elevations are low within this cell: large areas of inter-tidal samphire flourishing within the current range of tides; dune ridges are generally below 5m, and swales at tide level. There are bare supra-tidal flats south of the intertidal samphire, and throughout the salt marsh small calcarenite ridges are found. The spits and sand ridges of Cape Missiessey have been de-stabilised and transgressed from SW to NE.

Benthic Habitat

Bare sand is found off Cape Missiessey to variable distance, then dense seagrass. Intertidal seagrass grows to the shore within the shallow southern end of Smoky Bay, and south of Cape Missiessey.

Biota

There are 2,041ha of remnant vegetation, 77% of the cell; 67% of the cell is salt marsh/ mangrove. There are 4 flora survey sites, 1 herbarium record site, and 4 opportune fauna within the cell.
The spits and beach ridges at Cape Missiessey are in *Myoporum insulare, +/-Olearia axillaris* mid open shrubland over *+/-Rhagodia crassifolia, +/-Leucophyta brownii* low shrubs over *Threlkeldia diffusa, +/-Carpobrotus rossii (NC), +/-Frankenia sessilis, +/-Maireana oppositifolia, +/-Atriplex vesicaria ssp.* The sediment accumulating in the southern end of the bay has been colonised by *Avicennia marina ssp. marina* low open forest over *+/-Tecticornia sp., +/-Sarcocornia quinqueflora* shrubs and an extensive area of intertidal samphire. Intertidal samphire is also found amongst the dune ridges and around the edge of the bay to Smoky Bay: *Tecticornia arbuscula, +/-Sarcocornia quinqueflora, +/-Lycium australe* low shrubland over *+/-Suaeda australis.* On dune ridges at the edge of the bay a narrow strip of mallee woodland has been retained:*+/-Eucalyptus calcareana, +/-Eucalyptus gracilis,*

+/-*Eucalyptus oleosa ssp.,* +/-*Eucalyptus brachycalyx* mid open mallee forest over *Melaleuca lanceolata,* +/-*Geijera linearifolia* mid open shrubland over +/-*Rhagodia crassifolia,* +/-*Westringia rigida,* +/-*Atriplex vesicaria* ssp. low sparse shrubland

FIGURE 6.45 Looking towards Smoky Bay across EP71: de-stabilised dune; samphire and mangroves. Photo: Coast Protection Board, 2007

Land Use/ Land Ownership

Most of the Cape Missiessey salt marsh / mangrove and sand ridge area is held under a miscellaneous Crown lease, fronted by a narrow (c.30m) coastal reserve of unalloted Crown land, and some privately owned land to the south. East of the leasehold land a narrow (c.30m) coastal reserve of unalloted Crown land extend along the coast to approximately 2km south of Smoky Bay, backed by perpetual Crown leasehold and privately owned land. The coastal reserve approximately 2km south of Smoky Bay widens to <150m. Immediately south of the cell boundary (and north), the coastal reserve is a Crown lands Act reserve under the care, control and management of the District Council of Ceduna.

Nuyts Archipelago Marine Park offshore.

Uses (Field visits and local reports)

Recreation and tourism – fishing, camping, ORV use, hunting / shooting, boating
Professional fishing
Agriculture
Aquaculture
Boat launching

Threats (Field visits and local reports)

Eco-tourism / tourism ventures
Development
Uncontrolled camping and ORV use – track creation
Wondering stock (sheep, goats) / introduced animals (fox, cats, rabbits)
Destruction of native wildlife, firearms
Waste management
Boat launching (public safety, hydrocarbon spills)
PCASS
Weed infestation
Marine debris
Uncontrolled pedestrian access
Collection of fire wood
Wildfire

Opportunities (Field visits and local reports)

Rationalise vehicle movement and track closure / re-alignment
Campground development

Conservation Analysis (GIS)

The total conservation score for EP71 is 114.06, a medium score for the region. The pattern of total means is clear: high/medium values are found on the vegetated dunes; medium/high in the intertidal samphire; low to medium totals in the mangroves, de-vegetated dunes and bare supra-tidal flats; very low totals are found on the cleared lands.
Threatened species layers make substantial contribution to totals: numbers of threatened plants, presence of total number of threatened species (total whole cell), habitat for threatened bird (salt marsh areas) and mammal species (moderate values throughout). Focal species for this study are found within this cell: the Australian Pied Oystercatcher (salt marsh) and habitat for the White-bellied Sea-Eagle, also the Beach Slider and the Bight Coast Skink (all sand dunes). Viewscapes (scenic amenity), vegetation block metrics, Indigenous heritage and wetland values also contribute to the total.
One mammal and 23 bird species are recorded within this cell.

Threat Analysis (GIS)

The total of threat summary means is 37.41, which is low for the region. This low total is reflected in the threat summary map that shows generally medium to low totals; only the dunes south of Cape Missiessey, the supra-tidal flats, and the dunes of the small headland 4km south of Smoky Bay show medium to high totals. The intertidal samphire and mangroves have low threat totals.
The main contributors to the mapped threats are land ownership and use, ORV use (dunes and supra-tidal flats), viewscape, dune instability and potential for acid sulfate soils (all salt marsh – 67% of the cell). The distribution of invasive weeds makes a notably low contribution in this cell.

Adaptation to Climate Change Threats

(see also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Beach recession and dune instability due to foredune damage. Increase in dune mobility.	Active management of dunes	
	More frequent inundation of mangroves and salt marsh.	Continue to monitor DENR profile 330010 for salt marsh change. Consider possible retreat buffer zones for tide-dependant ecosystems. Re-zoning on land use and development plans needed	
2070: +c.80cm.	Dune instability and movement further increased Migration of mangroves and inter-tidal samphire (where possible) in adjustment to changing tide heights becomes clear.		
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides; damage to foredunes	Continue to monitor shoreline movement and salt marsh boundaries. Active management of dunes	
Intensity of large storms increases.			
Warmer average conditions: 2030:+0.3 to.60C 2070:+1.5 to 20C	(Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere. There will be an increased risk for species that are already vulnerable. Invasive species may become more dominant.		Maintain connectivity of vegetation within the coastal boundary

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Opportunity created for more frequent weed invasion, notably of dune grasses.	Active dune management, including weed control	Ensure that coastal vegetation blocks are part of the regional fire plan
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes. Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.30C to + 0.60C 2070: +1.00C to + 1.50C	Persistent swell wave climate maintains sediment movement into Smoky Bay.		

(Comment on climate change: this cell is severely threatened in the long term by climate change, which is likely to further de-stabilise dunes already mobile, and to radically change the habitat of tide-dependant species widely distributed across the cell.)

TABLE 6.42 Recommended Actions and Priority for EP71 Cape Missiessey

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DC of Ceduna, DENR, private land owners, community groups, EP NRM

Component	Issue	Proposed Action	Priority of Action	Key Players
	Very inadequate data on biodiversity and habitat values.	Undertake coastal flora and fauna surveys to inform future management directions. Prioritise this area in region wide effort to improve knowledge of existing assets. Identify records and surveys that are not in the BDBSA (eg. private surveys/records, government surveys not yet entered). Evaluate/verify data and enter into the BDBSA	High (cons)	DENR, EP NRM
	Existing and possible future development with potential impact on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Work with private land owners to minimise impact from existing development, including education and restoration where appropriate. Ensure future development is not located in areas of high conservation value or high sensitivity. Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs and cats, etc	Medium (threat)	EP NRM, DC of Ceduna, DENR, DPLG, private land owners, community groups
	Areas within cell identified as being important for rare and endemic plant communities and as habitat for threatened species, including shorebirds and raptors, with potential disturbance from agricultural activities, development, recreational activities, land management practices, uncontrolled access, weeds and pest animals	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches, dogs on leashes, track management, pest animal and plant control, restrict access to sensitive locations. Install interpretive/ educational signage. Community education programs.	High	DENR, private land owners, EP NRM, DPLG, DC of Ceduna, community groups
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	Medium (cons/ threat)	EP NRM, private land owners, DENR, DC of Ceduna, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Unrestricted access and multiple vehicle tracks around the coast impacting on the coastal dune and cliff top vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	High (cons/ threat)	Private land owners, DC of Ceduna, DTEI, DENR, EP NRM, SA Tourism
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg rabbits, foxes, cats. Undertake control program as required. Work with private landowners to ensure that stock are restricted from the coastal zone (eg. ensure fences are adequate and maintained)	Low (cons/ threat)	EP NRM, DENR, DC of Ceduna, private land owners
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	Medium (cons/ threat)	DC of Ceduna, DENR, EP NRM, private land owners
	Unrestricted pedestrian access in high visitation areas, with impact soil erosion, stability and compaction, safety hazard, vegetation damage, weed introduction, fauna disturbance and water runoff erosion	Formalise and maintain pedestrian access. Install directional / educational signage where required.	Medium (cons/ threat)	DC of Ceduna, community, EP NRM, DENR

Component	Issue	Proposed Action	Priority of Action	Key Players
Salt marsh and mangroves	Valuable bird habitat threatened by sea level rise	Monitor change using existing DENR profile line 330010. Consider retreat options to buffer zone. Review land use and development plans.	Medium	DENR, EP NRM, DC of Ceduna, DPLG, EP LGA, private land owners
	All salt marsh areas show the potential for acid sulfate soil following disturbance; in turn this would potentially threaten life forms within the surrounding area.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	High (threat)	DC of Ceduna, DENR, EP NRM, developers, private land owners
Dunes	These hold the highest total values in the cell; they have been de-stabilised in the past, and climate change threatens to exacerbate the problem.	Monitor changes through aerial photography. Manage instability through addressing storm and ORV impacts	Medium	DENR, EP NRM, leaseholder, DC of Ceduna, community
Beaches	Marine debris with potential impact on native fauna species	Investigate opportunities for, and/or support, ongoing marine debris cleanup programs. Undertake education program targeting fishers, campers, aquaculture operators	Medium	PIRSA, EP NRM, DENR, aquaculture operators, community, DC of Ceduna
	Significant shorebird breeding/ feeding / habitat, with potential disturbance from people, vehicles, dogs, pest animals,	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	High (cons/ threat)	DC of Ceduna, EP NRM, DTEI, EP LGA, DENR, Tourism SA, Birds Australia, community,

BIOTA

Flora

Remnant vegetation area (ha)	2,041.37 ha, 76.74% of cell area
# flora surveys / records	4 surveys, 1 herbarium record sites
# flora in cell	19
# conservation rated flora in cell	1
# non-indigenous flora in cell	4
Significant CDCS floristic community	Nil
Protected area	No remnant vegetation protected

Weeds

Species	Common Name	Status	Study rating
Euphorbia paralias	Sea Spurge	RA	5
Parapholis incurva	Curly Ryegrass		1
Hornungia procumbens	Oval Purse		0
Spergularia diandra (NC)	Lesser Sand-spurrey		0

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Tecticornia flabelliformis	Bead Samphire	V	V
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Frankenia pauciflora var.	Southern Sea-heath		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Frankenia sessilis	Small-leaf Sea-heath		
Geijera linearifolia	Sheep Bush		
Maireana oppositifolia	Salt Bluebush		
Sarcocornia quinqueflora	Beaded Samphire		
Senecio glossanthus (NC)	Annual Groundsel		
Suaeda australis	Austral Seablite		
Tecticornia arbuscula	Shrubby Samphire		
Tecticornia halocnemoides ssp.	Grey Samphire		
Tecticornia indica ssp. leiostachya	Brown-head Samphire		
Westringia dampieri	Shore Westringia		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	24 recorded – 23 birds, 0 butterflies, 1 mammals, 0 reptiles, 0 amphibians (an additional 23 reptiles and 26 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	4 opportune sites
# of threatened fauna in cell	3
# of non-indigenous fauna	3 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Passer domesticus	House Sparrow	Aves	x
Sturnus vulgaris	Common Starling	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p
Oryctolagus cuniculus	Rabbit (European Rabbit)	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Charadrius mongolus	Lesser Sand Plover	M	R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Anthochaera carunculata	Red Wattlebird		
Anthus novaeseelandiae	Australasian Pipit		
Calidris ruficollis	Red-necked Stint	M	
Charadrius ruficapillus	Red-capped Plover		
Chroicocephalus novaehollandiae	Silver Gull		
Coracina novaehollandiae	Black-faced Cuckoo-shrike		
Corvus coronoides	Australian Raven		
Falco cenchroides	Nankeen Kestrel		
Hirundo neoxena	Welcome Swallow		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Melithreptus brevirostris	Brown-headed Honeyeater		
Microcarbo melanoleucos	Little Pied Cormorant		
Pelecanus conspicillatus	Australian Pelican		
Phalacrocorax fuscescens	Black-faced Cormorant		
Phalacrocorax varius	Pied Cormorant		
Thalasseus bergii	Crested Tern		
Tringa nebularia	Common Greenshank	M	

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p

Species	Common Name	Status*	Record
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

No native mammals recorded

Reptiles

Species	Common Name	Aus status	SA status	Record
Amphibolurus norrisi	Mallee Tree-dragon			e
Ctenophorus chapmani	Prickly Dragon			c
Ctenotus euclae	Bight Coast Ctenotus			c
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Diplodactylus calcicolus	South Coast Gecko			c
Egernia stokesii	Gidgee Skink			e
Gehyra lazelli	Southern Rock Dtella			c
Gehyra variegata	Tree Dtella			e
Hemiergis initialis	Western Earless Skink			c
Hemiergis peronii	Four-toed Earless Skink			c
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			e
Morethia obscura	Mallee Snake-eye			c
Nephrurus milii	Barking Gecko			c
Parasuta spectabilis	Mallee Black-headed Snake			c
Pogona barbata	Eastern Bearded Dragon			c
Pseudonaja affinis	Dugite			c
Pygopus lepidopodus	Common Scaly-foot			c
Tiliqua rugosa	Sleepy Lizard			c

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP73 Cape D'Estrees

Cell area 1,149 ha. Shoreline length is 36.52 km

Landforms

EP73 is a low undulating calcarenite coastal plain with low cliffs, bluffs and sandy beaches; nearshore wave energy is low because of shelter from islands and reefs.
The Cape Vivonne to Cape D'estrees section is dominated by steep, coarse sand beaches fronted by sand flats and backed by bluffs and sand dunes. The main headlands and two minor ones are in basement rocks and Pleistocene Bridgewater limestone (calcarenite); degraded Pleistocene sands cover the coastal plain, together with small Holocene clifftop dunes. Cape D'estrees headland is mainly 5 to10m high calcarenite cliff, with small beaches. The shoreline is sheltered by islands, reefs and sand banks.
Laura Bay is a small protected embayment between low headlands: the shoreline and tidal inlets on the western side are lined with mangroves, backed by intertidal and supra-tidal samphire. The shoreline on the eastern side is sandy beach, fronted by sand flats, and backed by samphire and chenier ridges. Short et al (1986, p.116) note that the chenier/beach ridges record 1,200m of progradation between 4,000BP and 2,000BP; the materials are thought to be locally formed biogenic calcareous sands.

Benthic Habitat

Mainly inshore seagrass from Cape Vivonne to Cape D'estrees, then bare sand to Laura Bay. Bare sandflats are found to 500m offshore in Laura Bay, then dense seagrass.

Biota

Remnant vegetation is 1,390 ha, or 85% of the cell. There are 10 flora survey sites, 15 herbarium record sites, 2 threatened plant population flora record sites, 21 opportune fauna sites, and 2 reserve database fauna record sites.
Laura Bay CP shows a varied structure with *Eucalyptus oleosa ssp.* mid mallee woodland over *Melaleuca pauperiflora ssp. mutica, +/-Melaleuca lanceolata, +/-Geijera linearifolia* tall shrubs over *Enchylaena tomentosa var. tomentosa, +/-Atriplex vesicaria ssp.* low shrubs over *Sclerolaena diacantha.* Within the tidal lands backing Laura Bay there is extensive salt marsh: *Tecticornia arbuscula, +/-Sarcocornia quinqueflora, +/-Lycium australe* low shrubland over *+/-Suaeda australis*. Small areas of *Lawrencia squamata* low open shrubland are recorded on calcarenite ridges within the salt marsh. Much of the low cliffs and bluffs are in *Melaleuca lanceolata, Geijera linearifolia, +/-Pittosporum angustifolium, +/-Exocarpos aphyllus* mid open shrubland over *+/-Atriplex paludosa ssp. cordata, +/-*

Rhagodia crassifolia, +/-Atriplex vesicaria ssp. low shrubs over *+/-Carpobrotus rossii (NC), +/-Threlkeldia diffusa, +/-Frankenia sessilis.* At Cape Vivonne and Whittelbee Point *Atriplex cinerea, Olearia axillaris* low open shrubland over *Spinifex hirsutus, Cakile maritima ssp. maritima, +/-Carpobrotus rossii (NC), +/-Threlkeldia diffusa, +/-Tetragonia implexicoma* are found. At Cape D'estrees two areas of *Westringia dampieri, +/-Atriplex sp., +/-Frankenia pauciflora var. fruticulosa* low open shrubland occur.

FIGURE 6.46 Cape D'estrees, Decres Bay on left. Photo: Coast Protection Board, 2007

Land Use/ Land Ownership

Approximately 18% of this cell is within Conservation Parks; Laura Bay CP on the eastern boundary of the cell and Wittelbee CP near the centre of the cell. Most of the Cape D'estrees peninsula is perpetual Crown leasehold land fronted by a narrow (c.30m) coastal reserve of unalloted Crown land. Between the leasehold land and Wittelbee CP, and west of Wittelbee CP to the cell boundary the narrow coastal reserve (c.30-100m) of unalloted Crown land is backed by privately owned land.

The Parks of the Far West brochure, 2007 describes Wittelbee CP as "A small coastal park with sandy beaches and low, rocky headlands backed with sand dunes, samphire flats and mallee woodlands." and Laura Bay CP as "Lying within a sheltered bay, containing tidal samphire flats, mangroves along a small creek and rocky headlands – all backed by mallee – this park provides a good representation of the different ecosystems of the Eyre Peninsula"

Nuyts Archipelago Marine Park offshore.

Uses (Field visits and local reports)

Recreation and tourism – surfing, fishing, camping, ORV use, hunting / shooting, boating, nature observation

Professional fishing, boat mooring, in Laura Bay
Conservation
Scattered dwellings
Offshore aquaculture
Beach boat launching

Threats (Field visits and local reports)

Offshore aquaculture
Eco-tourism / tourism ventures
Development – including dwellings, sub-divisions, etc
Wondering stock (sheep) / introduced animals (fox, cats, rabbits)
Destruction of native wildlife, firearms
Uncontrolled camping
Uncontrolled ORV use – track creation
Waste management
Collection of fire wood
Wildfire
Weeds
Marine debris

Opportunities (Field visits and local reports)

Feral animal and weed control programs eg. re-instate fox bating program
Development of walking trails within CP's
Conservation study sites for school groups etc
Rationalise vehicle movement and track closure / re-alignment
Campground development

Conservation Analysis (GIS)

The sum of conservation means is 120.29, which is high for the region. The pattern of summed values is complex. Small areas of high totals are found on vegetated sand dunes in Decres Bay, near Wittelbee Point and on the fringes of Laura Bay. Medium to medium high values are widely distributed across the low cliffs as well as the salt marsh; only the cleared areas show low values. There are many layers with near average and above totals that contribute to the sum for this cell. These layers include: endemic plant communities, habitat for threatened birds and mammal species, significant butterfly habitat, White-bellied Sea-Eagle, viewscape and viewshed, vegetation block metrics, and indigenous heritage
There are 3 reptile and 57 bird species reported for this cell, including the state endangered White-bellied Sea Eagle, Eastern Osprey and Fairy Tern.

Threat Analysis (GIS)

The total threat value, 39.42, is an average value for the region. Medium high values are distributed along the coastal plain, with higher values at Cape Vivonne, and low values at the two small parks and Laura Bay salt marsh.
Off road vehicle impact (widespread – giving the second highest total for ORV in the region), land ownership and land use, viewshed and viewscape are the principal contributors to this total. ORV activity is apparent around the whole of Decres Bay, including Wittelbee CP. In the Laura Bay the threat of acid sulfate soils extends across the salt marsh.

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Beach recession and dune instability due to foredune damage. Increase in dune mobility.	Active management of dunes	
	More frequent inundation of Laura Bay mangroves and salt marsh.	Continue to monitor DENR profile 330010 for salt marsh change. Consider possible retreat buffer zones for tide-dependant ecosystems. Re-zoning on land use and development plans needed	
2070: +c.80cm.	Dune instability and movement further increased. Pocket beaches below cliffs lost by sand removal to nearshore. Migration of mangroves and inter-tidal samphire (where possible) in adjustment to changing tide heights becomes clear.		
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides; damage to foredunes	Continue to monitor shoreline movement and salt marsh boundaries. Active management of dunes	
Intensity of large storms increases.			

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere). There will be an increased risk for species that are already vulnerable. Invasive species may become more dominant.		Maintain connectivity of vegetation within the coastal boundary
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Opportunity created for more frequent weed invasion, notably of dune grasses.	Active dune management, including weed control	Ensure that coastal vegetation blocks are part of the regional fire plan
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes. Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains sediment movement into Laura Bay.		

TABLE 6.43 Recommended Actions and Priority for EP73 Cape D'Estrees

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM

Component	Issue	Proposed Action	Priority of Action	Key Players
	Ongoing and accelerating sea level beginning to cause change in dunes and salt marshes.	Create a baseline for monitoring shoreline, dune and salt marsh change by establishing a rectified aerial photographic record at an appropriate resolution.	High	DENR, EP NRM
	Existing and possible future development with potential impact on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Work with private land owners to minimise impact from existing development, including education and restoration where appropriate. Ensure future development is not located in areas of high conservation value or high sensitivity. Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs and cats, etc	Medium (cons/ threat)	EP NRM, DC of Ceduna, DENR, DPLG, private land owners, community groups
	Potential impact on breeding habitats of the endangered White-bellied Sea-Eagle, particularly during the breeding season.	Develop site management and monitoring strategy, including closure, relocation or seasonal closures of roads/walking tracks/car parks in the near vicinity. Ensure management/ works programs are not undertaken during the breeding season.	High (cons)	Private land owner, DENR, EP NRM, DC Ceduna, community
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	High (cons/ threat)	DC of Ceduna, DENR, EP NRM, private land owners, community
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, DC of Ceduna, EP NRM, private land owners, community groups

Component	Issue	Proposed Action	Priority of Action	Key Players
	Unrestricted access and multiple vehicle tracks around the coast impacting on the coastal dune and cliff top vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing erosion. Install directional /educational signage. Community education	High (cons/ threat)	Private land owners, DC of Ceduna, DTEI, DENR, EP NRM, SA Tourism, community
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg rabbits, foxes, cats. Undertake control program as required. Work with private landowners to ensure that stock are restricted from the coastal zone (eg. ensure fences are adequate and maintained)	Medium	EP NRM, DENR, DC of Ceduna, private land owners
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	Medium (cons/ threat)	EP NRM, private land owners, DENR, DC of Ceduna, community
Laura Bay salt marsh	Tide-dependant mangrove and salt marsh need space to retreat with sea level rise.	Modify land use and development plans to create buffer zone for salt marsh retreat, (and in accordance with EP regional plans).	High (cons/ threat)	DC of Ceduna, DPLG, EP LGA, EP NRM, DENR, private land owners
	All salt marsh areas show the potential for acid sulfate soil following disturbance; in turn this would potentially threaten life forms within the surrounding area.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Medium	DC of Ceduna, DENR, EP NRM, developers, private land owners

Component	Issue	Proposed Action	Priority of Action	Key Players
Laura Bay and Wittelbee CPs	The CPs have high conservation values. Potential impact from pest animals and recreational activities such as off-road vehicles and camping.	Review the management of this valuable area. Prepare management plans for the conservation parks.	High (cons/ threat)	DENR
	Formal camping area with impact from multiple tracks, weeds, soil compaction, vegetation trampling and removal, local impact from visitors	Continue to manage and maintain formal camping areas to minimise impacts eg. barriers/ fencing to prevent spread and informal tracks, signage, provision of appropriate amenities, weed management, maintenance of facilities/ infrastructure.	Medium (cons/ threat)	DENR
Beaches	Vehicles and dogs on beaches and beach boat launching with potential impact on meiofauna, shorebirds and intertidal species and/or habitat.	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Review beach boat launching locations with a view to rationalise. Develop and implement specific shorebird management plans to protect these valuable areas, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs eg. "chicks on beach".	High (cons/ threat)	DC of Ceduna, EP NRM, DTEI, EP LGA, DENR, PIRSA, Tourism SA, Birds Australia, community
	Marine debris with potential impact on native fauna species	Investigate opportunities for, and/or support, ongoing marine debris cleanup programs. Undertake education program targeting fishers, campers, aquaculture operators	Medium (cons/ threat)	PIRSA, EP NRM, DENR, aquaculture operators, community, DC of Ceduna

BIOTA

Flora

Remnant vegetation area (ha)	1,390.21 ha, 84.75% of cell area
# flora surveys / records	10 surveys, 15 herbarium record sites, 2 threatened plant population record site.
# flora in cell	135 (note: includes a marine species)
# conservation rated flora in cell	1
# non-indigenous flora in cell	12
Significant CDCS floristic community	*Melaleuca lanceolata* / *Atriplex paludosa* ssp shrubland – 96% of SA records in EP *Melaleuca lanceolata* / *Senecio lautus* shrubland – 97% of SA records in EP *Melaleuca lanceolata* / *Tetragonia implexicoma* shrubland – 72% of SA records in EP
Protected area	21% of remnant vegetation protected within Laura Bay and Wittelbee Conservation Parks

Weeds

Species	Common Name	Status	Study rating
Carrichtera annua	Ward's Weed	RA	4
Euphorbia paralias	Sea Spurge	RA	5
Lycium ferocissimum	African Boxthorn	D, RA	8
Oxalis pes-caprae	Soursob	D, RA	5
Anagallis arvensis	Pimpernel		2
Bupleurum semicompositum	Hare's Ear		0
Cakile maritima ssp. maritima	Two-horned Sea Rocket		1
Carpobrotus chilensis	Angled Pigface		0
Parapholis incurva	Curly Ryegrass		1
Psilocaulon granulicaule	Match-head Plant		0
Rostraria pumila	Tiny Bristle-grass		2
Vulpia myuros f. myuros	Rat's-tail Fescue		2

D: Declared weed, RA: Red alert weed

Native flora*

Species	Common Name	Aus status	SA status
Leiocarpa pluriseta			R
Acacia anceps (NC)	Angled Wattle		
Acacia hakeoides	Hakea Wattle		
Acacia sp. Winged (C.R.Alcock 4936)	Angled Wattle		
Acrotriche patula	Prickly Ground-berry		
Alyxia buxifolia	Sea Box		
Amyema melaleucae	Tea-tree Mistletoe		
Asperococcus bullosus			
Atriplex cinerea	Coast Saltbush		
Atriplex paludosa ssp.	Marsh Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Atriplex vesicaria ssp.	Bladder Saltbush		
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrodanthonia setacea	Small-flower Wallaby-grass		

Species	Common Name	Aus status	SA status
Austrostipa elegantissima	Feather Spear-grass		
Austrostipa eremophila	Rusty Spear-grass		
Austrostipa flavescens	Coast Spear-grass		
Austrostipa nitida	Balcarra Spear-grass		
Austrostipa scabra ssp. scabra	Rough Spear-grass		
Austrostipa sp.	Spear-grass		
Avicennia marina ssp. marina	Grey Mangrove		
Beyeria lechenaultii	Pale Turpentine Bush		
Brachyscome lineariloba	Hard-head Daisy		
Bulbine semibarbata	Small Leek-lily		
Carpobrotus rossii (NC)	Native Pigface		
Carpobrotus sp.	Pigface		
Cassytha melantha	Coarse Dodder-laurel		
Cassytha peninsularis	Peninsula Dodder-laurel		
Cassytha pubescens	Downy Dodder-laurel		
Comesperma volubile	Love Creeper		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Cratystylis conocephala	Bluebush Daisy		
Dianella revoluta var.			
Dianella revoluta var. divaricata	Broad-leaf Flax-lily		
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Dodonaea stenozyga	Desert Hop-bush		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eremophila deserti	Turkey-bush		
Eremophila weldii	Purple Emubush		
Eucalyptus brachycalyx	Gilja		
Eucalyptus calcareana	Nundroo Mallee		
Eucalyptus dumosa	White Mallee		
Eucalyptus dumosa complex	White Mallee		
Eucalyptus gracilis	Yorrell		
Eucalyptus oleosa (NC)	Red Mallee		
Eucalyptus oleosa ssp. ampliata	Red Mallee		
Eucalyptus rugosa	Coastal White Mallee		
Eucalyptus sp.			
Exocarpos aphyllus	Leafless Cherry		
Exocarpos sparteus	Slender Cherry		
Frankenia pauciflora var.	Southern Sea-heath		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Frankenia sessilis	Small-leaf Sea-heath		
Frankenia sp.	Sea-heath		
Geijera linearifolia	Sheep Bush		
Goodenia varia	Sticky Goodenia		
Halosarcia sp. (NC)	Samphire		
Helichrysum leucopsideum	Satin Everlasting		
Hemichroa diandra	Mallee Hemichroa		
Lasiopetalum behrii	Pink Velvet-bush		
Lasiopetalum discolor	Coast Velvet-bush		
Lawrencia squamata	Thorny Lawrencia		
Lycium australe	Australian Boxthorn		
Maireana erioclada	Rosy Bluebush		
Maireana oppositifolia	Salt Bluebush		
Maireana sedifolia	Bluebush		

Species	Common Name	Aus status	SA status
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Melaleuca pauperiflora (NC)	Boree		
Melaleuca pauperiflora ssp. mutica	Boree		
Microcybe multiflora ssp. multiflora	Small-leaf Microcybe		
Millotia major			
Minuria leptophylla	Minnie Daisy		
Myoporum brevipes	Warty Boobialla		
Myoporum insulare	Common Boobialla		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Olearia brachyphylla	Short-leaf Daisy-bush		
Olearia minor	Heath Daisy-bush		
Olearia muelleri	Mueller's Daisy-bush		
Oxalis perennans (NC)	Native Sorrel		
Pittosporum angustifolium	Native Apricot		
Plantago sp. B (R.Bates 44765)	Little Plantain		
Posidonia coriacea	Leathery Tapeweed		
Posidonia sinuosa	Narrow-leaf Tapeweed		
Ptilotus obovatus var. obovatus	Silver Mulla Mulla		
Pultenaea elachista	Limestone Bush-pea		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia crassifolia	Fleshy Saltbush		
Samolus repens	Creeping Brookweed		
Santalum acuminatum	Quandong		
Sarcocornia blackiana	Thick-head Samphire		
Sarcocornia quinqueflora	Beaded Samphire		
Scaevola bursariifolia	Bursaria Fanflower		
Scaevola crassifolia	Cushion Fanflower		
Scaevola spinescens	Spiny Fanflower		
Sclerolaena uniflora	Small-spine Bindyi		
Senecio glossanthus (NC)	Annual Groundsel		
Senecio pinnatifolius (NC)	Variable Groundsel		
Senna artemisioides ssp. petiolaris (NC)	Flat-stalk Senna		
Senna artemisioides ssp. X coriacea	Broad-leaf Desert Senna		
Spinifex hirsutus (NC)	Rolling Spinifex		
Spyridium phylicoides	Narrow-leaf Spyridium		
Tecticornia arbuscula	Shrubby Samphire		
Tecticornia halocnemoides ssp.	Grey Samphire		
Tecticornia indica ssp.	Brown-head Samphire		
Tecticornia indica ssp. leiostachya	Brown-head Samphire		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Triodia compacta	Spinifex		
Triodia irritans	Spinifex		
Vittadinia australasica var. australasica	Sticky New Holland Daisy		
Westringia dampieri	Shore Westringia		
Westringia rigida	Stiff Westringia		
Westringia sp.	Native Rosemary		
Wilsonia humilis	Silky Wilsonia		
Zygophyllum angustifolium	Scrambling Twinleaf		
Zygophyllum aurantiacum ssp. aurantiacum (NC)	Shrubby Twinleaf		
Zygophyllum billardierei	Coast Twinleaf		

Species	Common Name	Aus status	SA status
Zygophyllum billardierei (NC)	Coast Twinleaf		
Zygophyllum ovatum	Dwarf Twinleaf		
Zygophyllum sp.	Twinleaf		

R: Rare, V: Vulnerable, E: Endangered
* note: includes some marine species

Fauna

# of fauna in cell	60 recorded – 57 birds, 0 butterflies, 0 mammals, 3 reptiles, 0 amphibians (an additional 20 reptiles and 26 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	21 opportune sites, 2 reserve database record sites
# of threatened fauna in cell	11
# of non-indigenous fauna	2 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Columba livia	Rock Dove	Aves	x
Sturnus vulgaris	Common Starling	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Pandion cristatus	Eastern Osprey	M	E
Sternula nereis	Fairy Tern		E
Thinornis rubricollis	Hooded Plover		V
Actitis hypoleucos	Common Sandpiper	M	R
Anhinga novaehollandiae	Australasian Darter		R
Calidris alba	Sanderling	M	R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Limosa lapponica	Bar-tailed Godwit	M	R
Neophema petrophila	Rock Parrot		R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Acanthiza apicalis	Inland Thornbill		
Acanthiza chrysorrhoa	Yellow-rumped Thornbill		
Anas gracilis	Grey Teal		
Anthochaera carunculata	Red Wattlebird		
Anthus novaeseelandiae	Australasian Pipit		
Calidris ruficollis	Red-necked Stint	M	
Charadrius ruficapillus	Red-capped Plover		
Chroicocephalus novaehollandiae	Silver Gull		
Colluricincla harmonica	Grey Shrike-thrush		
Corvus coronoides	Australian Raven		
Corvus mellori	Little Raven		

Species	Common Name	Aus status	SA status
Cracticus tibicen	Australian Magpie		
Cracticus torquatus	Grey Butcherbird		
Cygnus atratus	Black Swan		
Egretta novaehollandiae	White-faced Heron		
Eolophus roseicapillus	Galah		
Falco berigora	Brown Falcon		
Falco cenchroides	Nankeen Kestrel		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Manorina flavigula	Yellow-throated Miner		
Microcarbo melanoleucos	Little Pied Cormorant		
Morus serrator	Australasian Gannet		
Ocyphaps lophotes	Crested Pigeon		
Pelecanus conspicillatus	Australian Pelican		
Petroica goodenovii	Red-capped Robin		
Phalacrocorax carbo	Great Cormorant		
Phalacrocorax fuscescens	Black-faced Cormorant		
Phalacrocorax sulcirostris	Little Black Cormorant		
Phalacrocorax varius	Pied Cormorant		
Phaps elegans	Brush Bronzewing		
Pluvialis squatarola	Grey Plover	M	
Poliocephalus poliocephalus	Hoary-headed Grebe		
Pomatostomus superciliosus	White-browed Babbler		
Rhipidura albiscapa	Grey Fantail		
Sericornis frontalis	White-browed Scrubwren		
Smicrornis brevirostris	Weebill		
Thalasseus bergii	Crested Tern		
Tringa nebularia	Common Greenshank	M	
Vanellus miles	Masked Lapwing		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p

Species	Common Name	Status*	Record
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

No mammal species recorded

Reptiles

Species	Common Name	Aus status	SA status	Record
Tiliqua rugosa	Sleepy Lizard			c
Pygopus lepidopodus	Common Scaly-foot			c
Pseudonaja affinis	Dugite			c
Pogona barbata	Eastern Bearded Dragon			c
Parasuta spectabilis	Mallee Black-headed Snake			c
Nephrurus milii	Barking Gecko			c
Morethia obscura	Mallee Snake-eye			c
Morethia adelaidensis	Adelaide Snake-eye			e
Menetia greyii	Dwarf Skink			e
Lerista terdigitata	Southern Three-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista dorsalis	Southern Four-toed Slider			e
Hemiergis peronii	Four-toed Earless Skink			c
Hemiergis initialis	Western Earless Skink			c
Gehyra variegata	Tree Dtella			e
Gehyra lazelli	Southern Rock Dtella			x
Egernia stokesii	Gidgee Skink			e
Diplodactylus calcicolus	South Coast Gecko			c
Delma australis	Barred Snake-lizard			e
Ctenotus orientalis	Spotted Ctenotus			x
Ctenotus euclae	Bight Coast Ctenotus			c
Ctenophorus chapmani	Prickly Dragon			x
Amphibolurus norrisi	Mallee Tree-dragon			e

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP75 Murat Bay

Cell area 746 ha. Shoreline length 17.29 km.

Landforms

This is a low slightly undulating coastal plain of Pleistocene calcarenite limestone. The cell tracks the inner shore of a broad, shallow, low wave energy, embayment. Narrow coarse sand beaches, stands of mangrove with salt marsh, low crumbling calcarenite cliffs and small headlands characterise the shoreline. The coastal plain undulates virtually at sea level, small wetlands, salt marsh and sabkhas are found within the coastal boundary. Sediment, including calcareous sands, appears to be slowly drifting into the embayment; and this is being colonised by patches of mangrove and samphire.

Benthic Habitat

Inshore bare sand, with medium density seagrass in the bay.

Biota

There is 624.5ha of remnant vegetation, 83.7% of the cell. There is 1 flora survey site, 1 herbarium record site, and 3 opportune fauna sites.
Shrubland dominates along this coastline, with many small areas of *Melaleuca lanceolata, Geijera linearifolia, +/-Pittosporum angustifolium, +/-Exocarpos aphyllus* mid open shrubland over *+/-Atriplex paludosa ssp. cordata, +/-Rhagodia crassifolia, +/-Atriplex vesicaria ssp.* low shrubs over *+/-Carpobrotus rossii (NC), +/-Threlkeldia diffusa, +/-Frankenia sessilis.* 15% of the cell is samphire: *Tecticornia sp., Atriplex vesicaria ssp.* low open shrubland over *+/-Hemichroa diandra, +/-Maireana oppositifolia..*
Clumps of *Avicenna marina* dot the shoreline. Near the proposed marina *Nitraria billardierei, +/-Olearia axillaris* mid open shrubland over *Threlkeldia diffusa, Tetragonia implexicoma, Rhagodia candolleana ssp. candolleana, Atriplex vesicaria ssp.* shrubs are found.
East of Round Point there is a small stand of *Eucalyptus oleosa ssp., +/-Eucalyptus calcareana, +/-Eucalyptus gracilis* mid mallee woodland over *+/-Geijera linearifolia, +/-Exocarpos aphyllus* mid sparse shrubland over *Cratystylis conocephala, Rhagodia crassifolia, +/-Eremophila scoparia over Atriplex vesicaria ssp., +/-Zygophyllum aurantiacum ssp.* low open shrubland. North of McKenzie's Landing there is *Atriplex vesicaria ssp., +/-Tecticornia disarticulata, +/-Frankenia sessilis, +/-Maireana erioclada, +/-Salsola tragus* low open shrubland over *+/-Austrostipa nitida, +/-Sclerolaena obliquicuspis, +/-Sclerolaena patenticuspis, +/-Austrodanthonia caespitosa, +/-Carrichtera annua.*

Land Use/ Land Ownership

Only a very small area of this cell is fronted by a coastal reserve; approximately 800m of coast north of the boundary of EP74 has a narrow (c.15-120m) coastal reserve of unalloted Crown land, and approximately 1.5km east of McKenzie Landing, a 2km stretch of foreshore has a

coastal reserve (c.50-220m wide) of unalloted Crown land. Apart from these areas, the land is privately owned and in most areas meets the coastline. A significant amount of the land that meets the coast without a coastal reserve is owned by the Aboriginal Lands Trust. None of the cell is protected within the state reserve system or Heritage Agreements.

Nuyts Archipelago Marine Park offshore.

FIGURE 6.47 Looking across Ceduna, Murat Bay, and the Thevenard peninsula, towards Bosanquet Bay. Middle left shows former salt marsh/ sabkhas, the site of proposed marina and real estate development. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

Aboriginal homelands
Land and water based aquaculture activities
Recreational and professional fishing
Kite surfing
Uncontrolled camping and un-authorised ORV use
Water sport activities (jet skies, water skiing, boating, fishing etc)
Residential

Threats (Field visits and local reports)

Land based aquaculture
Offshore aquaculture
Eco-tourism ventures
Development – subdivision, residential, proposed marina development
Introduced animals (fox, cats, rabbits)
Track creation
Destruction of native wildlife, firearms

Un-controlled camping
Waste management
Collection of fire wood
Wildfire
Uncontrolled ORV usage
PCASS
Marine debris
Spread of environmental weeds, particularly garden escapee plants.
Rubbish dumping
Beach boat launching – disturbance to shorebirds, damage to coastal vegetation and landforms (eg. dunes), public safety, hydrocarbon spills

Opportunities (Field visits and local reports)

Rationalise vehicle movement and track closure / re-alignment
Development of feature walking trails to direct foot traffic

Conservation Analysis (GIS)

The total of conservation means is 96.83, an average total for the region. The distribution of mean values shows mainly medium low areas, with medium high totals on dune ridges, medium low in the salt marsh and very low on cleared land.
Medium to low totals are found for threatened plants and endemic species; but habitat for threatened bird species and threatened animal species, butterfly habitat and habitat for focal species Eastern Osprey show higher than average totals. Viewshed, viewscape, vegetation block metrics and indigenous heritage also contribute substantially.
There are 4 bird and 1 reptile species recorded in this cell.

Threat Analysis (GIS)

At 51.9, the total of threat means is high within the region. The main contributors to this total are ORV activity (the highest score in the region), land ownership and use, and viewscape are the principal contributors; with more modest contributions from existing development and development zoning. The distribution of total values shows many areas with high totals through the cell, and an area of medium to medium high values near Rocky Point (mainly salt marsh).

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Sea level rise: 2030 : +c.20cm	Beach recession and dune instability due to foredune damage. Increase in dune mobility. More frequent inundation of mangroves and salt marsh.	Active management of dunes Consider possible retreat buffer zones for tide-dependant ecosystems. Re-zoning on land use and development plans needed	
2070: +c.80cm.	Dune instability and movement further increased. Pocket beaches below cliffs lost by sand removal to nearshore. Migration of mangroves and inter-tidal samphire (where possible) in adjustment to changing tide heights becomes clear.		
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides; damage to foredunes	Continue to monitor shoreline movement and salt marsh boundaries. Active management of dunes	
Intensity of large storms increases.			
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere). There will be an increased risk for species that are already vulnerable. Invasive species may become more dominant.		Maintain connectivity of vegetation within the coastal boundary
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Opportunity created for more frequent weed invasion, notably of dune grasses.	Active dune management, including weed control	Ensure that coastal vegetation blocks are part of the regional fire plan
'Flashy' run off: Drier creeks, but larger rare floods	N/A		

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Groundwater lowering; saline incursion:	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes. Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains sediment movement into Murat Bay.		

TABLE 6.44 Recommended Actions and Priority for EP75 Murat Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Very inadequate data on biodiversity and habitat values, although there are a variety of habitats within this sheltered embayment and 83% of the cell is in remnant vegetation, there are few flora and fauna records, most notably for the salt marsh.	Establish strategically located flora and fauna survey sites to set up a baseline statement of ecological assets. Identify records and surveys that are not in the BDBSA (eg. private surveys/records, government surveys not yet entered). Evaluate/verify data and enter into the BDBSA	High (cons)	DENR, EP NRM, land owners, community
	Existing and possible future development with impact on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Work with private land owners to minimise impact from existing development, including education and restoration where appropriate. Ensure future development is not located in areas of high conservation value or high sensitivity. Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs and cats, etc	High (cons/ threat)	EP NRM, DC of Streaky Bay, DENR, DPLG, private land owners, community groups

Component	Issue	Proposed Action	Priority of Action	Key Players
	Potential impact on breeding habitat of the endangered Eastern Osprey, particularly during the breeding season.	Develop site management and monitoring strategy. Community education.	Medium (threat)	DENR, local community, EP NRM
	Informal camping appears to occur around much of this coast, with potential impact from soil compaction, vegetation damage, increased fire risk, dune instability, weed introduction	Monitor impacts of camping. Review locations, management and need for camping in this location, with consideration to close and sign areas inappropriate for camping and/or formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping is to be allowed	Medium	DC of Ceduna, DENR, EP NRM, land owners, community
	Unrestricted access, multiple vehicle tracks and informal car parks around the coast, with impact on coastal dune, and salt marsh vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing access with a view to rationalise unnecessary tracks and car parks. Block access (eg. fencing/rocks) to tracks and car parks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks or car parks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	High (cons/ threat)	DC of Ceduna, private land owners, DENR, EP NRM, community
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, private land owners, community groups, EP NRM
	Unrestricted pedestrian access in high visitation areas with impact soil erosion, stability and compaction, vegetation damage, weed introduction and fauna disturbance.	Formalise and maintain pedestrian access. Install directional / educational signage where required.	Medium	DC of Ceduna, community, EP NRM, DENR

Component	Issue	Proposed Action	Priority of Action	Key Players
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg rabbits, foxes, cats. Undertake control program as required. Work with private landowners to ensure that stock are restricted from the coastal zone (eg. ensure fences are adequate and maintained)	Medium	EP NRM, DC of Ceduna, private land owners, community
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	Medium	EP NRM, private land owners, DENR, DC of Ceduna, community
	Maintenance of coastal access management infrastructure	Use the EP Coastal infrastructure audit to setup a maintenance program	Medium	DENR, DC of Ceduna, EP NRM, community
Salt marsh, mangroves and low lying areas	Salt marsh, mangroves and low sand ridges all susceptible to migration through natural processes caused by sea level rise	Create a baseline for salt marsh, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	High	DENR, EP NRM
		Consider establishing a buffer zone for retreat of tide-dependant ecosystems in the land use and development plans.	High	DC of Ceduna, EP LGA, DPLG, DENR, EP NRM
	All salt marsh areas show the potential for acid sulfate soil following disturbance; in turn this would potentially threaten all life forms within the bay.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Medium (threat)	DC of Ceduna, DENR, developers, private land owners
Beaches, sandflats and wetland areas	Marine debris with potential impact on native fauna species	Investigate opportunities for, and/or support, ongoing marine debris cleanup programs. Undertake education program targeting fishers, campers, aquaculture operators	Medium	PIRSA, EP NRM, DENR, DC of Ceduna, aquaculture operators, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Significant shorebird breeding, feeding and resting habitat, with disturbance from people, vehicles, dogs and pest animals. (Vehicles on beaches and beach boat launching also a threat to meiofauna and shorebirds)	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Review beach boat launching locations with a view to rationalise. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Community education and awareness programs, eg. "chicks on beach".	High (cons/ threat)	DC of Ceduna, EP NRM, DTEI, EP LGA, DENR, PIRSA, Tourism SA, Birds Australia, community

BIOTA

Flora

Remnant vegetation area (ha)	624.54 ha, 83.76% of cell area
# flora surveys / records	1 surveys, 1 herbarium record sites
# flora in cell	26
# conservation rated flora in cell	0
# non-indigenous flora in cell	9
Significant CDCS floristic community	Nil
Protected area	No remnant vegetation protected

Weeds

Species	Common Name	Status	Study rating
Carrichtera annua	Ward's Weed	RA	4
Euphorbia paralias	Sea Spurge	RA	5
Limonium companyonis	Sea-lavender	RA	7
Mesembryanthemum crystallinum	Common Iceplant	RA	4
Lycium ferocissimum	African Boxthorn	D, RA	8
Diplotaxis tenuifolia	Lincoln Weed	D	3
Brassica tournefortii	Wild Turnip		3

Species	Common Name	Status	Study rating
Rostraria pumila	Tiny Bristle-grass		2
Vulpia myuros f. myuros	Rat's-tail Fescue		2

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Acacia anceps			
Atriplex vesicaria ssp.	Bladder Saltbush		
Austrostipa acrociliata	Graceful Spear-grass		
Austrostipa nitida	Balcarra Spear-grass		
Austrostipa sp.	Spear-grass		
Carpobrotus rossii	Native Pigface		
Crassula colligata ssp. lamprosperma			
Exocarpos aphyllus	Leafless Cherry		
Frankenia pauciflora var. gunnii	Southern Sea-heath		
Geijera linearifolia	Sheep Bush		
Melaleuca lanceolata	Dryland Tea-tree		
Olearia axillaris	Coast Daisy-bush		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Sclerolaena diacantha	Grey Bindyi		
Senecio glossanthus	Annual Groundsel		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	5 recorded – 4 birds, 0 butterflies, 0 mammals, 1 reptiles, 0 amphibians (an additional 21 reptiles and 26 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	3 opportune sites
# of threatened fauna in cell	0
# of non-indigenous fauna	0 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Pieris rapae rapae	Cabbage White	Invertebrate	p

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Falco cenchroides	Nankeen Kestrel		
Lichenostomus virescens	Singing Honeyeater		
Threskiornis molucca	Australian White Ibis		
Threskiornis spinicollis	Straw-necked Ibis		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

No mammal species recorded

Reptiles

Species	Common Name	Aus status	SA status	Record
Amphibolurus norrisi	Mallee Tree-dragon			x
Ctenophorus chapmani	Prickly Dragon			c
Ctenotus euclae	Bight Coast Ctenotus			c
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Diplodactylus calcicolus	South Coast Gecko			c
Drysdalia mastersii	Master's Snake			c
Egernia stokesii	Gidgee Skink			e
Gehyra lazelli	Southern Rock Dtella			c
Gehyra variegata	Tree Dtella			e
Hemiergis initialis	Western Earless Skink			c
Hemiergis peronii	Four-toed Earless Skink			c
Lerista dorsalis	Southern Four-toed Slider			e

Species	Common Name	Aus status	SA status	Record
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			e
Morethia obscura	Mallee Snake-eye			c
Nephrurus milii	Barking Gecko			c
Parasuta spectabilis	Mallee Black-headed Snake			c
Pseudonaja affinis	Dugite			c
Pygopus lepidopodus	Common Scaly-foot			c

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP76 Denial Bay

Cell area 796 ha. Shoreline length 17.73 km.

Landforms

From EP77 (Tourville Bay) to Cape Beaufort there are bedrock outcrops of Palaeoprotorozoic granites in a low curved rise that forms a 10m bluff behind a high tide beach; in front of the beach is bedrock platform. The beaches through the whole cell are narrow, steep, low energy and with coarse sands, fronted by wide sand flats; these sand flats represent sediment moving into the bay from the south. The nearshore sediment occurs in a series of sand waves linked to small forelands (such as Matts Point) on the shore. These features may be controlled by topography in the underlying strata, or nearshore processes controlling the sediment movement. At the back of the beach there is a low sloping bluff, c.10-20m.

Benthic Habitat

Inshore bare sand and seagrass patches from Tourville Bay to Matts Point, then inshore dense seagrass.

Biota

There are 690.9 ha of remnant vegetation: 89% of the cell. There are 5 flora survey sites, 2 herbarium record sites, and 6 opportune fauna sites.
From Tourville Bay around the Cape Beaufort peninsula to Matts Point the coastal plain is fronted by low shrubland dominated by *Melaleuca lanceolata* and *Geijera linearifolia*, with areas of chenopod shrubland with *Atriplex paludosa ssp. cordata and Maireana oppositifolia.* Further back from the winds of the shoreline is *Eucalyptus calcareana, +/-Eucalyptus gracilis, +/-Eucalyptus oleosa ssp., +/-Eucalyptus brachycalyx* mid open mallee forest. North from approximately Matts Point there are small areas of mangrove, salt marsh, *Lawrencia squamata* low open shrubland and some *Melaleuca lanceolata, Geijera linearifolia* mid open shrubland. Towards the centre of the peninsula are large remnant blocks of *Nitraria billardierei, Olearia axillaris, +/-Atriplex cinerea, +/-Myoporum insulare* mid open shrubland; one of these is linked to the coastal boundary and is included in that boundary.

Land Use/ Land Ownership

The majority of this cell is privately owned, and only approximately half has a coastal reserve. A coastal reserve (c. 20-250m wide) of unalloted Crown land extends from Cape Beaufort north to approximately 2km north of Matt's Point. A coastal reserve (c.20-50m wide) of unalloted Crown land also extends north from the Denial Bay settlement to the cell boundary. Crown land Act reserve under the care, control and management of the District Council of Ceduna surrounds the Denial Bay settlement.

Nuyts Archipelago Marine Park offshore.

FIGURE 6.48 Matts Point in foreground, Cape Beaufort in background. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

Land and water based aquaculture activities
Recreational and professional fishing
Kite Surfing
Uncontrolled camping and uncontrolled ORV use
Water sport activities (jet skies, water skiing etc)
Agriculture
Residential
Maritime heritage (McKenzie landing)

Threats (Field visits and local reports)

Land based aquaculture
Offshore aquaculture
Eco-tourism / tourism ventures
Development
Wondering stock (sheep) / introduced animals (fox, cats, rabbits)
Track creation
Destruction of native wildlife, firearms
Un-controlled camping
Waste management
Collection of fire wood
Wildfire
Uncontrolled ORV usage
Marine debris

Opportunities (Field visits and local reports)

Rationalise vehicle movement and track closure / re-alignment
Possible campground development

Conservation Analysis (GIS)

The total of summary conservation means is 118.85, an average value for the region. In distribution these values increase towards the south of the cell, with low totals on cleared land near the township of Denial Bay and patches inland from Matts Point, to high medium totals on vegetated dunes near Cape Beaufort. Most totals are medium to medium high.
The distribution of plant communities endemic to the Eyre Peninsula is the only plant variable above average, and this is widespread (with the exception of some dunes west of Cape Beaufort); habitat for threatened birds (mainly in the Cape Beaufort area), for threatened mammals (dunes) and for butterflies are also high; focal species Easter Osprey scores well, as do viewshed, viewscape and vegetation block metrics, and indigenous heritage.
There is one reptile and 42 bird species recorded in this cell, including the state endangered Fairy Tern.

Threat Analysis (GIS)

The total from the threat summary layers is 52.32, a high total for the region. Medium to high threat values cover the cell, with only tiny areas totalling medium low. In general the highest totals are in the north of the cell, near Denial Bay settlement.
The principal layers contributing to the threat total are: ORV activity (near Denial Bay, Matts Point and Cape Beaufort), land ownership and land use (throughout cell), viewshed and viewscape, and the distribution of invasive weeds (African Boxthorn and Aleppo Pine are recorded near Denial Bay, but there is a lack of data in this area). There is also previous rabbit activity, but unconfirmed recently.

Adaptation to Climate Change Threats

(see also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Beach recession and dune instability due to foredune damage. Increase in dune mobility. More frequent inundation of mangroves and salt marsh.	Active management of dunes	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
2070: +c.80cm.	Dune instability and movement further increased. Pocket beaches below cliffs lost by sand removal to nearshore.		
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides; damage to foredunes	Continue to monitor shoreline movement. Active management of dunes	
Intensity of large storms increases.			
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere). There will be an increased risk for species that are already vulnerable. Invasive species may become more dominant.		Maintain connectivity of vegetation within the coastal boundary
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Opportunity created for more frequent weed invasion, notably of dune grasses.	Active dune management, including weed control	Ensure that coastal vegetation blocks are part of the regional fire plan
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes. Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains sediment movement into Murat Bay.		

TABLE 6.45 Recommended Actions and Priority for EP76 Denial Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Very inadequate data on biodiversity and habitat values. There are extensive areas of remnant vegetation in this cell (89%), but limited data on flora and fauna and feral animals.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM, land owners
	Shoreline subject to change through sea level rise	Create a baseline for shoreline and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	High	DENR, EP NRM
	Non-indigenous coastal heritage sites identified – Cape Beaufort whaling site and Denial Bay jetty - but not included on any statutory heritage register, with potential impact from recreational activities	Consider including onto heritage register eg. local heritage lists. Ensure sites managed to protect from damage. Install interpretive educational signage.	Medium	DC of Ceduna, DENR, SA Heritage Council, community
	Areas within cell identified as being of high conservation value, and important for endemic plant communities and as habitat for threatened species, little protection and impact from agricultural activities, development, uncontrolled access, weeds and pest animals	Review management and land management practices in these areas with a view to minimise damage and disturbance and increase protection. Investigate and implement actions to improve, protect and mitigate threats to these areas. Ensure future development is not located in areas of high conservation value or high sensitivity.	Medium (cons/ threat)	DENR, private land owners, EP NRM, DPLG, DC of Ceduna
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	Medium (cons/ threat)	DC of Ceduna, DENR, EP NRM, private land owners, community groups

Component	Issue	Proposed Action	Priority of Action	Key Players
	Unrestricted access and multiple vehicle tracks around the coast impacting on the coastal dune and cliff top vegetation, soil compaction and erosion, weed introduction, dune instability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	High (cons/ threat)	Private land owners, DC of Ceduna, DTEI, DENR, EP NRM, SA Tourism, community
	Potential impact on breeding habitat of the endangered Eastern Osprey, particularly during the breeding season.	Develop site management and monitoring strategy, including consideration to closure, relocation or seasonal closures of roads/walking tracks/car parks in the near vicinity. Ensure management/works programs are not undertaken during the breeding season. Community education.	Medium (cons/ threat)	DENR, EP NRM, community
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species.	Monitor and record existence and impacts of introduced pest animals eg rabbits, foxes, cats. Undertake control program as required. Work with private landowners to ensure that stock are restricted from the coastal zone (eg. ensure fences are adequate and maintained)	Medium	EP NRM, DENR, DC of Ceduna, private land owners, community
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	Medium (cons/ threat)	EP NRM, private land owners, DENR, DC of Ceduna, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, private land owners, community groups, EP NRM
	Marine debris with potential impact on native fauna species	Investigate opportunities for, and/or support, ongoing marine debris cleanup programs. Undertake education program targeting fishers, campers, aquaculture operators	Medium	PIRSA, EP NRM, DENR, DC of Ceduna, aquaculture operators, community
Beaches	Vehicles and dogs on beaches and beach boat launching with potential impact on meiofauna, shorebirds and intertidal species and/or habitat.	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Review beach boat launching locations with a view to rationalise. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	Medium (cons/ threat)	DC of Ceduna, EP NRM, DTEI, EP LGA, DENR, PIRSA, Tourism SA, Birds Australia, community

Component	Issue	Proposed Action	Priority of Action	Key Players
Northern half of cell	Existing development impacting on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Work with private land owners to minimise impact from existing development, including education, restoration where appropriate and/or negotiation/enforcement to ensure the developments do not encroach on the coastal Crown reserve Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs and cats, ORV etc	Medium	EP NRM, DC of Ceduna, DENR, private land owners, community groups

BIOTA

Flora

Remnant vegetation area (ha)	690.88 ha, 86.74% of cell area
# flora surveys / records	5 surveys, 2 herbarium record sites
# flora in cell	56
# conservation rated flora in cell	3
# non-indigenous flora in cell	13
Significant CDCS floristic community	*Melaleuca lanceolata* / *Atriplex paludosa* ssp shrubland – 96% of records in EP *Melaleuca lanceolata* / *Senecio lautus* shrubland – 97% of records in EP *Nitraria billardierei* shrubland – 54% of records in EP
Protected area	No remnant vegetation protected

Weeds

Species	Common Name	Status	Study rating
Argyranthemum frutescens ssp.	Marguerite Daisy	RA	4
Euphorbia paralias	Sea Spurge	RA	5
Gazania rigens	Gazania	RA	6
Leptospermum laevigatum	Coast Tea-tree	RA	5
Limonium companyonis	Sea-lavender	RA	7
Lycium ferocissimum	African Boxthorn	D, RA	8
Pinus halepensis	Aleppo Pine	D, RA	5
Diplotaxis tenuifolia	Lincoln Weed	D	3
Herniaria cinerea	Rupturewort		0
Hirschfeldia incana	Hoary Mustard		0
Mesembryanthemum sp.	Iceplant		3
Schismus barbatus	Arabian Grass		0
Tribulus terrestris	Caltrop		0

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Leiocarpa pluriseta			R
Poa drummondiana	Knotted Poa		R
Templetonia battii	Spiny Templetonia		R
Acacia anceps (NC)	Angled Wattle		
Angianthus tomentosus	Hairy Angianthus		
Atriplex cinerea	Coast Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Atriplex vesicaria ssp.	Bladder Saltbush		
Austrostipa drummondii	Cottony Spear-grass		
Austrostipa sp.	Spear-grass		
Avicennia marina ssp. marina	Grey Mangrove		
Beyeria lechenaultii	Pale Turpentine Bush		
Calandrinia eremaea	Dryland Purslane		
Carpobrotus rossii (NC)	Native Pigface		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Cratystylis conocephala	Bluebush Daisy		
Dodonaea stenozyga	Desert Hop-bush		
Eremophila deserti	Turkey-bush		
Eremophila scoparia	Broom Emubush		
Eucalyptus dumosa complex	White Mallee		
Eucalyptus oleosa (NC)	Red Mallee		
Exocarpos aphyllus	Leafless Cherry		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Frankenia sessilis	Small-leaf Sea-heath		
Geijera linearifolia	Sheep Bush		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Moss sp.			
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Olearia minor	Heath Daisy-bush		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Ptilotus obovatus var. obovatus	Silver Mulla Mulla		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia crassifolia	Fleshy Saltbush		
Salsola tragus	Buckbush		
Samolus repens	Creeping Brookweed		
Santalum acuminatum	Quandong		
Scaevola spinescens	Spiny Fanflower		
Sclerolaena uniflora	Small-spine Bindyi		
Senecio pinnatifolius (NC)	Variable Groundsel		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	43 recorded – 42 birds, 0 butterflies, 0 mammals, 1 reptiles, 0 amphibians (an additional 21 reptiles and 26 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	6 opportune sites
# of threatened fauna in cell	8
# of non-indigenous fauna	0 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Pieris rapae rapae	Cabbage White	Invertebrate	p

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Sternula nereis	Fairy Tern		E
Numenius madagascariensis	Eastern Curlew	M	V
Arenaria interpres	Ruddy Turnstone	M	R
Egretta sacra	Eastern Reef Egret		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Limosa lapponica	Bar-tailed Godwit	M	R
Tringa brevipes	Grey-tailed Tattler	M	R
Anas castanea	Chestnut Teal		
Anthus novaeseelandiae	Australasian Pipit		
Aquila audax	Wedge-tailed Eagle		
Ardea modesta	Eastern Great Egret		
Artamus cyanopterus	Dusky Woodswallow		
Calidris acuminata	Sharp-tailed Sandpiper	M	
Calidris ruficollis	Red-necked Stint	M	
Charadrius ruficapillus	Red-capped Plover		
Chroicocephalus novaehollandiae	Silver Gull		
Cincloramphus cruralis	Brown Songlark		
Cincloramphus mathewsi	Rufous Songlark		
Circus approximans	Swamp Harrier		
Cygnus atratus	Black Swan		
Egretta novaehollandiae	White-faced Heron		
Elanus axillaris	Black-shouldered Kite		
Epthianura tricolor	Crimson Chat		
Falco cenchroides	Nankeen Kestrel		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Lalage sueurii	White-winged Triller		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Malurus lamberti	Variegated Fairy-wren		
Microcarbo melanoleucos	Little Pied Cormorant		
Ocyphaps lophotes	Crested Pigeon		
Pelecanus conspicillatus	Australian Pelican		

Species	Common Name	Aus status	SA status
Phalacrocorax fuscescens	Black-faced Cormorant		
Phalacrocorax sulcirostris	Little Black Cormorant		
Phalacrocorax varius	Pied Cormorant		
Pluvialis squatarola	Grey Plover	M	
Rhipidura leucophrys	Willie Wagtail		
Thalasseus bergii	Crested Tern		
Tringa nebularia	Common Greenshank	M	
Turnix velox	Little Button-quail		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

No mammal species recorded

Reptiles

Species	Common Name	Aus status	SA status	Record
Amphibolurus norrisi	Mallee Tree-dragon			e
Ctenophorus chapmani	Prickly Dragon			c
Ctenotus euclae	Bight Coast Ctenotus			c

Species	Common Name	Aus status	SA status	Record
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Diplodactylus calcicolus	South Coast Gecko			c
Drysdalia mastersii	Master's Snake			c
Egernia stokesii	Gidgee Skink			e
Gehyra lazelli	Southern Rock Dtella			c
Gehyra variegata	Tree Dtella			e
Hemiergis initialis	Western Earless Skink			c
Hemiergis peronii	Four-toed Earless Skink			c
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			e
Morethia obscura	Mallee Snake-eye			x
Nephrurus milii	Barking Gecko			c
Parasuta spectabilis	Mallee Black-headed Snake			c
Pseudonaja affinis	Dugite			c
Pygopus lepidopodus	Common Scaly-foot			c

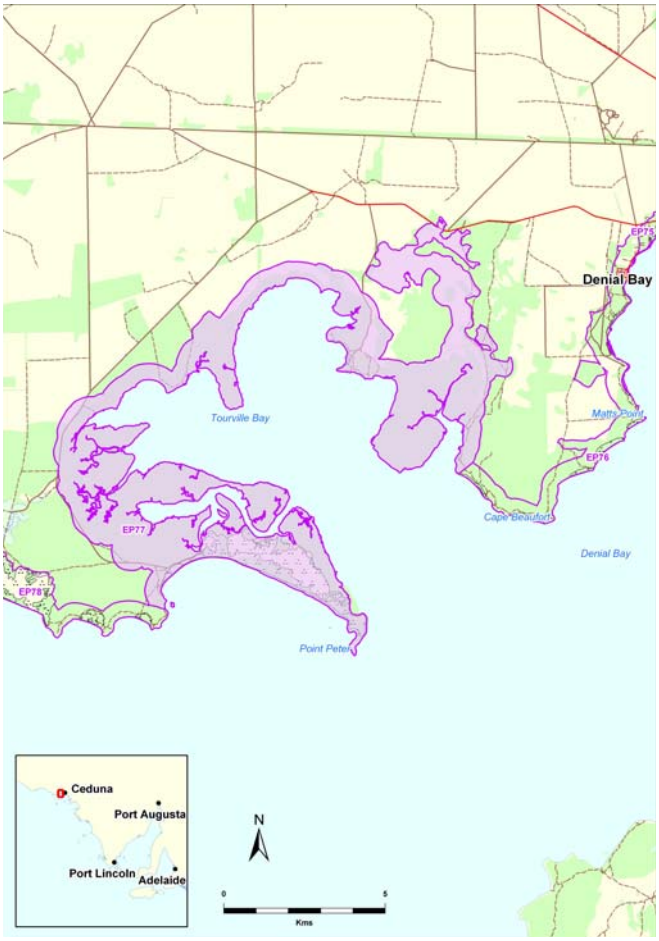
R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP77 Tourville Bay

Cell area 5,083 ha. Shoreline length 157.17 km.



Landforms

This large cell includes the open ocean embayment from the hard rock headlands of Point James to Point Peter and the mangrove/ salt marsh complexes of Tourville Bay. Holocene barrier sands have protected the salt marsh complex of the bay from SW wave energy, but active dune transgression impacting on mangroves, samphire and cheniers adjacent to Davenport Creek is occurring. Dating of former chenier ridges within the dunes (Short et al, 1986, p.119) shows mangroves and cheniers were established following sea level stillstand by 2,000BP, and the main dune transgression occurred after this date. Chenier ridges are well developed in the east of the embayment; in the north-east bare supra-tidal flats and stranded supra-tidal samphire are recorded.

Benthic Habitat

Within the bay intertidal bare sand and seagrass, and the channels of a flood tide delta; sediment patterns also indicate a flood tide delta deposition since standstill. There is calcarenite reef off Point Peter and the three headlands including Point James; there is medium seagrass and inshore sand off the sandy embayments.

Biota

There is 4,105ha of remnant vegetation, which is 80.77% of the cell. There are 8 flora survey sites, 1 opportune flora site, 6 herbarium record sites, and 7 opportune fauna sites.
Much of this cell is salt marsh, 74%: *Tecticornia halocnemoides ssp., +/-Tecticornia arbuscula, +/-Maireana oppositifolia, +/-Frankenia pauciflora var., +/-Wilsonia humilis* low shrubland; also *Tecticornia halocnemoides ssp., +/-Maireana oppositifolia, +/-Lawrencia squamata, +/-Tecticornia indica ssp.* low open shrubland over *+/-Disphyma crassifolium ssp. clavellatum, +/-Frankenia sp*; and mangrove - *Avicennia marina ssp. marina* low open forest over *+/-Tecticornia sp., +/-Sarcocornia quinqueflora* shrubs. The cell also includes smaller areas of *Atriplex vesicaria ssp.* low chenopod shrubland, *Myoporum insulare, +/-Olearia axillaris* mid open dune shrubland, and *Melaleuca lanceolata, Geijera linearifolia, +/-Pittosporum angustifolium, +/-Exocarpos aphyllus* mid open shrubland.

Land Use/ Land Ownership

Much of this cell is held under perpetual Crown lease, fronted by a narrow (c.30m) coastal reserve of unalloted Crown land. A section adjacent to Davenport Creek is held under Crown land Act reserve by the District Council of Ceduna. The mangrove / salt marsh area east of Nadia landing is privately owned, without a coastal reserve.

FIGURE 6.49 Davenport Creek, looking towards Point Peter. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

Recreation and tourism – surfing, kite surfing, fishing, camping, ORV use, hunting / shooting, water sport activities (eg. jet skies, water skiing, etc), boat launching
Professional fishing
Agriculture

Threats (Field visits and local reports)

Eco-tourism / tourism ventures
Sub-divisions
Wandering stock (sheep) / introduced animals (fox, cats, rabbits)
Track creation
Destruction of native wildlife, firearms
Un-controlled camping
Waste management
Collection of fire wood
Wildfire
Uncontrolled ORV usage
Cullen & Bird p.B5 note: "The environment is semi-arid and even under natural conditions these dunes may have been subject to wind erosion. The sparse dune vegetation has evidently been depleted by stock grazing and occasional burning and in recent years by the impacts of off-road vehicles. In consequence the dunes are now in places bare of vegetation and sand is drifting across the marshlands and mangroves, and on to the tidal shores of Tourville Bay. Mobilisation of these dunes has thus led to an invasion of these estuarine ecosystems at the rear by drifting sand, an effect which could be adverse to the wildlife and fishery resources of this area. It would certainly be difficult to re-vegetate and stabilise dunes that are already drifting here, but the

problem will worsen unless off-road vehicles are excluded from the remaining partly vegetated dune areas south of Davenport Creek".
Extensive PCASS recorded under salt marsh areas.

Opportunities (Field visits and local reports)

Davenport Creek is listed in the Directory of Important Wetlands in Australia: this lists the following reasons for inclusion

- "It is a good example of a wetland type occurring within a biogeographic region in Australia.
- It is a wetland which is important as the habitat for animal taxa at a vulnerable stage in their life cycles, or provides a refuge when adverse conditions such as drought prevail.
- The wetland supports native plant or animal taxa or communities which are considered endangered or vulnerable at the national level.
- The wetland is of outstanding historical or cultural significance."

The directory notes that Davenport Creek contains the largest area of mangroves on the west coast, and supports a wide diversity of waterbirds. Tourville Bay is listed by Watkins (1993) as an area of international importance for shorebirds.

Davenport Creek Controlling Authority
Land management plan for Davenport Creek
Rationalise vehicle movement and track closure / re-alignment
Re-instate fox bating program
Campground development
DENR profile record through salt marsh at profile 330011, NW Davenport Creek; and through salt marsh at profile 330012, near Nadia Landing.

Conservation Analysis (GIS)

The sum of conservation means is 111.13, average for the region. The vegetated parts of the large dunes west of Point Peter have medium high totals; however the extensive mangroves and intertidal samphire only total average values.
The main contributors to the conservation total include: the distribution of threatened plant species (medium high throughout), total number of threatened species (notably salt marsh and mangrove areas), endemic plant associations, habitat of threatened bird species (salt marsh, mangroves), significant butterfly habitat (all except de-vegetated areas), habitat for the Australian Pied Oystercatcher (salt marsh, mangroves and remote beaches), viewscape, vegetation block metrics, indigenous heritage and wetland value.
There are 5 reptiles and 24 bird species recorded in this cell, including the state vulnerable Eastern Curlew and Hooded Plover.

Threat Analysis (GIS)

Total threats, 37.39, is low within the region. Highest total threat values are found on the dunes west of Point Peter (camping, ORV, unstable dunes), and near Nadia Landing (informal camping, ORV, invasive weeds – African boxthorn recorded).
Above average values accrue for land ownership and land use, viewscape, dune instability and potential acid sulfate soils.

Adaptation to Climate Change Threats

(see also discussion of scenario in section 4.11)

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	**Impacts and implications (for this cell)**	**Protect and manage habitat threats**	**Address landscape issues: fire, connectivity, refuges, hydrology**
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, salt marsh, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Beach recession and dune instability due to foredune damage. Increase in dune mobility. More frequent inundation of mangroves and salt marsh. Habitat of threatened salt marsh plant species, including the Commonwealth listed Bead Samphire, is critically modified by changing frequency and duration of tidal inundation.	Active management of dunes Continue to monitor DENR profiles 330011 and 3300012 for salt marsh change. Consider possible retreat buffer zones for tide-dependant ecosystems. Re-zoning on land use and development plans needed	
2070: +c.80cm.	Dune instability and movement further increased Migration of mangroves and inter-tidal samphire (where possible) in adjustment to changing tide heights continues.		
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides; damage to foredunes	Continue to monitor shoreline movement and salt marsh boundaries. Active management of dunes	
Intensity of large storms increases.			
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere). There will be an increased risk for species that are already vulnerable. Invasive species may become more dominant.		Maintain connectivity of vegetation within the coastal boundary

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Opportunity created for more frequent weed invasion, notably of dune grasses.	Active dune management, including weed control	Ensure that coastal vegetation blocks are part of the regional fire plan
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes. Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains sediment movement into Tourville Bay.		

(Comment on climate change: this cell is severely threatened in the long term by climate change, which is likely to further de-stabilise dunes already mobile, and to radically change the habitat of tide-dependant species widely distributed across the cell.)

TABLE 6.46 Recommended Actions and Priority for EP77 Tourville Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly for fauna.	Undertake coastal flora and fauna surveys to inform future management directions. Create a baseline for shoreline, salt marsh, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	High (cons)	DENR, EP NRM

Component	Issue	Proposed Action	Priority of Action	Key Players
	Areas within cell identified as having high conservation values, little or no protection and impact from recreational activities and land management practices	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches and vehicle tracks, restrict/control access to sensitive areas, stock management, pest animal and plant control. Install interpretive / educational signage. Community education.	High	DENR, private land owners, EP NRM, community
	Informal camping and car parks occur within the cell (eg. Nadia Landing), with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction (African Boxthorn).	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	High (cons/ threat)	DENR, EP NRM, private land owners, DC of Ceduna, DTEI
	Unrestricted access and ORV activity occurs throughout the cell, shown in multiple vehicle tracks, with impact on soil compaction and erosion, vegetation damage, weed introduction, dune stability, disturbance to native fauna species including shorebirds. Dune transgression threatens salt marsh and mangrove areas.	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	High	Private land owners, community groups, DENR, EP NRM, DC of Ceduna

Component	Issue	Proposed Action	Priority of Action	Key Players
	Unregistered off-road vehicle use (eg. quad bikes, trail bikes): illegal, vegetation damage and potential dune destabilisation	Install educational signs on dune vegetation, stability and policy on unregistered vehicles e.g. quad bikes. Undertake compliance program	Medium (cons/ threat)	DENR, SAPOL, DC of Ceduna, community
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, private land owners, community groups, EP NRM, DC of Ceduna
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required).	Medium	EP NRM, private land owners, DENR, DC of Ceduna, community
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species, including shorebirds.	Monitor and record existence and impacts of introduced pest animals eg. rabbits, foxes and cats. Undertake a control program if required. Work with private landowners to ensure that stock are restricted from the coastal reserve, unalloted Crown land and other areas of high conservation value and/or sensitive features (eg. dunes) by ensuring fences are adequate and maintained.	Low	EP NRM, private landowners, DENR, DC of Ceduna
Point Peter	Non-indigenous coastal heritage site identified – Point Peter whaling site - but not included on any statutory heritage register, with potential impact from recreational activities	Consider including onto heritage register eg. local heritage lists. Ensure sites managed to protect from damage. Install interpretive educational signage.	Medium	DC of Ceduna, DENR, SA Heritage Council, community

Component	Issue	Proposed Action	Priority of Action	Key Players
Salt marsh	Extensive areas of tide dependant ecosystems subject to more frequent and longer inundation due to sea level rise	Continue to monitor DENR profiles 330011 and 3300012 for salt marsh change. Consider possible retreat buffer zones for tide-dependant ecosystems. Re-zoning on land use and development plans needed	High (cons/ threat)	DENR, DC of Ceduna, DPLG, EP NRM
Beaches and dunes	Vehicles and dogs on beaches a threat to meiofauna and shorebirds	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	High	DC of Ceduna, EP NRM, DTEI, EP LGA, DENR, Tourism SA, Birds Australia, community,
	Dune instability continues to reduce salt marsh and mangrove areas: problems of dunes and salt marsh increased by climate change (see above)	Include active dune management in management plan suggested below.	Medium	DENR, EP NRM, community groups, DC of Ceduna
Davenport Creek	Historical whaling site at Point Peter, potential impact from recreational activities	Ensure sites managed to protect from damage. Install interpretive educational signage.	Medium	DENR, community groups, DC of Ceduna

Component	Issue	Proposed Action	Priority of Action	Key Players
	Areas within cell identified as having high conservation values, being impacted by recreational activities and land management practices, including significant damage from uncontrolled access, formal and informal camping areas and car parks, other impacts include multiple tracks, weeds, dune instability, vegetation trampling and removal, local impact from visitors	Update management plan, including reviewing management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches and vehicle tracks, restrict/control access to sensitive areas, pest animal and plant control. Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close and sign areas inappropriate for camping and car parks. Formalise & manage (eg. fencing, signs, weed management) areas where camping and car parks are permitted. Install interpretive / educational signage. Community education.	High (cons/ threat)	Community group, DC of Ceduna, DENR, EP NRM

BIOTA

Flora

Remnant vegetation area (ha)	4,105.23ha, 80.77% of cell area
# flora surveys / records	8 surveys, 1 opportune sites, 6 herbarium record sites
# flora in cell	70
# conservation rated flora in cell	3
# non-indigenous flora in cell	9
Significant CDCS floristic community	*Atriplex cinerea* shrublands – 20 sites recorded within SA, 60% of these in EP
Protected area	No remnant vegetation protected

Weeds

Species	Common Name	Status	Study rating
Arctotheca populifolia	Beach Daisy	RA	7
Euphorbia paralias	Sea Spurge	RA	5
Limonium companyonis	Sea-lavender	RA	7

Species	Common Name	Status	Study rating
Lycium ferocissimum	African Boxthorn	D, RA	8
Anagallis arvensis	Pimpernel		2
Cakile maritima ssp. maritima	Two-horned Sea Rocket		1
Erodium cicutarium	Cut-leaf Heron's-bill		0
Rostraria pumila	Tiny Bristle-grass		2
Spergularia diandra (NC)	Lesser Sand-spurrey		0

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Tecticornia flabelliformis	Bead Samphire	V	V
Microlepidium pilosulum	Hairy Shepherd's-purse		R
Poa fax	Scaly Poa		R
Acacia anceps			
Acacia anceps (NC)	Angled Wattle		
Atriplex cinerea	Coast Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Atriplex vesicaria ssp.	Bladder Saltbush		
Austrostipa nitida	Balcarra Spear-grass		
Austrostipa puberula	Fine-hairy Spear-grass		
Beyeria lechenaultii	Pale Turpentine Bush		
Calandrinia eremaea	Dryland Purslane		
Carpobrotus rossii	Native Pigface		
Carpobrotus rossii (NC)	Native Pigface		
Comesperma volubile	Love Creeper		
Crassula colligata ssp. lamprosperma			
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Daucus glochidiatus	Native Carrot		
Dianella revoluta var. divaricata	Broad-leaf Flax-lily		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Eremophila deserti	Turkey-bush		
Eucalyptus sp.			
Exocarpos aphyllus	Leafless Cherry		
Ficinia nodosa	Knobby Club-rush		
Frankenia pauciflora var.	Southern Sea-heath		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Frankenia sessilis	Small-leaf Sea-heath		
Geijera linearifolia	Sheep Bush		
Hemichroa diandra	Mallee Hemichroa		
Lawrencia squamata	Thorny Lawrencia		
Leucophyta brownii	Coast Cushion Bush		
Maireana erioclada	Rosy Bluebush		
Maireana oppositifolia	Salt Bluebush		
Melaleuca lanceolata	Dryland Tea-tree		
Myoporum brevipes	Warty Boobialla		
Nicotiana goodspeedii	Small-flower Tobacco		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Olearia minor	Heath Daisy-bush		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia crassifolia	Fleshy Saltbush		

Species	Common Name	Aus status	SA status
Salsola tragus	Buckbush		
Samolus repens	Creeping Brookweed		
Santalum acuminatum	Quandong		
Sarcocornia quinqueflora	Beaded Samphire		
Senecio glossanthus	Annual Groundsel		
Senecio pinnatifolius (NC)	Variable Groundsel		
Senecio spanomerus			
Senna artemisioides ssp. petiolaris			
Spinifex hirsutus (NC)	Rolling Spinifex		
Spyridium phylicoides	Narrow-leaf Spyridium		
Tecticornia arbuscula	Shrubby Samphire		
Tecticornia halocnemoides ssp.	Grey Samphire		
Tecticornia halocnemoides ssp. halocnemoides	Grey Samphire		
Tecticornia indica ssp. leiostachya	Brown-head Samphire		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Triodia bunicola	Flinders Ranges Spinifex		
Westringia rigida	Stiff Westringia		
Zygophyllum ammophilum	Sand Twinleaf		
Zygophyllum billardierei	Coast Twinleaf		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	29 recorded – 24 birds, 0 butterflies, 0 mammals, 5 reptiles, 0 amphibians (an additional 17 reptiles and 26 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	7 opportune sites
# of threatened fauna in cell	6
# of non-indigenous fauna	0 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Pieris rapae rapae	Cabbage White	Invertebrate	p

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Numenius madagascariensis	Eastern Curlew	M	V
Thinornis rubricollis	Hooded Plover		V
Arenaria interpres	Ruddy Turnstone	M	R
Calidris alba	Sanderling	M	R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Ardea modesta	Eastern Great Egret		
Artamus cyanopterus	Dusky Woodswallow		
Calidris acuminata	Sharp-tailed Sandpiper	M	

Species	Common Name	Aus status	SA status
Calidris ferruginea	Curlew Sandpiper	M	
Calidris ruficollis	Red-necked Stint	M	
Charadrius ruficapillus	Red-capped Plover		
Chroicocephalus novaehollandiae	Silver Gull		
Egretta novaehollandiae	White-faced Heron		
Falco cenchroides	Nankeen Kestrel		
Hydroprogne caspia	Caspian Tern		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Pelecanus conspicillatus	Australian Pelican		
Phalacrocorax fuscescens	Black-faced Cormorant		
Phalacrocorax varius	Pied Cormorant		
Pluvialis squatarola	Grey Plover	M	
Sericornis frontalis	White-browed Scrubwren		
Tringa nebularia	Common Greenshank	M	

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

No mammal species recorded

Reptiles

Species	Common Name	Aus status	SA status	Record
Amphibolurus norrisi	Mallee Tree-dragon			e
Ctenophorus chapmani	Prickly Dragon			x
Ctenotus euclae	Bight Coast Ctenotus			x
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Diplodactylus calcicolus	South Coast Gecko			c
Drysdalia mastersii	Master's Snake			x
Egernia stokesii	Gidgee Skink			e
Gehyra lazelli	Southern Rock Dtella			c
Gehyra variegata	Tree Dtella			e
Hemiergis initialis	Western Earless Skink			c
Hemiergis peronii	Four-toed Earless Skink			c
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			x
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			e
Morethia obscura	Mallee Snake-eye			c
Nephrurus milii	Barking Gecko			c
Parasuta spectabilis	Mallee Black-headed Snake			c
Pseudonaja affinis	Dugite			x
Pygopus lepidopodus	Common Scaly-foot			c

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP78 Bielamah Sandhills

Cell area 1,414 ha. Shoreline length 24.14 km.

Landforms

This is an undulating calcarenite coastal plain, with areas of white Holocene sands, and sabkhas in the hollows of the calcarenite immediately north of the coastal boundary. Rocky Point shows 10 - 20m high calcarenite cliffs, topped by small cliff top dunes and pocket beaches. The headland is a basement rock feature that outcrops at the cliff base, and forms shore platform ramps that extend to nearshore reefs. From Rocky Point to low rocky bluffs at mid embayment there are 10m calcarenite cliffs, with bedrock platforms and reefs, and with narrow to absent high tide beaches. Mid-embayment to Point James there are sand beaches with bars and nearshore reefs, low to absent calcarenite bluffs, and a large unstable transgressive dune field (Bielamah Dunes), extending to 1.5km inland and to over 40m high. The three headlands at Pt James again show calcarenite cliffs over basement platforms.

Benthic Habitat

About 1 km alongshore dense seagrass, sheltered immediately east of Rocky Point; approx. 5km. of inshore reef to mid-bay, then bare sand to Point James.

Biota

There is 923.9ha of remnant vegetation, 65% of the cell. There are 12 flora survey points, 1 opportune flora site, 1 Herbarium record site, and 1 opportune fauna site.
There are extensive areas of *Melaleuca lanceolata, Geijera linearifolia, +/-Pittosporum angustifolium, +/-Exocarpos aphyllus* mid open shrubland over *+/-Atriplex paludosa ssp. cordata, +/-Rhagodia crassifolia, +/-Atriplex vesicaria ssp.* low shrubs over *+/-Carpobrotus rossii (NC), +/-Threlkeldia diffusa, +/-Frankenia sessilis* in this cell; at the eastern end of the cell mallee woodland is established behind this shrubland. The frontal dunes of the Bielamah Sandhills are recorded as *Myoporum insulare, +/-Olearia axillaris* mid open shrubland. There are smaller areas of *Nitraria billardierei, Olearia axillaris, +/-Atriplex cinerea, +/-Myoporum insulare* mid open shrubland and emergent *+/-Atriplex vesicaria ssp., +/-Tecticornia sp. over Austrostipa nitida, Austrodanthonia caespitosa, +/-Austrostipa eremophila* low tussock grassland.

Land Use/ Land Ownership

Most of this cell (78%) is under perpetual Crown leasehold, fronted by a narrow (c.30m) coastal reserve of unalloted Crown land. Part of this leasehold land near Rocky Point is also under a

Heritage Agreement, (HA17). One large allotment of unalloted Crown land occurs in the middle of the Bielamah sandhills and another large allotment of unalloted Crownland occurs on the western side of the Bielamah sandhills.

Nuyts Archipelago Marine Park offshore.

FIGURE 6.50 Point James and Bielamah sandhills. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

Recreation and tourism – surfing, kite surfing, fishing, camping, ORV use, hunting / shooting
Professional fishing

Threats (Field visits and local reports)

Eco-tourism / tourism ventures
Sub-divisions
Wandering stock (sheep) / introduced animals (fox, cats, rabbits)
Track creation
Destruction of native wildlife, firearms
Un-controlled camping
Waste management
Collection of fire wood
Wildfire
Uncontrolled ORV usage

Opportunities (Field visits and local reports)

Rationalise vehicle movement and track closure / re-alignment
Campground development

FIGURE 6.51 Rocky Point (Heritage Agreement), Bielamah sandhills to the far right. Photo: Coast Protection Board, 2007

Conservation Analysis (GIS)

The total of conservation means for this cell is 101.75, average for the region. The distribution of total values is near to average throughout the cell: in vegetated dune areas, mainly of *Myoporum insulare/ Olearia axillaris* mid open shrubland, high medium totals are reached; de-vegetated dunes and cleared land have low totals.
Rare plant associations for SA, associations endemic to this region, viewscape and viewshed, vegetation metrics, and indigenous heritage all have scores above average. (However, from the very limited data available, few scores relating to fauna or habitat stand out).
There are 11 bird and 1 mammal species recorded in this cell, including the state vulnerable Hooded Plover.

Threat Analysis (GIS)

The total of threat means is 40.43, average for the region. Bielamah Sandhills have generally had high threat totals, together with several clifftop areas to the west; elsewhere medium to low values pertain. Rocky Point has a series of threats recorded, including ORV, informal camping, and invasive weeds (boxthorn).

Adaptation to Climate Change Threats

(see also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Beach recession and dune instability due to foredune damage. Increase in dune mobility.	Active management of dunes	
2070: +c.80cm.	Dune instability and movement further increased. Pocket beaches below cliffs lost by sand removal to nearshore. Erosion of cliffs and bluffs accelerated.	See above. Monitoring as above	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides; damage to foredunes	Continue to monitor shoreline movement. Active management of dunes	
Intensity of large storms increases.			
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere). There will be an increased risk for species that are already vulnerable. Invasive species may become more dominant.		Maintain connectivity of vegetation within the coastal boundary
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Opportunity created for more frequent weed invasion, notably of dune grasses.	Active dune management, including weed control	Ensure that coastal vegetation blocks are part of the regional fire plan
'Flashy' run off: Drier creeks, but larger rare floods	N/A		

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Groundwater lowering; saline incursion:	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes. Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	(Persistent swell wave climate)		

TABLE 6.47 Recommended Actions and Priority for EP78 Bielamah Sandhills

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly for fauna – only 1 opportune site.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Climate change threatens physical processes and habitat distribution. Management starts with recording change.	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	High	DENR, EP NRM
	Unrestricted access and ORV activity occurs throughout the cell, shown in multiple vehicle tracks, with impact on soil compaction and erosion, vegetation damage, weed introduction, dune stability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	High (cons/ threat)	Private land owners, DENR, EP NRM, DC of Ceduna

Component	Issue	Proposed Action	Priority of Action	Key Players
	Unregistered off-road vehicle use (eg. quad bikes, trail bikes): illegal, vegetation damage and potential dune destabilisation	Install educational signs on dune vegetation, stability and policy on unregistered vehicles e.g. quad bikes. Undertake compliance program	Low (cons/ threat)	DENR, SAPOL, community, DC of Ceduna
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	High (cons/ threat)	DENR, EP NRM, private land owners, DC of Ceduna
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species, including shorebirds.	Monitor and record existence and impacts of introduced pest animals eg. rabbits, foxes, camels, cats and deer. Undertake a control program if required. Work with private landowners to ensure that stock are restricted from the coastal reserve, unalloted Crown land and other areas of high conservation value and/or sensitive features (eg. dunes).	Medium	EP NRM, private land owners, DENR, DC of Ceduna
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	Medium	EP NRM, private land owners, DENR, DC of Ceduna, community
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, private land owners, community groups, EP NRM

Component	Issue	Proposed Action	Priority of Action	Key Players
	Areas within cell identified as having high conservation values, little or no protection and impact from recreational activities and land management practices	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches and vehicle tracks, restrict/control access to sensitive areas, stock management, pest animal and plant control. Install interpretive / educational signage. Community education.	High	DENR, private land owners, EP NRM, DC of Ceduna
Clifftops	Numerous informal tracks and informal car parks very close to potentially unstable cliff edge; safety hazard and impact from soil compaction, vegetation damage, weed introduction, fauna disturbance, soil stability and water runoff erosion	Review with a view to close or reroute tracks and car parks that are too close to cliff edge.	High (Hazard; cons/ threat)	DENR, DC of Ceduna
Beaches	Vehicles and dogs on beaches a threat to meiofauna and shorebirds	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	Medium	DC of Ceduna, DTEI, DENR, EP NRM, Tourism SA, Birds Australia, community

Component	Issue	Proposed Action	Priority of Action	Key Players
Dunes	Climate change threatens to de-stabilise through foredune damage and aridity slowing recovery from damage by storm or fire.	Active management to stabilise dunes, weed and pest control.	Medium	EP NRM, DENR, land owners, community

BIOTA

Flora

Remnant vegetation area (ha)	923.97 ha, 65.35% of cell area
# flora surveys / records	12 surveys, 1 opportune sites, 1 herbarium record sites
# flora in cell	73
# conservation rated flora in cell	0
# non-indigenous flora in cell	5
Significant CDCS floristic community	*Triodia compacta* hummock grassland - <20 (13) sites recorded along SA coast, 100% of these in EP *Melaleuca lanceolata* / *Senecio lautus* shrubland – 97% of records in EP *Melaleuca lanceolata* / *Tetragonia implexicoma* shrubland – 72% of records in EP
Protected area	17.7% of remnant vegetation within Heritage Agreement

Weeds

Species	Common Name	Status	Study rating
Arctotheca populifolia	Beach Daisy	RA	7
Euphorbia paralias	Sea Spurge	RA	5
Lycium ferocissimum	African Boxthorn	D, RA	8
Anagallis arvensis	Pimpernel		2
Cakile maritima ssp. maritima	Two-horned Sea Rocket		1

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Acacia anceps (NC)	Angled Wattle		
Acacia notabilis	Notable Wattle		
Acrotriche patula	Prickly Ground-berry		
Alyxia buxifolia	Sea Box		
Amyema melaleucae	Tea-tree Mistletoe		
Angianthus tomentosus	Hairy Angianthus		
Atriplex cinerea	Coast Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Austrostipa exilis	Heath Spear-grass		
Austrostipa sp.	Spear-grass		
Beyeria lechenaultii	Pale Turpentine Bush		

Species	Common Name	Aus status	SA status
Carpobrotus rossii	Native Pigface		
Carpobrotus rossii (NC)	Native Pigface		
Cassytha peninsularis	Peninsula Dodder-laurel		
Comesperma volubile	Love Creeper		
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eremophila crassifolia	Thick-leaf Emubush		
Eremophila weldii	Purple Emubush		
Eucalyptus calcareana	Nundroo Mallee		
Eucalyptus dumosa complex	White Mallee		
Eucalyptus gracilis	Yorrell		
Eutaxia microphylla	Common Eutaxia		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos syrticola	Coast Cherry		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Gahnia lanigera	Black Grass Saw-sedge		
Geijera linearifolia	Sheep Bush		
Goodenia varia	Sticky Goodenia		
Gramineae sp.	Grass Family		
Helichrysum leucopsideum	Satin Everlasting		
Hemichroa diandra	Mallee Hemichroa		
Lasiopetalum discolor	Coast Velvet-bush		
Lycium australe	Australian Boxthorn		
Maireana erioclada	Rosy Bluebush		
Maireana sp.	Bluebush/Fissure-plant		
Maireana trichoptera	Hairy-fruit Bluebush		
Melaleuca lanceolata	Dryland Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Minuria leptophylla	Minnie Daisy		
Olearia axillaris	Coast Daisy-bush		
Olearia exiguifolia	Lobed-leaf Daisy-bush		
Olearia lanuginosa	Woolly Daisy-bush		
Olearia minor	Heath Daisy-bush		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pittosporum angustifolium	Native Apricot		
Podotheca angustifolia	Sticky Long-heads		
Ptilotus obovatus var. obovatus	Silver Mulla Mulla		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia crassifolia	Fleshy Saltbush		
Salsola tragus	Buckbush		
Santalum acuminatum	Quandong		
Scaevola crassifolia	Cushion Fanflower		
Sclerolaena uniflora	Small-spine Bindyi		
Senecio pinnatifolius (NC)	Variable Groundsel		
Senecio sp.	Groundsel		
Spinifex hirsutus (NC)	Rolling Spinifex		
Spyridium phylicoides	Narrow-leaf Spyridium		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Thysanotus baueri	Mallee Fringe-lily		
Triodia compacta	Spinifex		

Species	Common Name	Aus status	SA status
Triodia irritans	Spinifex		
Westringia dampieri	Shore Westringia		
Zygophyllum billardierei	Coast Twinleaf		
Zygophyllum billardierei (NC)	Coast Twinleaf		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	12 recorded - 11 birds, 0 butterflies, 1 mammals, 0 reptiles, 0 amphibians (an additional 22 reptiles and 26 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	1 opportune site
# of threatened fauna in cell	3
# of non-indigenous fauna	1 recorded (an additional 0 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Sturnus vulgaris	Common Starling	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Thinornis rubricollis	Hooded Plover		V
Actitis hypoleucos	Common Sandpiper	M	R
Haematopus longirostris	Australian Pied Oystercatcher		R
Aquila audax	Wedge-tailed Eagle		
Chroicocephalus novaehollandiae	Silver Gull		
Falco cenchroides	Nankeen Kestrel		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Lichenostomus virescens	Singing Honeyeater		
Phalacrocorax varius	Pied Cormorant		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p

Species	Common Name	Status*	Record
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Tachyglossus aculeatus	Short-beaked Echidna		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Amphibolurus norrisi	Mallee Tree-dragon			e
Ctenophorus chapmani	Prickly Dragon			c
Ctenotus euclae	Bight Coast Ctenotus			c
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Diplodactylus calcicolus	South Coast Gecko			c
Drysdalia mastersii	Master's Snake			c
Egernia stokesii	Gidgee Skink			e
Gehyra lazelli	Southern Rock Dtella			c
Gehyra variegata	Tree Dtella			e
Hemiergis initialis	Western Earless Skink			c
Hemiergis peronii	Four-toed Earless Skink			c
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			e
Morethia obscura	Mallee Snake-eye			c
Nephrurus milii	Barking Gecko			c
Parasuta spectabilis	Mallee Black-headed Snake			c
Pseudonaja affinis	Dugite			c
Pygopus lepidopodus	Common Scaly-foot			c

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP79 Point Bell

Cell area 1,775 ha. Shoreline length 23.35 km.

Landforms

Included in this cell are extensive unstable Holocene dunes, a back barrier swamp, and one large headland, Point Bell. The long zeta-curved bay form of the shoreline reflects the pattern of the SW swell refracted around Point Bell and limestone reefs. Short et al,1986, note that fine white (mainly mineral) sands are found on beaches at the western, protected, end of the bay, while medium/coarse, brown (mainly carbonate) sands are found on the more exposed eastern end of the beach. These textural contrasts are also found in the adjacent dunes, where fine white sands are associated with larger dune forms. However, some fines resist aeolian transport and adjacent dunes may contain coarser mean sizes. The Holocene dune barrier occupies approximately ¾ of the cell, and is largely unstable. The dunes rise to nearly 30m in height and extend up to 1,500m from the shore.
Point Bell headland shows Pleistocene calcarenite over basement rocks, giving low cliffs and wide shore platforms to inshore reefs; overlying parts of peninsula are clifftop dunes. The calcarenite is also found as reefs at the eastern end of the bay, and as a core to the Holocene barrier dunes. Near the centre of the embayment the cell includes a back barrier flat and coastal lagoon; these seasonal waters are brackish to saline.

Benthic Habitat

This cell is dominated by low profile limestone reef; heavy reef is found around the two headlands; bare sand in the nearshore of the embayments.

Biota

923.97 ha remnant vegetation, 53.6% of the cell. There are 6 flora survey sites, 1 herbarium record site, 1 fauna survey site and 13 opportune fauna sites in this cell.
The foredunes of the Holocene barrier are recorded as *Nitraria billardierei, Olearia axillaris, +/-Atriplex cinerea, +/-Myoporum insulare* mid open shrubland; while the dune shrubland at the land ward side is largely *Myoporum insulare, +/-Olearia axillaris* mid open shrubland The calcrete plain landward of the dunes is *Melaleuca lanceolata, Geijera linearifolia, +/-Pittosporum angustifolium, +/-Exocarpos aphyllus* mid open shrubland. The seasonal wetland is *Lawrencia squamata* low open shrubland over *Atriplex vesicaria ssp., Frankenia sessilis, Maireana oppositifolia, Hemichroa diandra, Disphyma crassifolium ssp. clavellatum, +/-Nitraria billardierei, +/-Tecticornia disarticulata, +/-Austrostipa sp., +/-Danthonia sp. (NC)*. Three kinds of coastal shrubland are found on Point Bell: *Westringia*

dampieri, +/-Atriplex sp., +/-Frankenia pauciflora var. fruticulosa low open shrubland; *Melaleuca lanceolata, Geijera linearifolia, +/-Pittosporum angustifolium, +/-Exocarpos aphyllus* mid open shrubland; *Myoporum insulare, +/-Olearia axillaris* mid open shrubland and *Nitraria billardierei, Olearia axillaris, +/-Atriplex cinerea, +/-Myoporum insulare* mid open shrubland.

FIGURE 6.52 Rocky Point to Point Bell. Photo: Coast Protection Board, 2007.

Land Use/ Land Ownership

A large proportion of this cell (c. 62%) is under perpetual Crown leasehold, fronted by a narrow coastal reserve of unalloted Crown land or Crown land Act Reserve. Part of the leasehold land, in the centre of the cell and east of the cell is also under Heritage Agreement. A large parcel of unalloted Crown land is located in the centre of the cell, surrounded by leasehold land. Point Bell Conservation Park, in the west of the cell, accounts for 25% of the cell area.
Nuyts Archipelago Marine Park offshore.

Uses (Field visits and local reports)

Conservation
Recreation and tourism – surfing, kite surfing, fishing, camping, ORV use, hunting / shooting
Professional fishing

Threats (Field visits and local reports)

Eco-tourism / tourism ventures
Sub-divisions
Wondering stock (sheep) / introduced animals (fox, cats, rabbits)
Track creation
Destruction of native wildlife, firearms
Un-controlled camping
Waste management

Collection of fire wood
Wildfire
Uncontrolled ORV usage
Water extraction for agriculture and mining

Opportunities (Field visits and local reports)

Rationalise vehicle movement and track closure / re-alignment
Re-instate fox bating program
Campground development

Conservation Analysis (GIS)

Point Bell has a total of conservation means of 105.29, average for the region. Areas totalling above average values are within Point Bell CP and the vegetated coastal foredunes; areas of mid-open shrubland immediately north of the CP also record average to high totals. De-vegetated dunes and cleared areas show low totals, while the low shrubland of the seasonal wetland has average to low totals.
Plant associations endemic to the Eyre Peninsula region (distributed throughout the cell), habitat for numbers of threatened bird species (headland beaches and seasonal wetland), habitat for threatened mammal species (dunes), habitat for the focal species Beach Slider and the Bight Coast Skink (dunes), viewscape and indigenous heritage all have total values above average. Other layers, including bird, butterfly and reptile habitat, also contribute.
There are five mammal, five reptile and 20 bird species recorded in this cell.

Threat Analysis (GIS)

The total of threat means is 41.00, average for the region. Totals throughout the large dune barrier are slightly above average, but high in the frontal deflated de-vegetated dunes at the eastern end of the cell, a result of the combination of all the layers mentioned below. While viewscape, ownership and land use, cliff instability at Point Bell, together with ORV (notably around campsites in the CP) make some contribution, it is invasive weeds and dune instability that are the stand out contributors to this total. African Boxthorn is found throughout the cell; in places Sea Lavender and Beach Daisy are noted; de-vegetated dunes make up over half the area of the cell.

Adaptation to Climate Change Threats

(see also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Sea level rise: 2030 : +c.20cm	Beach recession and dune instability due to foredune damage. Increase in dune mobility.	Active management of dunes	
2070: +c.80cm.	Dune instability and movement further increased. Pocket beaches below cliffs lost by sand removal to nearshore.	See above.	
	Erosion of cliffs and bluffs accelerated, notably at Point Bell.	Monitoring as above	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides; damage to foredunes	Continue to monitor shoreline movement. Active management of dunes	
Intensity of large storms increases.			
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere). There will be an increased risk for species that are already vulnerable. Invasive species may become more dominant.		Maintain connectivity of vegetation within the coastal boundary
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Opportunity created for more frequent weed invasion, notably of dune grasses.	Active dune management, including weed control	Ensure that coastal vegetation blocks are part of the regional fire plan
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes. Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains adjustment of beach plan shape to refracted pattern of waves.		

TABLE 6.48 Recommended Actions and Priority for EP79 Point Bell

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly for fauna	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Climate change will induce further dune movement	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	High	DENR, EP NRM
	There is widespread instability through the dune barrier	Establish a plan to stabilise these dunes	Medium (cons/ threat)	DENR, EP NRM
	Unrestricted access and ORV activity occurs throughout the cell, shown in multiple vehicle tracks, with impact on soil compaction and erosion, vegetation damage, weed introduction, dune stability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	Medium (cons/ threat)	Private land owners, DENR, EP NRM, DC of Ceduna, SA Tourism
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	High (cons/ threat)	EP NRM, private land owners, DENR, DC of Ceduna, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, private land owners, community groups, EP NRM, DC of Ceduna
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	Medium (cons/ threat)	DENR, EP NRM, private land owners, DC of Ceduna
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species, including shorebirds.	Monitor and record existence and impacts of introduced pest animals eg. rabbits, foxes, camels, cats and deer. Undertake a control program as required. Work with private landowners to ensure that stock are restricted from the Park, coastal reserve and other areas of high conservation value and/or sensitive features (eg. dunes) by ensuring fencing is adequate and maintained.	Low	EP NRM, private land owners, DENR, DC of Ceduna
	Areas within cell identified as having high conservation values, little or no protection and impact from recreational activities and land management practices	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches and vehicle tracks, restrict/control access to sensitive areas, dogs on leashes, stock management, pest animal and plant control. Install interpretive / educational signage. Community education.	Medium (cons/ threat)	DENR, private land owners, EP NRM, DC of Ceduna

Component	Issue	Proposed Action	Priority of Action	Key Players
	Unregistered off-road vehicle use: illegal, vegetation damage and potential dune destabilisation	Install educational signs on dune vegetation, stability and policy on unregistered vehicles e.g. quad bikes. Undertake compliance program	Medium (cons)	DENR, SAPOL, community, DC of Ceduna
Point Bell CP	The CP has moderate/high conservation values. There is impact on conservation values, including from invasive weeds and recreational activities such as off-road vehicles and camping.	Review the management of this valuable area. Prepare a management plan for the conservation park.	High	DENR
	Numerous informal tracks and informal car parks very close to potentially unstable cliff edge; safety hazard and impact from soil compaction, vegetation damage, weed introduction, fauna disturbance, soil stability and water runoff erosion	Review with a view to close or reroute tracks and car parks that are too close to cliff edge.	High (Hazard; cons/ threat)	DENR
Beaches	Vehicles and dogs on beaches a threat to meiofauna and shorebirds	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	High (cons/ threat)	DTEI, DENR, EP NRM, EP LGA, Tourism SA, Birds Australia, private landowners, DC of Ceduna, community

BIOTA

Flora

Remnant vegetation area (ha)	951.16 ha, 53.60% of cell area
# flora surveys / records	6 surveys, 1 herbarium record sites
# flora in cell	62
# conservation rated flora in cell	3
# non-indigenous flora in cell	10
Significant CDCS floristic community	*Leucophyta brownie* shrubland– 56% of records in EP *Melaleuca lanceolata* / *Senecio lautus* shrubland – 97% of records in EP
Protected area	46.6% of remnant vegetation protected within Point Bell CP or within Heritage Agreement

Weeds

Species	Common Name	Status	Study rating
Arctotheca populifolia	Beach Daisy	RA	7
Euphorbia paralias	Sea Spurge	RA	5
Limonium companyonis	Sea-lavender	RA	7
Lycium ferocissimum	African Boxthorn	D, RA	8
Anagallis arvensis	Pimpernel		2
Bupleurum semicompositum	Hare's Ear		0
Centaurea melitensis	Malta Thistle		1
Hornungia procumbens	Oval Purse		0
Parapholis incurva	Curly Ryegrass		1
Spergularia diandra	Lesser Sand-spurrey		0

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Chondropyxis halophila	Salt Button-daisy		R
Haegiela tatei	Small Nut-heads		R
Isotoma scapigera	Salt Isotome		R
Acacia anceps (NC)	Angled Wattle		
Acrotriche patula	Prickly Ground-berry		
Angianthus tomentosus	Hairy Angianthus		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Austrostipa flavescens	Coast Spear-grass		
Austrostipa sp.	Spear-grass		
Beyeria lechenaultii	Pale Turpentine Bush		
Carpobrotus rossii (NC)	Native Pigface		
Cassytha peninsularis	Peninsula Dodder-laurel		
Comesperma volubile	Love Creeper		
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Eremophila deserti	Turkey-bush		
Eucalyptus dumosa complex	White Mallee		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Frankenia sessilis	Small-leaf Sea-heath		
Gahnia lanigera	Black Grass Saw-sedge		

Species	Common Name	Aus status	SA status
Geijera linearifolia	Sheep Bush		
Helichrysum leucopsideum	Satin Everlasting		
Hemichroa diandra	Mallee Hemichroa		
Hydrocotyle medicaginoides	Medic Pennywort		
Lasiopetalum discolor	Coast Velvet-bush		
Lawrencia squamata	Thorny Lawrencia		
Leucophyta brownii	Coast Cushion Bush		
Maireana oppositifolia	Salt Bluebush		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Myoporum insulare	Common Boobialla		
Olearia axillaris	Coast Daisy-bush		
Olearia minor	Heath Daisy-bush		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Podotheca angustifolia	Sticky Long-heads		
Ptilotus obovatus var. obovatus	Silver Mulla Mulla		
Pultenaea tenuifolia	Narrow-leaf Bush-pea		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Scaevola angustata	Coast Fanflower		
Scaevola crassifolia	Cushion Fanflower		
Sclerolaena uniflora	Small-spine Bindyi		
Senecio pinnatifolius (NC)	Variable Groundsel		
Spinifex hirsutus (NC)	Rolling Spinifex		
Spyridium phylicoides	Narrow-leaf Spyridium		
Tecticornia halocnemoides ssp.	Grey Samphire		
Tecticornia indica ssp.	Brown-head Samphire		
Tecticornia moniliformis			
Tecticornia pruinosa	Bluish Samphire		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Westringia dampieri	Shore Westringia		
Wilsonia backhousei	Narrow-leaf Wilsonia		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	30 recorded – 20 birds, 0 butterflies, 5 mammals, 5 reptiles, 0 amphibians (an additional 19 reptiles and 26 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	1 survey, 13 opportune sites
# of threatened fauna in cell	4
# of non-indigenous fauna	2 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Pieris rapae rapae	Cabbage White	Invertebrate	p
Mus musculus	House Mouse	Mammalia	x
Ovis aries	Sheep (Feral Sheep)	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Arenaria interpres	Ruddy Turnstone	M	R
Calidris alba	Sanderling	M	R
Haematopus fuliginosus	Sooty Oystercatcher		R
Neophema petrophila	Rock Parrot		R
Cacomantis pallidus	Pallid Cuckoo		
Calidris ruficollis	Red-necked Stint	M	
Cracticus torquatus	Grey Butcherbird		
Epthianura albifrons	White-fronted Chat		
Epthianura tricolor	Crimson Chat		
Falco cenchroides	Nankeen Kestrel		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Malurus lamberti	Variegated Fairy-wren		
Phalacrocorax fuscescens	Black-faced Cormorant		
Phalacrocorax varius	Pied Cormorant		
Pomatostomus superciliosus	White-browed Babbler		
Sericornis frontalis	White-browed Scrubwren		
Thalasseus bergii	Crested Tern		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Macropus fuliginosus	Western Grey Kangaroo		
Macropus robustus	Euro		
Tachyglossus aculeatus	Short-beaked Echidna		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Amphibolurus norrisi	Mallee Tree-dragon			e
Aprasia inaurita	Red-tailed Worm-lizard			x
Ctenophorus chapmani	Prickly Dragon			c
Ctenotus euclae	Bight Coast Ctenotus			c
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Diplodactylus calcicolus	South Coast Gecko			c
Drysdalia mastersii	Master's Snake			c
Egernia stokesii	Gidgee Skink			e
Gehyra lazelli	Southern Rock Dtella			c
Gehyra variegata	Tree Dtella			e
Hemiergis initialis	Western Earless Skink			c
Hemiergis peronii	Four-toed Earless Skink			x
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			x
Morethia obscura	Mallee Snake-eye			c
Nephrurus milii	Barking Gecko			c
Parasuta spectabilis	Mallee Black-headed Snake			x
Pogona minor	Dwarf Bearded Dragon			x
Pseudonaja affinis	Dugite			c
Pygopus lepidopodus	Common Scaly-foot			c

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP81 Chadinga CR

Cell area 2,993 ha. Shoreline length 25.85 km.

Landforms

This cell is a calcarenite coastal plain, largely covered with a Holocene sand barrier.
The western section of the cell - < 6 km from Eyre Bluff - is characterised by sandy beaches and extensive unstable Holocene dunes, extending up to 2 km inland, with dune vegetation increasing from west to east. Landward of this barrier is a back barrier depression, a seasonally flooded saline flat. The middle section of the cell is characterised by stable, well vegetated, long-walled parabolic dunes, fronted by beaches. The eastern third of the cell is undulating Pleistocene calcarenite, headlands with vegetated cliff top dunes separated by small beaches in front of low cliffs and bluffs. Basement rocks are prominent at the small headlands, and towards the eastern end as a continuous shore platform.

Benthic Habitat

Sandy beach and surf zone, with shallow heavy limestone reef to c.300m offshore.

Biota

78.79% of this cell is remnant vegetation, a total of 2,358 ha. There are 7 flora survey sites, 5 herbarium record sites, 2 fauna survey sites and 3 opportune fauna sites.
The majority of the dunes are in *Melaleuca lanceolata, Geijera linearifolia, +/-Pittosporum angustifolium, +/-Exocarpos aphyllus* mid open shrubland over *+/-Atriplex paludosa ssp. cordata, +/-Rhagodia crassifolia, +/-Atriplex vesicaria ssp.* low shrubs over *+/-Carpobrotus rossii (NC), +/-Threlkeldia diffusa, +/-Frankenia sessilis,* with areas of *Nitraria billardierei, Olearia axillaris, +/-Atriplex cinerea, +/-Myoporum insulare* mid open shrubland and *Myoporum insulare, +/-Olearia axillaris* mid open shrubland. The back barrier swamp is *Tecticornia indica ssp., +/-Maireana oppositifolia, +/-Atriplex paludosa ssp., +/-Atriplex vesicaria ssp.* low open shrubland over *+/-Carpobrotus rossii (NC)*

Land Use/ Land Ownership

A small section (c. 5% of cell area) on the western boundary of the cell is held under a perpetual Crown lease, fronted by a narrow (c.30m) coastal reserve of unalloted Crown land. The remainder of the cell is within the Chadinga Conservation Park. However, at the time of analysis, the north western portion of this cell was defined as Chadinga Conservation Reserve, and the south eastern half of this cell was unalloted Crown land, these areas were proclaimed as part of the Chadinga Conservation Park in May 2010.

Nuyts Archipelago Marine Park, to c.3n.m. offshore.

FIGURE 6.53 Chadinga Conservation Park. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

Conservation
Recreation and tourism – surfing, kite surfing, fishing, camping, ORV use, hunting / shooting
Professional fishing
Water extraction

Threats (Field visits and local reports)

Eco-tourism / tourism ventures
Sub-divisions
Wondering stock (sheep) / introduced animals (deer, camels fox, cats, rabbits)
Track creation
Destruction of native wildlife, firearms
Un-controlled camping
Waste management
Collection of fire wood
Wildfire
Uncontrolled ORV usage
Water extraction for agriculture

Opportunities (Field visits and local reports)

Rationalise vehicle movement and track closure / re-alignment
Campground development
Continue pest animal and plant control programs

Conservation Analysis (GIS)

The total of conservation means is 112.61, average for the region. All the vegetated dunes show medium high values; the de-vegetated dunes, calcarenite plain have below average totals. The back barrier depression has low totals, as have parts of the unstable dune.
Several layers contribute to the total with above average scores: endemic plant associations medium high throughout, but with highest values on the calcarenite plain); habitat for threatened bird species (mainly shorebirds), habitat for threatened reptile species (dunes), and habitat for threatened mammal species; butterfly habitat (SE part of the cell); habitat for focal species Beach Slider and Bight Coast Skink (dunes); viewshed and viewscape; vegetation block metrics and indigenous heritage.
There are four mammal, ten reptile and 16 bird species recorded in this cell, including the state vulnerable Hooded Plover.

Threat Analysis (GIS)

The threat total for this cell is low, 37.90. The major parts of this total are invasive weeds (African boxthorn, beach daisy, sea lavender, sea spurge), vegetation block degradation (a high percentage of exotic species), and dune instability. ORV constitutes localised threats, notably to shorebirds in the NW part of the cell.

Adaptation to Climate Change Threats

(see also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	**Impacts and implications (for this cell)**	**Protect and manage habitat threats**	**Address landscape issues: fire, connectivity, refuges, hydrology**
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Beach recession and dune instability due to foredune damage. Increase in dune mobility.	Active management of dunes	
2070: +c.80cm.	Dune instability and movement further increased. Pocket beaches below cliffs lost by sand removal to nearshore.	See above.	
	Erosion of cliffs and bluffs accelerated., notably in the SE part of the cell	Monitoring as above	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides; damage to foredunes	Continue to monitor shoreline movement. Active management of dunes	
Intensity of large storms increases.			
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere). There will be an increased risk for species that are already vulnerable. Invasive species may become more dominant.		Maintain connectivity of vegetation within the coastal boundary
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Opportunity created for more frequent weed invasion, notably of dune grasses.	Active dune management, including weed control	Ensure that coastal vegetation blocks are part of the regional fire plan
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes. Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains adjustment of beach plan shape to refracted pattern of waves.		

TABLE 6.49 Recommended Actions and Priority for EP81 Chadinga CR

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Unstable dune habitats threatened with rapid change by climate change	Create a baseline for shoreline, and dune change by establishing a rectified aerial photographic record at an appropriate resolution.	Medium	DENR, EP NRM
	Unrestricted access and ORV activity occurs throughout the cell, shown in multiple vehicle tracks, with impact on soil compaction and erosion, vegetation damage, weed introduction, dune stability, disturbance to native fauna species	Review of existing access with a view to rationalise unnecessary tracks and car parks. Block access (eg. fencing/rocks) to tracks and car parks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks or car parks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	High (KP/ cons/ threat)	Private land owners, DENR, EP NRM
	Unregistered off-road vehicle use (eg. quad bikes, trail bikes): illegal, vegetation damage and potential dune destabilisation	Install educational signs on dune vegetation, stability and policy on unregistered vehicles e.g. quad bikes. Undertake compliance program	Medium (KP/ cons/ threat)	DENR, SAPOL, community
	Invasive weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required). Undertake education program on impact of garden escape plants and weed control program.	Medium (cons/ threat)	EP NRM, private land owners, DENR
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, private land owners, community groups, EP NRM

Component	Issue	Proposed Action	Priority of Action	Key Players
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Map and review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	Medium (threat)	DENR, EP NRM, private land owners
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species, including shorebirds.	Monitor and record existence and impacts of introduced pest animals eg. rabbits, foxes, camels, cats and deer. Undertake a control program if required. Work with private landowners to ensure that stock are restricted from the Park and other areas of high conservation value and/or sensitive features (eg. clifftop dunes) by ensuring fences are adequate and maintained.	Medium	EP NRM, private land owners, DENR
	Areas within cell identified as having high conservation values, little or no protection and impact from recreational activities and land management practices	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches and vehicle tracks, restrict/control access to sensitive areas, stock management, pest animal and plant control. Install interpretive / educational signage. Community education.	High (cons/ threat)	DENR, private land owners, EP NRM

Component	Issue	Proposed Action	Priority of Action	Key Players
Chadinga CP	The CP has includes areas with high conservation values. Potential impact on conservation values, including from weeds, mining and recreational activities such as off-road vehicles and camping.	Review the management of this valuable area. Prepare a management plan for the conservation park.	High (cons/ threat)	DENR
	All dunes threatened with de-stabilisation by climate change: foredunes linked to beaches by sea level rise; whole dune by increasing aridity, including groundwater depletion.	Emphasis on adaptive management of dunes needed in proposed management plan.	Medium (cons/ threat)	DENR
Beaches	Shorebirds recorded, including the state vulnerable Hooded Plover, notably in the NW half of the cell. Vehicles on beaches a threat to meiofauna and shorebirds	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	Medium (cons/ threat)	DTEI, DENR, EP NRM, Tourism SA, Birds Australia, private land owners, community
Cliff tops	Numerous informal tracks and informal car parks very close to potentially unstable cliff edge; safety hazard and impact from soil compaction, vegetation damage, weed introduction, fauna disturbance, soil stability and water runoff erosion	Review with a view to close or reroute tracks and car parks that are too close to cliff edge.	High (Hazard; cons/ threat)	DENR, private land owners, community

Component	Issue	Proposed Action	Priority of Action	Key Players
Salt marsh area, north western part of cell	All low lying land and salt marsh areas have the potential for acid sulfate soil following disturbance; in turn this would potentially threaten all life forms within the back barrier flat.	Avoid disturbance of soils. If disturbance threatened, potential hazard can be avoided by following procedures in CPB 'Coastline, No.33' on acid sulfate soils.		DENR

BIOTA

Flora

Remnant vegetation area (ha)	2,358.19 ha, 78.79% of cell area
# flora surveys / records	7 surveys, 5 herbarium record sites
# flora in cell	46
# conservation rated flora in cell	0
# non-indigenous flora in cell	6
Significant CDCS floristic community	*Leucophyta brownie* shrubland– 56% of SA records in EP *Melaleuca lanceolata* / *Senecio lautus* shrubland – 97% of SA records in EP *Melaleuca lanceolata* / *Tetragonia implexicoma* shrubland – 72% of SA records in EP *Olearia axillaris* / *Tetragonia implexicoma* shrubland – 75% of SA records in EP
Protected area	60.5% of remnant vegetation within Chadinga Conservation Park (Conservation Reserve at the time of analysis)

Weeds

Species	Common Name	Status	Study rating
Arctotheca populifolia	Beach Daisy	RA	7
Euphorbia paralias	Sea Spurge	RA	5
Limonium companyonis	Sea-lavender	RA	7
Lycium ferocissimum	African Boxthorn	D, RA	8
Cakile edentula	American Sea Rocket		0
Rostraria pumila	Tiny Bristle-grass		2

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Acacia anceps			
Acacia anceps (NC)	Angled Wattle		
Atriplex cinerea	Coast Saltbush		
Atriplex sp.	Saltbush		
Austrostipa sp.	Spear-grass		
Beyeria lechenaultii	Pale Turpentine Bush		
Calandrinia eremaea	Dryland Purslane		

Species	Common Name	Aus status	SA status
Carpobrotus rossii	Native Pigface		
Carpobrotus rossii (NC)	Native Pigface		
Cassytha peninsularis	Peninsula Dodder-laurel		
Crassula colligata ssp. lamprosperma			
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Exocarpos syrticola	Coast Cherry		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Frankenia sessilis	Small-leaf Sea-heath		
Geijera linearifolia	Sheep Bush		
Lawrencia squamata	Thorny Lawrencia		
Leucophyta brownii	Coast Cushion Bush		
Maireana oppositifolia	Salt Bluebush		
Melaleuca lanceolata	Dryland Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Moss sp.			
Myoporum insulare	Common Boobialla		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Rhagodia crassifolia	Fleshy Saltbush		
Sclerolaena uniflora	Small-spine Bindyi		
Senecio pinnatifolius (NC)	Variable Groundsel		
Solanum symonii	Symon's Kangaroo-apple		
Tecticornia halocnemoides ssp. halocnemoides	Grey Samphire		
Tecticornia moniliformis			
Tecticornia pruinosa	Bluish Samphire		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Zygophyllum ammophilum	Sand Twinleaf		
Zygophyllum ammophilum complex			
Zygophyllum billardierei (NC)	Coast Twinleaf		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	30 recorded – 16 birds, 0 butterflies, 4 mammals, 10 reptiles, 0 amphibians (an additional 15 reptiles and 26 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	2 survey sites, 3 opportune sites
# of threatened fauna in cell	2
# of non-indigenous fauna	3 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Pieris rapae rapae	Cabbage White	Invertebrate	p
Felis catus	Cat (Feral Cat)	Mammalia	x
Mus musculus	House Mouse	Mammalia	x

Species	Common Name	Class	Record
Oryctolagus cuniculus	Rabbit (European Rabbit)	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Thinornis rubricollis	Hooded Plover		V
Actitis hypoleucos	Common Sandpiper	M	R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Anthochaera carunculata	Red Wattlebird		
Aquila audax	Wedge-tailed Eagle		
Calidris ruficollis	Red-necked Stint	M	
Colluricincla harmonica	Grey Shrike-thrush		
Falco cenchroides	Nankeen Kestrel		
Hirundo neoxena	Welcome Swallow		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Phalacrocorax varius	Pied Cormorant		
Phaps elegans	Brush Bronzewing		
Sericornis frontalis	White-browed Scrubwren		
Smicrornis brevirostris	Weebill		
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Nyctophilus timoriensis	Greater Long-eared Bat	ssp	ssp

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Morelia spilota	Carpet Python		R	c
Amphibolurus norrisi	Mallee Tree-dragon			e
Aprasia inaurita	Red-tailed Worm-lizard			x
Ctenophorus chapmani	Prickly Dragon			x
Ctenotus euclae	Bight Coast Ctenotus			x
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Diplodactylus calcicolus	South Coast Gecko			c
Drysdalia mastersii	Master's Snake			c
Egernia richardi	Western Tree Skink			c
Egernia stokesii	Gidgee Skink			e
Gehyra lazelli	Southern Rock Dtella			x
Gehyra variegata	Tree Dtella			e
Hemiergis initialis	Western Earless Skink			c
Lerista dorsalis	Southern Four-toed Slider			x
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			x
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			x
Morethia obscura	Mallee Snake-eye			c
Nephrurus milii	Barking Gecko			c
Nephrurus stellatus	Starred Knob-tailed Gecko			x
Parasuta spectabilis	Mallee Black-headed Snake			x
Pseudonaja affinis	Dugite			x
Pygopus lepidopodus	Common Scaly-foot			c

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP82 Clare Bay

Cell area 626 ha. Shoreline length 16.54 km.

Landforms

A low coastal plateau of gentle slopes, consisting of Pleistocene calcarenite over basement rocks, with cliffs of 10 – 30m high and cliff top dunes. Basement rocks are dominant at the tide line, being seen in ramps, platforms and nearshore reefs that protect the shoreline. The coast is highly indented, with numerous small bays and headlands. There is little sand, with narrow coarse sand beaches that form less than half of the shoreline length. Clare Bay retains a small beach behind reef protection; [at Clare Bay an elevated shore platform in beach calcarenite records a late Pleistocene elevated sea level, c.+1m. This is recorded as a significant geological feature: see photograph below]. Offshore deep reefs extend <500m.

Benthic Habitat

Heavy and low profile reefs to a variety of depths; no bare sand recorded.

Biota

The area of remnant vegetation is 555.73 ha, this is 88.72% of the cell. There are 2 flora survey sites, 1 herbarium record site, and 4 opportune fauna sites.
The low calcarenite plateau and clifftop dunes are vegetated by open shrubland: the most common is *Nitraria billardierei, Olearia axillaris, +/-Atriplex cinerea, +/-Myoporum insulare* mid open shrubland; usually further back from the cliff tops is *Melaleuca lanceolata, Geijera linearifolia, +/-Pittosporum angustifolium, +/-Exocarpos aphyllus* mid open shrubland; at Clare Bay there is an isolated area of *Myoporum insulare, +/-Olearia axillaris* mid open shrubland over *+/-Rhagodia crassifolia, +/-Leucophyta brownii* low shrubs; further west a small patch of *Lawrencia squamata* low open shrubland. Towards the western end of the cell is one area of *Atriplex paludosa ssp. cordata, Maireana oppositifolia, +/-Frankenia sessilis, +/-Eremophila deserti* low open shrubland. Near the coastal boundary and well back from the cliffs is low mallee woodland.

Land Use/ Land Ownership

A large proportion of this cell (54%) is under perpetual Crown leasehold, fronted by a narrow (c. 30m) coastal reserve of unalloted Crown land. A large parcel of unalloted Crown land extends inland beyond the coastal boundary in the centre of the cell, on the western side of Clare Bay. Four small freehold allotments are located on the eastern side of Clare Bay, with dwellings within each. The western portion of the cell contains land under Heritage Agreements, fronted by a coastal reserve (c.50-250m wide) of unalloted Crown land.

Nuyts Archipelago Marine Park, to c.3n.m. offshore.

FIGURE 6.54 Clare Bay with enclosing basement rock reef, and raised shore platforms which are listed as a significant geological feature. Coast Protection Board, 2007

Uses (Field visits and local reports)

Recreational – fishing, camping, ORV use, hunting / shooting
Professional fishing
Water extraction
Agricultural - grazing
Shacks / dwellings

Threats (Field visits and local reports)

Eco-tourism / tourism ventures
Sub-divisions
Additional development (dwellings within Heritage Agreement areas)
Wondering stock (sheep) / introduced animals (deer, fox, cats, rabbits)
Track creation
Destruction of native wildlife, firearms
Un-controlled camping
Waste management
Collection of fire wood
Wildfire
Uncontrolled ORV usage
Water extraction for agricultural purposes
Holiday homes located adjacent to cliff top

Opportunities (Field visits and local reports)

Rationalise vehicle movement and track closure / re-alignment

Conservation Analysis (GIS)

The total of conservation means is 122.28, high for the region. Again the pattern of values can be related to the distribution of dunes: on the dunes totals vary around medium high, on other areas values are less than average.
The following layers record higher than average conservation scores: endemic plant associations; endemic plant species; habitat for threatened birds, reptiles and mammals; butterfly habitat; habitat for focal species Eastern Osprey, Beach Slider and Bight Coast Skink; viewshed and viewscape; vegetation block metrics, and indigenous heritage (many recorded sites in this cell).
At Clare Bay the Geological Society of Australia has recorded a significant geological feature.
There are 9 bird species recorded in this cell, including the state endangered White-bellied Sea-Eagle and the Eastern Osprey.

Threat Analysis (GIS)

Total mean threat values is 45.98, this is average for the region. There is a complex pattern including many sites with high threat priority over much of the cell; only the Heritage Agreement land on the western quarter of the cell shows generally low totals, though even here threat totals are high along the cliff edges.
Layers with higher than average threat priority include: ORV (mapped in all parts of the cell, with a focus on all headlands and accessible beaches); viewshed and viewscape; land use (all Crown land mapped as 'livestock'); vegetation block degradation and distribution of invasive weeds (including African Boxthorn in the Crown leasehold land immediately west of Clare Bay); dune stability (patchy actual drift hazard at the east and western ends of the cell) and cliff stability (whole cell).

Adaptation to Climate Change Threats

(see also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, and vegetation change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Beach recession and dune instability due to foredune damage. Increase in dune mobility.	Active management of dunes	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
2070: +c.80cm.	Dune instability and movement further increased. Pocket beaches below cliffs lost by sand removal to nearshore.	See above.	
	Erosion of cliffs and bluffs accelerated as sheltering effect of reefs reduced by sea level rise.	Monitoring as above	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides; damage to foredunes	Continue to monitor shoreline movement. Active management of dunes	
Intensity of large storms increases.			
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere). There will be an increased risk for species that are already vulnerable. Invasive species may become more dominant.		Maintain connectivity of vegetation within the coastal boundary
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Opportunity created for more frequent weed invasion, notably of dune grasses.	Active dune management, including weed control	Ensure that coastal vegetation blocks are part of the regional fire plan
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes. Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains adjustment of beach plan shape to refracted pattern of waves. (Though some modification of refraction through the reduction in effect of reefs).		

TABLE 6.50 Recommended Actions and Priority for EP82 Clare Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Shoreline features and vegetation sensitive to anticipated impacts of climate change.	Create a baseline for shoreline, and vegetation change, by establishing a rectified aerial photographic record at an appropriate resolution.	High (threat)	DENR, EP NRM
	Unrestricted access and ORV activity occurs throughout the cell, shown in multiple vehicle tracks (notably at headlands), with impact on soil compaction and erosion, vegetation damage, weed introduction, dune stability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing access with a view to rationalise unnecessary tracks and car parks. Block access (eg. fencing/rocks) to tracks and car parks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks or car parks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education.	High (cons/ threat)	Private land owners, DENR, EP NRM, DTEI
	Unregistered off-road vehicle use (eg. quad bikes, trail bikes): illegal, vegetation damage and potential dune destabilisation	Install educational signs on dune vegetation, stability and policy on unregistered vehicles e.g. quad bikes. Undertake compliance program.	Medium (cons/ threat)	DENR, SAPOL, community
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required).	Medium (cons/ threat)	EP NRM, private land owners, DENR

Component	Issue	Proposed Action	Priority of Action	Key Players
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	High (cons/ threat)	DENR, EP NRM, private land owners
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species, including shorebirds.	Monitor and record existence and impacts of introduced pest animals eg. rabbits, foxes, cats and deer. Undertake a control program if required. Work with private landowners to ensure that stock are restricted from the unalloted Crown land and other areas of high conservation value and/or sensitive features (eg. clifftop dunes) eg. ensure fences are adequate and maintained.	Medium (threat)	EP NRM, private land owners, DENR
	Potential impact on breeding habitat of the endangered Eastern Osprey, particularly during the breeding season.	Develop site management and monitoring strategy, including closure, relocation or seasonal closures of roads/walking tracks/car parks in the near vicinity. Ensure management/works programs are not undertaken during the breeding season. Community education	High (cons)	DENR, local community
	Areas within cell identified as having high conservation values, little or no protection and impact from recreational activities and land management practices	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches and vehicle tracks, stock management, pest animal and plant control. Install interpretive / educational signage. Community education.	High (cons/ threat)	DENR, private land owners, EP NRM

Component	Issue	Proposed Action	Priority of Action	Key Players
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites	High (cons)	Traditional owners, DPC, DENR, private land owners, community groups, EP NRM
	A number of significant cultural sites for local Aboriginal people are located on cliff areas and in sand dunes that are not on state heritage register	Undertake anthropological investigation and traditional ecological knowledge study	High	Traditional owners, DENR, DPC, OAG, EP NRM
Clare Bay	Significant geological feature present – GSA reference E34 (see section 3.4.1)	Interpretive signage	Low (threat)	GSA SA branch, EP NRM, DENR
	Existing development throughout cell impacting on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Work with private land owners to minimise impact from existing development, including education and restoration where appropriate. Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs, cats and ORV, etc	Medium (cons/ threat)	DENR, private land owners, EP NRM
Cliff tops	Numerous informal tracks and informal car parks very close to potentially unstable cliff edge; safety hazard and impact from soil compaction, vegetation damage, weed introduction, fauna disturbance, soil stability and water runoff erosion	Review with a view to close or reroute tracks and car parks that are too close to cliff edge.	High (Hazard; cons/ threat)	DENR, private land owners
Cliff top dunes	Dune areas threatened by climate change aridity slowing recovery from damage and lack of resilience against weed invasion.	Manage dune de- stabilisation	Medium (cons/ threat)	DENR, EP NRM, private land owners

Component	Issue	Proposed Action	Priority of Action	Key Players
Beaches	Vehicles and dogs on beaches a threat to meiofauna and shorebirds	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	High (cons/ threat)	DTEI, DENR, EP NRM, private land owners, SA Tourism, community, Birds Australia

BIOTA

Flora

Remnant vegetation area (ha)	555.73 ha, 88.72% of cell area
# flora surveys / records	2 surveys, 1 herbarium record sites
# flora in cell	32
# conservation rated flora in cell	0
# non-indigenous flora in cell	9
Significant CDCS floristic community	*Nitraria billardierei* shrubland – 54% of SA records in EP *Olearia axillaris* / *Tetragonia implexicoma* shrubland – 75% of SA records in EP
Protected area	18% of remnant vegetation within Heritage Agreement

Weeds

Species	Common Name	Status	Study rating
Avena fatua	Wild Oat	RA	5
Limonium companyonis	Sea-lavender	RA	7
Mesembryanthemum crystallinum	Common Iceplant	RA	4
Lycium ferocissimum	African Boxthorn	D, RA	8
Anagallis arvensis	Pimpernel		2
Brassica tournefortii	Wild Turnip		3
Critesion murinum ssp. (NC)	Barley-grass		0
Rostraria pumila	Tiny Bristle-grass		2
Sonchus oleraceus (NC)	Common Sow-thistle		0

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Angianthus tomentosus	Hairy Angianthus		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Austrodanthonia setacea	Small-flower Wallaby-grass		
Austrostipa velutina			
Calandrinia eremaea	Dryland Purslane		
Carpobrotus rossii (NC)	Native Pigface		
Crassula colorata var. acuminata	Dense Crassula		
Cratystylis conocephala	Bluebush Daisy		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eremophila deserti	Turkey-bush		
Exocarpos syrticola	Coast Cherry		
Helichrysum leucopsideum	Satin Everlasting		
Maireana erioclada	Rosy Bluebush		
Maireana oppositifolia	Salt Bluebush		
Moss sp.			
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Olearia exiguifolia	Lobed-leaf Daisy-bush		
Podotheca angustifolia	Sticky Long-heads		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Senecio pinnatifolius (NC)	Variable Groundsel		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	9 recorded – 9 birds, 0 butterflies, 0 mammals, 0 reptiles, 0 amphibians (an additional 23 reptiles and 26 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	4 opportune sites
# of threatened fauna in cell	4
# of non-indigenous fauna	0 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Pieris rapae rapae	Cabbage White	Invertebrate	p

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Calidris alba	Sanderling	M	R
Haematopus fuliginosus	Sooty Oystercatcher		R
Lophocroa leadbeateri	Major Mitchell's Cockatoo		R
Calidris ferruginea	Curlew Sandpiper	M	

Species	Common Name	Aus status	SA status
Calidris ruficollis	Red-necked Stint	M	
Charadrius ruficapillus	Red-capped Plover		
Lichenostomus virescens	Singing Honeyeater		
Tringa nebularia	Common Greenshank	M	

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

No mammal species recorded

Reptiles

Species	Common Name	Aus status	SA status	Record
Morelia spilota	Carpet Python		R	c
Amphibolurus norrisi	Mallee Tree-dragon			e
Ctenophorus chapmani	Prickly Dragon			c
Ctenotus euclae	Bight Coast Ctenotus			c
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Diplodactylus calcicolus	South Coast Gecko			c

Species	Common Name	Aus status	SA status	Record
Drysdalia mastersii	Master's Snake			c
Egernia richardi	Western Tree Skink			c
Egernia stokesii	Gidgee Skink			e
Gehyra lazelli	Southern Rock Dtella			c
Gehyra variegata	Tree Dtella			e
Hemiergis initialis	Western Earless Skink			c
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			e
Morethia obscura	Mallee Snake-eye			c
Nephrurus milii	Barking Gecko			c
Parasuta spectabilis	Mallee Black-headed Snake			c
Pseudonaja affinis	Dugite			c
Pygopus lepidopodus	Common Scaly-foot			c

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded.

Cell EP83 Fowlers Bay

Cell area 8,144 ha. Shoreline length 20.00 km

Landforms

The shoreline of EP83 is a 20 km fine sand beach; the shape of the zeta-curve Fowlers Bay is controlled by wave refraction around Point Fowler (Short, 1986). Wave energy increases from low near Port Eyre, which is protected by Point Fowler, to high at the more exposed eastern end of the cell; seagrass wrack from the dense offshore beds off Port Eyre collect at the low energy end of the bay. At the western end of the bay there are patches of low tide calcarenite reefs at the shoreline.
The low coastal plain of Pleistocene calcarenite has a coastal fringe cover of Holocene sands that are transgressive in the centre to eastern part of the bay. The extensive de-vegetated sands in the centre of the bay are known as the Nantiby Sands. Behind the dunes the back barrier flat is extensive, only rising slightly at the eastern end of the cell.

Benthic Habitat

For much of the bay there is a narrow band of inshore bare sand, with low profile platform reef offshore. The inshore sand area widens at the western re-curve of the bay, and off Port Eyre there are wide areas of dense seagrass (see Marine Park criteria description), with heavy limestone reef further offshore.

Biota

7,631 ha (93%) of the cell is remnant vegetation. There are 12 flora survey sites, 2 opportune flora sites, 18 herbarium record sites, 1 fauna survey site, and 9 opportune fauna sites.
The Holocene dune fringing the bay is vegetated with a number of shrubland associations: *Atriplex cinerea, Olearia axillaris* low open shrubland; *Nitraria billardierei, Olearia axillaris, +/-Atriplex cinerea, +/-Myoporum insulare* mid open shrubland; and *Melaleuca lanceolata, Geijera linearifolia, +/-Pittosporum angustifolium, +/-Exocarpos aphyllus* mid open shrubland. Further back, the older dunes and the back barrier flats are in mallee woodland: *Eucalyptus oleosa ssp.* mid mallee woodland over *Melaleuca pauperiflora ssp. mutica, +/-Melaleuca lanceolata, +/-Geijera linearifolia* tall shrubs. In the NW of the cell troughs of samphire shrubland are separated by Pleistocene barrier ridges.

Land Use/ Land Ownership

A narrow (30-100m) coastal reserve of unalloted Crown land fronts this cell. The north west of the cell is within the Fowlers Bay CP (28% of cell) and is adjacent to a large parcel of unalloted

Crown land. 47%of the cell is covered by Heritage Agreements, some of which are also held under Crown leasehold.

The Parks of the Far West brochure, 2007 describes Fowlers Bay CP as "'A park of outstanding natural beauty that conserves a spectacular coastline comprised of rocky headlands, high cliffs, sheltered bays and long, sandy beaches. Keep an eye out for seabirds such as the Osprey, White-bellied Sea-Eagle, Hooded Plover, Pied Oystercatcher and Fairy Tern. Other wildlife includes Southern Hairy-nosed Wombats and Australian Sea-lions. The area is popular for fishing, particularly for salmon, mulloway, whiting and garfish. A ruined lookout and whale bones on Point Fowler are evidence of the area's whaling history."

Nuyts Archipelago Marine Park, to c.3n.m. offshore.

FIGURE 6.55 Fowlers Bay. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

Recreation and tourism – fishing, surfing, camping, ORV use, hunting / shooting
Conservation
Professional fishing
Water extraction
Scattered dwellings/shacks throughout

Threats (Field visits and local reports)

Eco-tourism ventures
Sub-divisions
Wondering stock (sheep) / introduced animals (fox, cats, rabbits)
Track creation
Destruction of native wildlife, firearms

Un-controlled camping
Waste management,
Collection of fire wood
Wildfire
Uncontrolled ORV usage
Water extraction for agricultural purposes
Marine debris

Opportunities (Field visits and local reports)

Rationalise vehicle movement and track closure / re-alignment
Current weed management program underway (boxthorn)

Conservation Analysis (GIS)

The total of conservation means is 128.50, high for the region. There are widespread mid-high values, except for cleared areas (low) and samphire shrublands (mid – low). Several layers contribute to this high total with priority totals well above average: endemic plant associations (medium to high throughout, generally higher in the mallee woodland); endemic plant species (highest priority in this layer for species in the mallee woodland); numbers of plant and animal species (as above); habitat for threatened bird (as above) reptile (dunes) and mammal species (entire cell, except approaching Port Eyre); habitat for significant butterfly species (mid – high for all vegetated areas except samphire); viewscape; vegetation block metrics; and indigenous heritage.
There are six mammals, seven reptiles and 27 bird species recorded in this cell, including the state endangered Fairy Tern, Eastern Osprey and White-bellied Sea-Eagle; also the state vulnerable Hooded Plover and Banded Stilt. As well as the Hooded Plover shorebirds include the Australian Pied Oystercatcher and the Sooty Oystercatcher.

Threat Analysis (GIS)

Threat priority total is low – 33.47. The pattern of total threat priority suggests this low total is in part due to ¾ of the cell being protected by park or Heritage Agreement; two areas only have a high – medium total: privately owned land near to Port Eyre and a de-vegetated dune area outside Heritage Agreement at the eastern end of the cell.
The major contributors to the threat priority total is distribution of invasive weeds (African boxthorn in the mallee woodland and beach daisy near the shoreline), development zoning (extensive 'remote areas' zoning), and ORV.

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, and vegetation change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Beach recession and dune instability due to foredune damage. Increase in dune mobility.	Active management of dunes	
2070: +c.80cm.	Dune instability and movement further increased. Erosion of bluffs accelerated by elevated storm damage.	Monitoring as above	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides; damage to foredunes	Continue to monitor shoreline movement. Active management of dunes	
Intensity of large storms increases.			
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere). There will be an increased risk for species that are already vulnerable. Invasive species may become more dominant.		Maintain connectivity of vegetation within the coastal boundary
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Opportunity created for more frequent weed invasion, notably of dune grasses.	Active dune management, including weed control	Ensure that coastal vegetation blocks are part of the regional fire plan
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes. Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains adjustment of beach plan shape to refracted pattern of waves.		

TABLE 6.51 Recommended Actions and Priority for EP83 Fowlers Bay

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Climate change threatens to change habitats and de-stabilise dunes	Create a baseline for shoreline, dune and vegetation change by establishing a rectified aerial photographic record at an appropriate resolution.	High (cons/ threat)	EP NRM, DENR
	Unrestricted access and ORV activity occurs throughout the cell, shown in multiple vehicle tracks, with impact on soil compaction and erosion, vegetation damage, weed introduction, dune stability, disturbance to native fauna species including shorebirds	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	High (cons/ threat)	Private land owners, DENR, EP NRM, community
	Areas within cell identified as being important for rare and endemic plant communities and as habitat for threatened species, little or no protection and impact from recreational activities and land management practices	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches and vehicle tracks, dogs on leashes, pest animal and plant control. Install interpretive educational signage. Community education.	High (cons/ threat)	DENR, private land owners, EP NRM

Component	Issue	Proposed Action	Priority of Action	Key Players
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	Medium (cons/ threat)	DENR, EP NRM, private land owners, Fowlers Bay Progress Association, Yalata Land Management
	Unregistered off-road vehicle use (eg. quad bikes, trail bikes): illegal, vegetation damage and potential dune destabilisation	Install educational signs on dune vegetation, stability and policy on unregistered vehicles e.g. quad bikes. Undertake compliance program	Medium (cons)	DENR, SAPOL, community
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species, including shorebirds.	Monitor and record existence and impacts of introduced pest animals eg rabbits, foxes, cats. Undertake control program as required. Work with private landowners to ensure that stock are restricted from the coastal zone (eg. ensure fences are adequate and maintained)	Medium (cons/ threat)	EP NRM, private land owners, DENR
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required).	Medium (cons/ threat)	EP NRM, private land owners, DENR
	Existing development throughout cell impacting on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Work with private land owners to minimise impact from existing development, including education and restoration where appropriate. Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs, cats and ORV, etc	Medium (cons/ threat)	DENR, private landowners, EP NRM, community groups

Component	Issue	Proposed Action	Priority of Action	Key Players
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, private land owners, community groups, EP NRM
Fowlers Bay CP	The CP has high conservation values. Potential impact on conservation values, including from weeds and recreational activities such as off-road vehicles and camping.	Review the management of this valuable area. Prepare a management plan for the conservation park.	High (cons/ threat)	DENR
Beaches	Vehicles and dogs on beaches a threat to meiofauna and shorebirds, notably the Hooded Plover and Oystercatchers at the western end of this cell.	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	Medium (cons/ threat)	DENR, EP NRM, DTEI, Tourism SA, Birds Australia, community, private land owners
	Marine debris with potential impact on native fauna species	Investigate opportunities for, and/or support, ongoing marine debris cleanup programs. Undertake education program targeting fishers and campers	Medium (cons)	PIRSA, EP NRM, DENR, fishing groups, community

BIOTA

Flora

Remnant vegetation area (ha)	7,631.96 ha, 93.70% of cell area
# flora surveys / records	12 surveys, 2 opportune sites, 18 herbarium record sites, 2 threatened plant population record site.
# flora in cell	155
# conservation rated flora in cell	1
# non-indigenous flora in cell	17
Significant CDCS floristic community	*Melaleuca lanceolata* / *Atriplex paludosa* ssp shrubland – 96% of SA records in EP *Nitraria billardierei* shrubland – 54% of SA records in EP *Olearia axillaris* / *Tetragonia implexicoma* shrubland – 75% of SA records in EP
Protected area	75.6% of remnant vegetation protected within Fowlers Bay CP and Heritage Agreements

Weeds

Species	Common Name	Status	Study rating
Acacia cyclops	Western Coastal Wattle	RA	5
Arctotheca populifolia	Beach Daisy	RA	7
Carrichtera annua	Ward's Weed	RA	4
Euphorbia paralias	Sea Spurge	RA	5
Limonium companyonis	Sea-lavender	RA	7
Mesembryanthemum crystallinum	Common Iceplant	RA	4
Lycium ferocissimum	African Boxthorn	D, RA	8
Marrubium vulgare	Horehound	D, RA	5
Anagallis arvensis	Pimpernel		2
Avellinia michelii	Avellinia		0
Brassica tournefortii	Wild Turnip		3
Bromus rubens	Red Brome		2
Cakile maritima ssp. maritima	Two-horned Sea Rocket		1
Parapholis incurva	Curly Ryegrass		1
Schismus barbatus	Arabian Grass		0
Silene tridentata			0
Sonchus oleraceus (NC)	Common Sow-thistle		0

D: Declared weed, RA: Red alert weed

Native flora

Species	Common Name	Aus status	SA status
Microlepidium alatum		V	V
Acacia anceps			
Acacia anceps (NC)	Angled Wattle		
Acacia notabilis	Notable Wattle		
Acacia oswaldii	Umbrella Wattle		
Acacia sp. Winged (C.R.Alcock 4936)	Angled Wattle		
Acrotriche patula	Prickly Ground-berry		
Alyxia buxifolia	Sea Box		
Amyema melaleucae	Tea-tree Mistletoe		
Angianthus tomentosus	Hairy Angianthus		

Species	Common Name	Aus status	SA status
Atriplex acutibractea ssp. acutibractea	Pointed Saltbush		
Atriplex cinerea	Coast Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Atriplex stipitata	Bitter Saltbush		
Atriplex vesicaria ssp.	Bladder Saltbush		
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrostipa acrociliata	Graceful Spear-grass		
Austrostipa eremophila	Rusty Spear-grass		
Austrostipa nitida	Balcarra Spear-grass		
Austrostipa puberula	Fine-hairy Spear-grass		
Austrostipa sp.	Spear-grass		
Beyeria lechenaultii	Pale Turpentine Bush		
Brachyscome ciliaris var.	Variable Daisy		
Brachyscome ciliaris var. ciliaris	Variable Daisy		
Brachyscome lineariloba	Hard-head Daisy		
Calandrinia eremaea	Dryland Purslane		
Carpobrotus modestus	Inland Pigface		
Carpobrotus modestus/rossii	Native Pigface		
Carpobrotus rossii (NC)	Native Pigface		
Cassytha melantha	Coarse Dodder-laurel		
Cassytha sp.	Dodder-laurel		
Chrysocephalum apiculatum	Common Everlasting		
Comesperma volubile	Love Creeper		
Crassula colorata var. acuminata	Dense Crassula		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Cratystylis conocephala	Bluebush Daisy		
Cyperus sp.	Flat-sedge		
Dianella brevicaulis/revoluta var.	Black-anther Flax-lily		
Dianella revoluta var. revoluta	Black-anther Flax-lily		
Dianella sp.	Flax-lily		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Dodonaea bursariifolia	Small Hop-bush		
Dodonaea stenozyga	Desert Hop-bush		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eremophila deserti	Turkey-bush		
Eremophila glabra ssp. glabra	Tar Bush		
Eremophila scoparia	Broom Emubush		
Eucalyptus brachycalyx	Gilja		
Eucalyptus calcareana	Nundroo Mallee		
Eucalyptus dumosa	White Mallee		
Eucalyptus dumosa complex	White Mallee		
Eucalyptus gracilis	Yorrell		
Eucalyptus oleosa (NC)	Red Mallee		
Eucalyptus oleosa ssp.			
Eucalyptus oleosa ssp. ampliata	Red Mallee		
Eucalyptus oleosa ssp. oleosa	Red Mallee		
Eucalyptus rugosa	Coastal White Mallee		
Eutaxia microphylla	Common Eutaxia		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos syrticola	Coast Cherry		
Ficinia nodosa	Knobby Club-rush		
Frankenia pauciflora var.	Southern Sea-heath		
Frankenia serpyllifolia	Thyme Sea-heath		

Species	Common Name	Aus status	SA status
Frankenia sessilis	Small-leaf Sea-heath		
Frankenia sp.	Sea-heath		
Gahnia lanigera	Black Grass Saw-sedge		
Geijera linearifolia	Sheep Bush		
Goodenia varia	Sticky Goodenia		
Halosarcia sp. (NC)	Samphire		
Helichrysum leucopsideum	Satin Everlasting		
Hemichroa diandra	Mallee Hemichroa		
Hemichroa pentandra	Trailing Hemichroa		
Lawrencia squamata	Thorny Lawrencia		
Leiocarpa tomentosa	Woolly Plover-daisy		
Lomandra collina	Sand Mat-rush		
Lycium australe	Australian Boxthorn		
Maireana erioclada	Rosy Bluebush		
Maireana oppositifolia	Salt Bluebush		
Maireana sedifolia	Bluebush		
Maireana sp.	Bluebush/Fissure-plant		
Melaleuca lanceolata	Dryland Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Melaleuca pauperiflora ssp. mutica	Boree		
Microcybe multiflora ssp. multiflora	Small-leaf Microcybe		
Moss sp.			
Myoporum insulare	Common Boobialla		
Myoporum platycarpum ssp.	False Sandalwood		
Nicotiana goodspeedii	Small-flower Tobacco		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Olearia brachyphylla	Short-leaf Daisy-bush		
Olearia floribunda var. floribunda	Heath Daisy-bush		
Olearia minor	Heath Daisy-bush		
Olearia muelleri	Mueller's Daisy-bush		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pittosporum angustifolium	Native Apricot		
Podolepis rugata var. rugata	Pleated Copper-wire Daisy		
Podotheca angustifolia	Sticky Long-heads		
Ptilotus obovatus var. obovatus	Silver Mulla Mulla		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia crassifolia	Fleshy Saltbush		
Rhagodia preissii ssp. preissii	Mallee Saltbush		
Rhagodia spinescens	Spiny Saltbush		
Salsola tragus	Buckbush		
Santalum acuminatum	Quandong		
Sarcozona praecox	Sarcozona		
Scaevola bursariifolia	Bursaria Fanflower		
Scaevola crassifolia	Cushion Fanflower		
Scaevola spinescens	Spiny Fanflower		
Schenkia australis	Spike Centaury		
Sclerolaena brevifolia	Small-leaf Bindyi		
Sclerolaena obliquicuspis	Oblique-spined Bindyi		
Sclerolaena uniflora	Small-spine Bindyi		
Senecio glossanthus (NC)	Annual Groundsel		
Senecio pinnatifolius (NC)	Variable Groundsel		
Senna artemisioides ssp. X coriacea	Broad-leaf Desert Senna		

Species	Common Name	Aus status	SA status
Solanum simile	Kangaroo Apple		
Solanum symonii	Symon's Kangaroo-apple		
Spinifex hirsutus (NC)	Rolling Spinifex		
Tecticornia arbuscula	Shrubby Samphire		
Tecticornia disarticulata			
Tecticornia halocnemoides ssp. halocnemoides	Grey Samphire		
Tecticornia pergranulata ssp. pergranulata	Black-seed Samphire		
Tecticornia pruinosa	Bluish Samphire		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Thysanotus baueri	Mallee Fringe-lily		
Thysanotus patersonii	Twining Fringe-lily		
Trichanthodium skirrophorum	Woolly Yellow-heads		
Velleia arguta	Toothed Velleia		
Vittadinia cuneata var. cuneata f. cuneata	Fuzzy New Holland Daisy		
Vittadinia sp.	New Holland Daisy		
Waitzia acuminata var. acuminata	Orange Immortelle		
Westringia rigida	Stiff Westringia		
Zygophyllum aurantiacum ssp.			
Zygophyllum billardierei	Coast Twinleaf		
Zygophyllum ovatum	Dwarf Twinleaf		

R: Rare, V: Vulnerable, E: Endangered

Fauna

# of fauna in cell	40 recorded – 27 birds, 0 butterflies, 6 mammals, 7 reptiles, 0 amphibians (an additional 16 reptiles and 26 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	1 survey, 9 opportune sites, 1 reserve database fauna record site
# of threatened fauna in cell	9
# of non-indigenous fauna	2 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Pieris rapae rapae	Cabbage White	Invertebrate	p
Mus musculus	House Mouse	Mammalia	x
Oryctolagus cuniculus	Rabbit (European Rabbit)	Mammalia	x

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Pandion cristatus	Eastern Osprey	M	E
Sternula nereis	Fairy Tern		E
Cladorhynchus leucocephalus	Banded Stilt		V
Thinornis rubricollis	Hooded Plover		V

Species	Common Name	Aus status	SA status
Calidris alba	Sanderling	M	R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Lophocroa leadbeateri	Major Mitchell's Cockatoo		R
Acanthagenys rufogularis	Spiny-cheeked Honeyeater		
Acanthiza apicalis	Inland Thornbill		
Acanthiza chrysorrhoa	Yellow-rumped Thornbill		
Anthochaera carunculata	Red Wattlebird		
Barnardius zonarius	Australian Ringneck, (Ring-necked Parrot)		
Calidris ruficollis	Red-necked Stint	M	
Charadrius ruficapillus	Red-capped Plover		
Colluricincla harmonica	Grey Shrike-thrush		
Corvus coronoides	Australian Raven		
Cracticus tibicen	Australian Magpie		
Cracticus torquatus	Grey Butcherbird		
Lichenostomus virescens	Singing Honeyeater		
Manorina flavigula	Yellow-throated Miner		
Pardalotus striatus	Striated Pardalote		
Rhipidura leucophrys	Willie Wagtail		
Smicrornis brevirostris	Weebill		
Strepera versicolor	Grey Currawong		ssp
Zosterops lateralis	Silvereye		

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Chalinolobus gouldii	Gould's Wattled Bat		
Lasiorhinus latifrons	Southern Hairy-nosed Wombat		
Nyctophilus geoffroyi	Lesser Long-eared Bat		
Nyctophilus timoriensis	Greater Long-eared Bat	ssp	ssp

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Morelia spilota	Carpet Python		R	c
Amphibolurus norrisi	Mallee Tree-dragon			e
Ctenophorus chapmani	Prickly Dragon			c
Ctenotus euclae	Bight Coast Ctenotus			c
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Diplodactylus calcicolus	South Coast Gecko			x
Drysdalia mastersii	Master's Snake			c
Egernia stokesii	Gidgee Skink			x
Gehyra lazelli	Southern Rock Dtella			c
Gehyra variegata	Tree Dtella			e
Hemiergis initialis	Western Earless Skink			x
Lerista dorsalis	Southern Four-toed Slider			x
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			x
Menetia greyii	Dwarf Skink			x
Morethia adelaidensis	Adelaide Snake-eye			e
Morethia obscura	Mallee Snake-eye			c
Nephrurus milii	Barking Gecko			c
Parasuta spectabilis	Mallee Black-headed Snake			c
Pseudonaja affinis	Dugite			c
Pseudonaja inframacula	Peninsula Brown Snake			x
Pygopus lepidopodus	Common Scaly-foot			c

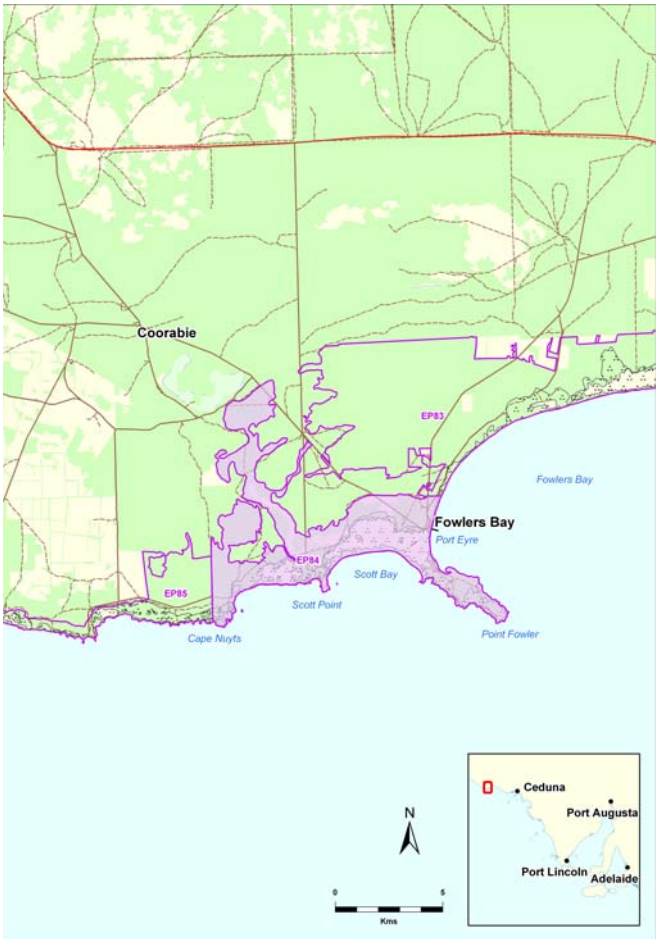
R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP84 Fowlers Bay CR

Cell area 4,130 ha. Shoreline length 30.19 km.



Landforms

Two small embayments between Point Fowler, Scott Point and Cape Nuyts characterise this shoreline. The low calcarenite coastal plain declines running east from Cape Nuyts and for much of the cell is near to sea level. The promontaries mark higher points in this plain, and show low calcrete capped calcarenite cliffs over basement rocks. The western embayment is medium to high energy with bars and reefs immediately offshore, and off the headlands. At the back of the beach, dunes cover a low bluff and a largely unstable transgressive Holocene sand mass that extends up to 1 km inland. Scott Bay is more exposed and away from the headland reefs shows high wave energy; unstable dunes behind the beach have transgressed NE across the Point Fowler promontory to threaten Port Eyre.
Landward of the dune barriers are back barrier flats which at the eastern end of the cell are close to sea level and subject to land based flooding. The coastal boundary has been extended some way north to include these brackish to saline seasonal wetlands. There is potential for coastal flooding of this area with ongoing and accelerated sea level rise.

Benthic Habitat

The three main headlands have limestone reefs offshore. Scott Bay has inshore sand to c.200m offshore; the western embayment has bare sand inshore only in the centre of the bay. Extensive dense seagrass is found in the sheltered waters off Port Eyre; listed as significant for its representativeness in the marine park description.

Biota

There is 3,124.9ha of remnant vegetation, 75.6% of the cell. There are 11 flora survey sites, 1 opportune flora site, 13 herbarium record sites, and 34 opportune fauna sites.
The dunes of the headlands and bays are in sparse coastal shrubland: *Nitraria billardierei, Olearia axillaris, +/-Atriplex cinerea, +/-Myoporum insulare* mid open shrubland; *Myoporum insulare, +/-Olearia axillaris* mid open shrubland; *Atriplex paludosa ssp. cordata, Maireana oppositifolia, +/-Frankenia sessilis, +/-Eremophila deserti* low open shrubland; and *Melaleuca lanceolata, Geijera linearifolia, +/-Pittosporum angustifolium, +/-Exocarpos aphyllus* mid open shrubland. Inland from the generally low dune barriers is *Tecticornia sp., Atriplex vesicaria ssp.* low open shrubland and some eucalypt mallee woodland.

FIGURE 6.56 Fowlers Bay (Port Eyre), Scott Bay in background. Note the incursion of the de-stabilised dunes onto the roads and houses at Port Eyre. Photo: Coast Protection Board, 2007

Land Use/ Land Ownership

The majority of this cell (78%) is within the Fowlers Bay Conservation Park. Fowlers Bay settlement and the low lying land in the north west of the cell are privately owned. (Note: at the time of naming the cells, part of Fowlers Bay Conservation Park had not been gazetted and was still Fowlers Bay Conservation Reserve).

The Parks of the Far West brochure, 2007 describes Fowlers Bay CP as "A park of outstanding natural beauty that conserves a spectacular coastline comprised of rocky headlands, high cliffs, sheltered bays and long, sandy beaches. Keep an eye out for seabirds such as the Osprey, White-bellied Sea-Eagle, Hooded Plover, Pied Oystercatcher and Fairy Tern. Other wildlife includes Southern Hairy-nosed Wombats and Australian Sea-lions. The area is popular for fishing, particularly for salmon, mulloway, whiting and garfish. A ruined lookout and whale bones on Point Fowler are evidence of the area's whaling history."

Nuyts Archipelago Marine Park, to c.3n.m. offshore.

Uses (Field visits and local reports)

Recreation and tourism – fishing, surfing, camping, ORV use, hunting / shooting, caravan park, boat based whale watching tour operations
Holiday homes, boat launching from beach
Community fun days on salt lake system
Conservation
Professional fishing
Water extraction, commercial and private uses
Waste management refuse site

Maritime heritage registered site (whaling)
Aboriginal hunting and cultural activities
Commercial / recreational jetty operations

Threats (Field visits and local reports)

Sand dune transgression into Port Eyre (= settlement of Fowlers Bay): Short & Hesp 1986 p.125 report that dunes have already buried some streets and buildings of the 19th century wheat port.
Tourism / Eco-tourism ventures (whale watching tour operations)
Sub-divisions
Wondering stock (sheep) / introduced animals (fox, cats, rabbits)
Track creation
Destruction of native wildlife, firearms
Un-controlled camping,
Waste management,
Collection of fire wood
Wildfire
Uncontrolled ORV usage
Water extraction for commercial and private uses
Boat launching (public safety, hydrocarbon spills)
PCASS

Opportunities (Field visits and local reports)

Bird Atlas surveys
Biennial Hooded Plover surveys
Rationalise vehicle movement and track closure / re-alignment
Campground development
Current weed management program underway (boxthorn)
Interpretation and protection works for historic whaling sites

Conservation Analysis (GIS)

The total of conservation means, 133.99, is high for the region. The distribution of these values shows that there are few parts of the cell below average – these are mudflats and small parts of the de-vegetated dunes. Most of the cell has medium – high totals, also high totals are found on the vegetated dunes and parts of the eucalypt mallee woodland.
Layers with higher than average priority include: rarity of plant associations (whole cell), numbers of threatened plant species (whole cell), endemic plant associations, habitat for threatened bird (mallee woodland), reptile (dunes), and mammal (dunes) species, habitat for butterflies (all vegetated areas), habitat for (focal species) White-bellied Sea-Eagle, viewscape, vegetation block metrics and indigenous heritage.
There is one mammal, 13 reptiles and 44 bird species recorded in this cell, including the state endangered Eastern Osprey, White-bellied Sea-Eagle and Fairy Tern, also the state vulnerable Hooded Plover.

Threat Analysis (GIS)

The threat total 35.23 is low for the region. Mean threat values are shown for dune areas, high totals for Port Eyre and a small part of the innermost saline flat; elsewhere totals are below average.
Vegetation block degradation, distribution of invasive weeds (African boxthorn and sea lavender reported at a number of sites), ORV (especially intense on flats and dunes near Port Eyre), dune instability and viewscape are the main contributors to the total. The history of dune instability at Port Eyre (see photo above) is a clear reminder of the impact of dune instability.

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)

NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	**Impacts and implications (for this cell)**	**Protect and manage habitat threats**	**Address landscape issues: fire, connectivity, refuges, hydrology**
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, and vegetation change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Beach recession and dune instability due to foredune damage. Increase in dune mobility.	Active management of dunes	
2070: +c.80cm.	Dune instability and movement further increased. Erosion of bluffs accelerated by elevated storm damage.	Monitoring as above	
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides; damage to foredunes	Continue to monitor shoreline movement. Active management of dunes	
Intensity of large storms increases.			
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere). There will be an increased risk for species that are already vulnerable. Invasive species may become more dominant.		Maintain connectivity of vegetation within the coastal boundary
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Opportunity created for more frequent weed invasion, notably of dune grasses.	Active dune management, including weed control	Ensure that coastal vegetation blocks are part of the regional fire plan
'Flashy' run off: Drier creeks, but larger rare floods	N/A		

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Groundwater lowering; saline incursion:	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes. Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains adjustment of beach plan shape to refracted pattern of waves.		

TABLE 6.52 Recommended Actions and Priority for EP84 Fowlers Bay CR

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Unrestricted access and ORV activity occurs throughout the cell, shown in multiple vehicle tracks, with impact on soil compaction and erosion, vegetation damage, weed introduction, dune stability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	High (cons/ threat)	Private land owners, DENR, EP NRM, community
	Unregistered off-road vehicle use: illegal, vegetation damage and potential dune destabilisation	Install educational signs on dune vegetation, stability and policy on unregistered vehicles e.g. quad bikes. Undertake compliance program	High (cons/ threat)	DENR, SAPOL, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	High (cons/ threat)	DENR, EP NRM, private land owners
	Potential impact on breeding habitats of the endangered Eastern Osprey and White-bellied Sea-Eagle, particularly during the breeding season.	Develop site management and monitoring strategy, including consideration to closure, relocation or seasonal closures of roads/walking tracks/car parks in the near vicinity. Ensure management works/programs are not undertaken near breeding sites during the breeding season. Community education	High (cons)	DENR, EP NRM
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species, including shorebirds.	Monitor and record existence and impacts of introduced pest animals eg rabbits, foxes, cats. Undertake control program as required. Work with private landowners to ensure that stock are restricted from the coastal zone (eg. ensure fences are adequate and maintained)	Medium (cons/ threat)	EP NRM, private land owners, DENR
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required).	Medium (cons/ threat)	EP NRM, private land owners, DENR

Component	Issue	Proposed Action	Priority of Action	Key Players
	Areas within cell identified as being important for rare and endemic plant communities and as habitat for threatened species, little or no protection and impact from recreational activities and land management practices	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches and vehicle tracks, dogs on leashes, pest animal and plant control. Install interpretive educational signage. Community education.	High (cons/ threat)	DENR, private land owners, EP NRM
	Potential impacts on Aboriginal heritage sites	Ensure future infrastructure avoids Aboriginal heritage sites. Consultation to appropriately manage sites where required.	High (cons)	Traditional owners, DPC, DENR, private land owners, community groups, EP NRM
Fowlers Bay CP	The CP has high conservation values. Potential impact on conservation values, including from weeds and recreational activities such as off-road vehicles and camping.	Review the management of this valuable area. Prepare a management plan for the conservation park.	High (cons/ threat)	DENR
Cliff tops	Numerous informal tracks and informal car parks very close to potentially unstable cliff edge; safety hazard and impact from soil compaction, vegetation damage, weed introduction, fauna disturbance, soil stability and water runoff erosion	Review with a view to close or reroute tracks and car parks that are too close to cliff edge.	High (Hazard; cons/ threat)	DENR
All low lying and salt marsh areas	All low lying land and salt marsh areas have the potential for acid sulfate soil following disturbance; in turn this would potentially threaten life forms offshore.	Potential hazard can be avoided by following procedures in CPB 'Coastline' on acid sulfate soils.	Medium (threat)	DENR, private land owners, developers

Component	Issue	Proposed Action	Priority of Action	Key Players
Beaches	Vehicles and dogs on beaches a threat to meiofauna and shorebirds, including breeding Australian Pied Oystercatchers	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	Medium (cons/ threat)	DENR, EP NRM, DTEI, Tourism SA, Birds Australia, community, private land owners
Fowlers Bay settlement	Existing development impacting on high conservation values of surrounding area (eg. domestic animals disturbing/destroying native species, vegetation damage, soil compaction, weed escapes, increased tracks, etc)	Work with private land owners to minimise impact from existing development, including education and restoration where appropriate. Community education about impacts, eg. regarding garden plants becoming weeds, impacts of uncontrolled dogs, cats and ORV, etc	High (cons/ threat)	EP NRM, private land owners, DENR, community groups
	Non-indigenous coastal heritage sites identified – Fowlers Bay jetty and monument to Matthew Flinders - but not included on any statutory heritage register, with potential impact from recreational activities	Consider including onto heritage register eg. local heritage lists. Ensure sites managed to protect from damage. Install interpretive educational signage.	Medium	DENR, SA Heritage Council, DPLG, community
Point Fowler	Registered non-indigenous heritage sites – whale bone area and Point Fowler structure – with potential impact from recreational activities	Ensure sites managed to protect from damage. Install interpretive educational signage.	Medium	DENR

BIOTA

Flora

Remnant vegetation area (ha)	3,124.91 ha, 75.66% of cell area
# flora surveys / records	11 surveys, 1 opportune sites, 13 herbarium record sites
# flora in cell	179 (note: includes 2 marine species)
# conservation rated flora in cell	8
# non-indigenous flora in cell	32
Significant CDCS floristic community	*Maireana oppositifolia* shrubland – 50% of SA records in EP *Melaleuca lanceolata* / *Atriplex paludosa* ssp shrubland – 96% of SA records in EP *Nitraria billardierei* shrubland – 54% of SA records in EP *Olearia axillaris* / *Tetragonia implexicoma* shrubland – 75% of SA records in EP *Threlkeldia diffusa* shrubland – <20 (8) sites recorded along SA coast
Protected area	72.8% of remnant vegetation protected within Fowlers Bay CP

Weeds

Species	Common Name	Status	Study rating
Acacia cyclops	Western Coastal Wattle	RA	5
Arctotheca populifolia	Beach Daisy	RA	7
Argyranthemum frutescens ssp.	Marguerite Daisy	RA	4
Euphorbia paralias	Sea Spurge	RA	5
Gazania rigens	Gazania	RA	6
Limonium companyonis	Sea-lavender	RA	7
Mesembryanthemum crystallinum	Common Iceplant	RA	4
Lycium ferocissimum	African Boxthorn	D, RA	8
Asphodelus fistulosus	Onion Weed	D	3
Anagallis arvensis	Pimpernel		2
Avellinia michelii	Avellinia		0
Brassica tournefortii	Wild Turnip		3
Briza minor	Lesser Quaking-grass		2
Bromus diandrus	Great Brome		2
Buglossoides arvensis	Sheepweed		0
Bupleurum semicompositum	Hare's Ear		0
Cakile maritima ssp. maritima	Two-horned Sea Rocket		1
Centaurea melitensis	Malta Thistle		1
Centaurium erythraea	Common Centaury		1
Critesion murinum ssp. (NC)	Barley-grass		0
Erodium cicutarium	Cut-leaf Heron's-bill		0
Hornungia procumbens	Oval Purse		0
Lepidium didymum	Lesser Swine's-cress		0
Malva parviflora	Small-flower Marshmallow		0
Melilotus indicus	King Island Melilot		1
Parapholis incurva	Curly Ryegrass		1
Plantago coronopus ssp. commutata	Bucks-horn Plantain		2
Rostraria cristata	Annual Cat's-tail		2
Rostraria pumila	Tiny Bristle-grass		2
Schismus arabicus	Arabian Grass		0
Solanum nigrum	Black Nightshade		2
Sonchus oleraceus (NC)	Common Sow-thistle		0

D: Declared weed, RA: Red alert weed

Native flora*

Species	Common Name	Aus status	SA status
Prasophyllum catenemum			E
Tecticornia flabelliformis	Bead Samphire	V	V
Haegiela tatei	Small Nut-heads		R
Isotoma scapigera	Salt Isotome		R
Leiocarpa pluriseta			R
Microlepidium pilosulum	Hairy Shepherd's-purse		R
Poa drummondiana	Knotted Poa		R
Poa fax	Scaly Poa		R
Abutilon macrum	Slender Lantern-bush		
Acacia anceps			
Acacia anceps (NC)	Angled Wattle		
Acacia cyclops	Western Coastal Wattle		
Amyema melaleucae	Tea-tree Mistletoe		
Angianthus preissianus	Salt Angianthus		
Angianthus tomentosus	Hairy Angianthus		
Apium annuum	Annual Celery		
Arthropodium minus	Small Vanilla-lily		
Atriplex cinerea	Coast Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Austrodanthonia caespitosa	Common Wallaby-grass		
Austrodanthonia setacea	Small-flower Wallaby-grass		
Austrostipa acrociliata	Graceful Spear-grass		
Austrostipa elegantissima	Feather Spear-grass		
Austrostipa eremophila	Rusty Spear-grass		
Austrostipa flavescens	Coast Spear-grass		
Austrostipa puberula	Fine-hairy Spear-grass		
Austrostipa scabra ssp. falcata	Slender Spear-grass		
Austrostipa velutina			
Beyeria lechenaultii	Pale Turpentine Bush		
Bromus arenarius	Sand Brome		
Bulbine semibarbata	Small Leek-lily		
Calandrinia brevipedata	Short-stalked Purslane		
Calandrinia eremaea	Dryland Purslane		
Carpobrotus rossii (NC)	Native Pigface		
Cassytha melantha	Coarse Dodder-laurel		
Caulerpa obscura			
Convolvulus crispifolius	Silver Bindweed		
Crassula colorata var. acuminata	Dense Crassula		
Crassula colorata var. colorata	Dense Crassula		
Crassula sp.	Crassula/Stonecrop		
Cratystylis conocephala	Bluebush Daisy		
Danthonia sp. (NC)	Wallaby-grass		
Daucus glochidiatus	Native Carrot		
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Dissocarpus biflorus var. biflorus	Two-horn Saltbush		
Distichlis distichophylla	Emu-grass		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Enneapogon intermedius	Tall Bottle-washers		
Eragrostis parviflora	Weeping Love-grass		

Species	Common Name	Aus status	SA status
Eremophila alternifolia	Narrow-leaf Emubush		
Eremophila crassifolia	Thick-leaf Emubush		
Eremophila deserti	Turkey-bush		
Eremophila scoparia	Broom Emubush		
Eriochlamys behrii	Woolly Mantle		
Eucalyptus dumosa	White Mallee		
Eucalyptus dumosa complex	White Mallee		
Eucalyptus gracilis	Yorrell		
Eucalyptus oleosa ssp. ampliata	Red Mallee		
Eucalyptus rugosa	Coastal White Mallee		
Exocarpos aphyllus	Leafless Cherry		
Exocarpos syrticola	Coast Cherry		
Ficinia nodosa	Knobby Club-rush		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Frankenia sessilis	Small-leaf Sea-heath		
Geijera linearifolia	Sheep Bush		
Geranium retrorsum	Grassland Geranium		
Goodenia varia	Sticky Goodenia		
Hemichroa diandra	Mallee Hemichroa		
Hyalosperma glutinosum ssp. glutinosum	Golden Sunray		
Hyalosperma semisterile	Orange Sunray		
Kippistia suaedifolia	Fleshy Kippistia		
Lawrencia squamata	Thorny Lawrencia		
Lepidosperma congestum			
Leptorhynchos waitzia	Button Immortelle		
Leucophyta brownii	Coast Cushion Bush		
Logania crassifolia	Coast Logania		
Lycium australe	Australian Boxthorn		
Maireana erioclada	Rosy Bluebush		
Maireana integra	Entire-wing Bluebush		
Maireana oppositifolia	Salt Bluebush		
Maireana trichoptera	Hairy-fruit Bluebush		
Melaleuca lanceolata	Dryland Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Minuria leptophylla	Minnie Daisy		
Moss sp.			
Myoporum brevipes	Warty Boobialla		
Myoporum insulare	Common Boobialla		
Nicotiana goodspeedii	Small-flower Tobacco		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Olearia brachyphylla	Short-leaf Daisy-bush		
Olearia exiguifolia	Lobed-leaf Daisy-bush		
Olearia minor	Heath Daisy-bush		
Parietaria debilis	Smooth-nettle		
Pimelea glauca	Smooth Riceflower		
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pimelea stricta	Erect Riceflower		
Pittosporum angustifolium	Native Apricot		
Poa fordeana	Forde's Poa		
Poa labillardieri var. labillardieri	Common Tussock-grass		
Podotheca angustifolia	Sticky Long-heads		
Pogonolepis muelleriana	Stiff Cup-flower		

Species	Common Name	Aus status	SA status
Ptilotus obovatus var. obovatus	Silver Mulla Mulla		
Rhagodia candolleana ssp. candolleana	Sea-berry Saltbush		
Rhagodia crassifolia	Fleshy Saltbush		
Salsola tragus	Buckbush		
Samolus repens	Creeping Brookweed		
Santalum acuminatum	Quandong		
Sarcozona praecox	Sarcozona		
Scaevola angustata	Coast Fanflower		
Scaevola crassifolia	Cushion Fanflower		
Schenkia australis	Spike Centaury		
Sclerolaena brevifolia	Small-leaf Bindyi		
Sclerolaena uniflora	Small-spine Bindyi		
Senecio glossanthus	Annual Groundsel		
Senecio laceratus	Cut-leaf Groundsel		
Senecio pinnatifolius (NC)	Variable Groundsel		
Senecio serratiformis ssp. serratiformis			
Senecio spanomerus			
Siloxerus multiflorus	Small Wrinklewort		
Solanum capsiciforme	Capsicum Kangaroo-apple		
Solanum hystrix	Afghan Thistle		
Solanum symonii	Symon's Kangaroo-apple		
Spinifex hirsutus	Rolling Spinifex		
Sporobolus virginicus	Salt Couch		
Spyridium phylicoides	Narrow-leaf Spyridium		
Stenopetalum saxatile	Narrow Thread-petal		
Suaeda australis	Austral Seablite		
Tecticornia arbuscula	Shrubby Samphire		
Tecticornia disarticulata			
Tecticornia indica ssp. bidens	Brown-head Samphire		
Tecticornia tenuis	Slender Samphire		
Templetonia retusa	Cockies Tongue		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Tragus australianus	Small Burr-grass		
Triglochin centrocarpum (NC)	Dwarf Arrowgrass		
Triglochin nana	Dwarf Arrowgrass		
Wahlenbergia gracilenta	Annual Bluebell		
Westringia rigida	Stiff Westringia		
Wilsonia humilis	Silky Wilsonia		
Wrangelia velutina			
Wurmbea dioica ssp. brevifolia	Early Nancy		
Zygophyllum ammophilum	Sand Twinleaf		
Zygophyllum billardierei	Coast Twinleaf		
Zygophyllum confluens	Forked Twinleaf		
Zygophyllum ovatum	Dwarf Twinleaf		

R: Rare, V: Vulnerable, E: Endangered

- note: includes 2 marine species

Fauna

# of fauna in cell	58 recorded – 44 birds, 0 butterflies, 1 mammals, 13 reptiles, 0 amphibians (an additional 17 reptiles and 26 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	34 opportune sites
# of threatened fauna in cell	10
# of non-indigenous fauna	3 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Columba livia	Rock Dove	Aves	x
Passer domesticus	House Sparrow	Aves	x
Sturnus vulgaris	Common Starling	Aves	x
Pieris rapae rapae	Cabbage White	Invertebrate	p

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Haliaeetus leucogaster	White-bellied Sea-Eagle	M	E
Pandion cristatus	Eastern Osprey	M	E
Sternula nereis	Fairy Tern		E
Thinornis rubricollis	Hooded Plover		V
Calidris alba	Sanderling	M	R
Egretta sacra	Eastern Reef Egret		R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Lophocroa leadbeateri	Major Mitchell's Cockatoo		R
Anas gracilis	Grey Teal		
Anas superciliosa	Pacific Black Duck		
Anthus novaeseelandiae	Australasian Pipit		
Calidris acuminata	Sharp-tailed Sandpiper	M	
Calidris ruficollis	Red-necked Stint	M	
Charadrius ruficapillus	Red-capped Plover		
Chlidonias hybrida	Whiskered Tern		
Chroicocephalus novaehollandiae	Silver Gull		
Corvus coronoides	Australian Raven		
Cracticus tibicen	Australian Magpie		
Cracticus torquatus	Grey Butcherbird		
Egretta novaehollandiae	White-faced Heron		
Elanus axillaris	Black-shouldered Kite		
Eolophus roseicapillus	Galah		
Falco cenchroides	Nankeen Kestrel		
Gallirallus philippensis	Buff-banded Rail		
Himantopus himantopus	Black-winged Stilt		
Hirundo neoxena	Welcome Swallow		
Hydroprogne caspia	Caspian Tern		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Malacorhynchus membranaceus	Pink-eared Duck		

Species	Common Name	Aus status	SA status
Microcarbo melanoleucos	Little Pied Cormorant		
Pelecanus conspicillatus	Australian Pelican		
Petrochelidon nigricans	Tree Martin		
Phalacrocorax carbo	Great Cormorant		
Phalacrocorax sulcirostris	Little Black Cormorant		
Phalacrocorax varius	Pied Cormorant		
Poliocephalus poliocephalus	Hoary-headed Grebe		
Sericornis frontalis	White-browed Scrubwren		
Thalasseus bergii	Crested Tern		
Tringa nebularia	Common Greenshank	M	

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Papilio demoleus sthenelus	Chequered Swallowtail	Va	p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

Species	Common Name	Aus status	SA status
Lasiorhinus latifrons	Southern Hairy-nosed Wombat		

R: Rare, V: Vulnerable, E: Endangered

Reptiles

Species	Common Name	Aus status	SA status	Record
Morelia spilota	Carpet Python		R	x
Amphibolurus norrisi	Mallee Tree-dragon			e
Ctenophorus chapmani	Prickly Dragon			c
Ctenophorus fordi	Mallee Dragon			x
Ctenotus euclae	Bight Coast Ctenotus			c
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Demansia reticulata	Desert Whipsnake			x
Diplodactylus calcicolus	South Coast Gecko			c
Drysdalia mastersii	Master's Snake			x
Egernia stokesii	Gidgee Skink			e
Gehyra lazelli	Southern Rock Dtella			c
Gehyra variegata	Tree Dtella			e
Hemiergis initialis	Western Earless Skink			c
Hemiergis peronii	Four-toed Earless Skink			x
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			x
Lialis burtonis	Burton's Legless Lizard			x
Menetia greyii	Dwarf Skink			x
Morethia adelaidensis	Adelaide Snake-eye			e
Morethia obscura	Mallee Snake-eye			c
Nephrurus milii	Barking Gecko			c
Parasuta nigriceps	Mitchell's Short-tailed Snake			x
Parasuta spectabilis	Mallee Black-headed Snake			x
Pogona vitticeps	Central Bearded Dragon			x
Pseudonaja affinis	Dugite			c
Pygopus lepidopodus	Common Scaly-foot			c
Ramphotyphlops bicolor	Southern Blind Snake			x
Simoselaps bertholdi	Desert Banded Snake			x

R: Rare, V: Vulnerable, E: Endangered

x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

Cell EP85 Cape Adieu

Cell area 2,448 ha. Shoreline length 34.42 km.

Landforms

This is a low undulating coastal plateau of Pleistocene Bridgewater Formation (aeolianite/ calcarenite). Pre-Cambrian basement granite/gabbro and metamorphic rocks outcrop at the calcarenite cliff base at Cape Adieu, and in shore platforms and nearshore reefs along the length of the cell. The majority of the cell is classified as cliffs, varying between bluffs and cliffs up to 50m; however there are many beaches of variable sizes. Beaches are generally well protected by reefs and hence wave energy at the shore is low. Holocene (St Kilda Formation) cliff top dunes are seen on much of the limestone plate surface, Short et al, 1986, though there remain 3 sand ramp active beach/ dune connections over low calcarenite bluffs.

Benthic Habitat

Heavy and low profile reefs, with some bare sand patches

Biota

2,228 ha of vegetation remain, 91% of the cell. There are 12 flora survey sites, 2 opportune survey sites, 3 herbarium record sites and 4 opportune fauna sites. This is coastal shrubland over clifftop dunes and calcarenite plateau. *Nitraria billardierei, Olearia axillaris, +/-Atriplex cinerea, +/-Myoporum insulare* mid open shrubland; *Myoporum insulare, +/-Olearia axillaris* mid open shrubland; *Melaleuca lanceolata, Geijera linearifolia, +/-Pittosporum angustifolium, +/-Exocarpos aphyllus* mid open shrubland. There are also small areas of *Atriplex paludosa ssp. cordata, Maireana oppositifolia, +/-Frankenia sessilis, +/-Eremophila deserti* low open shrubland and *Lawrencia squamata* low open shrubland. Near Cape Nuyts an extensive area of Heritage Agreement mallee woodland has been included in the coastal boundary: *Eucalyptus calcareana, +/-Eucalyptus gracilis, +/-Eucalyptus oleosa ssp., +/-Eucalyptus brachycalyx* mid open mallee forest over *Melaleuca lanceolata, +/-Geijera linearifolia* mid open shrubland over *+/-Rhagodia crassifolia, +/-Westringia rigida, +/-Atriplex vesicaria ssp.* low sparse shrubland. North of Cabbots Beach there is a small area of low saline wetland with samphire shrubland *Tecticornia sp.*, *Atriplex vesicaria ssp.* low open shrubland over *+/-Hemichroa diandra, +/-Maireana oppositifolia.*

Land Use/ Land Ownership

Nuyts Archipelago Marine Park offshore which encloses the Nuyts Reef CP islands.
The majority of this cell is Crown land. Crown leasehold land covers a large proportion of the eastern end of this cell, fronted by a very narrow (c. 30m) unalloted Crown land coastal reserve,

part the leasehold land is also covered by a Heritage Agreement (39% of cell area). The central part of the cell has an unalloted Crown land coastal reserve that ranges from approximately 50m to 500m, backed by privately owned land. The western part of the cell, from Cheetima Beach to Wahgunyah CP, is completely within unalloted Crown land, this Crown land extends up to approximately 6.5km inland.

FIGURE 6.57 Cheetima Beach. Photo: Coast Protection Board, 2007

Uses (Field visits and local reports)

Recreation and tourism – fishing, surfing, camping, ORV use, hunting / shooting
Conservation
Aboriginal hunting and cultural activities
Professional fishing
Water extraction for agricultural purposes

Threats (Field visits and local reports)

Eco-tourism ventures
Sub-divisions
Wondering stock (sheep, horses, goats) / introduced animals (camels, fox, cats, rabbits)
Track creation
Destruction of native wildlife, firearms
Uncontrolled camping
Waste management
Collection of fire wood
Wildfire
Uncontrolled ORV usage
Water extraction for agricultural purposes

Opportunities (Field visits and local reports)

Rationalise vehicle movement and track closure / re-alignment
Campground development
Current weed management program underway (boxthorn)

Conservation Analysis (GIS)

The total of conservation means is 23.64 which is high for the region. Variation of total scores varies between medium low and medium high: medium high scores are found in the vegetated dune shrublands, and the area of mallee woodland near Cape Nuyts, and these are the most extensive areas.
Layers with above average values include plant associations with state rarity, endemic plant associations, habitat for threatened bird species (mallee woodland north of Cape Nuyts), habitat for threatened reptile species (dunes and mallee woodland), butterfly habitat, habitat for focal species Eastern Osprey, viewscape and viewshed, and vegetation metrics.
There are 16 bird species recorded in this cell, but no mammals, butterflies, reptiles or amphibians recorded.

Threat Analysis (GIS)

The total for threat means is 38.60 which is average for the region. Most areas have a low total threat, but Cheetima Beach, Cabbots Beach and immediately north of Wandilla Beach have small areas of high totals. There are several small contributions to this, but the most notable are weeds (African boxthorn is noted from Cape Nuyts to Cabbots Beach; further west Iceplant, Beach Lavender and Beach Daisy are reported), ORV tracks (notable at prominent headlands and de-vegetated dune areas), viewscape and viewshed.

Adaptation to Climate Change Threats

(See also discussion of scenario in section 4.11)
NOTE: the advice below is indicative of likely change and the direction of change, with implications for ecosystems. Dates, amounts and probabilities cannot be accurately calculated at this time. Thus advice on flood levels, for example, should not be used in engineering or development planning.

Climate change element/ scenario	**Impacts and implications (for this cell)**	**Protect and manage habitat threats**	**Address landscape issues: fire, connectivity, refuges, hydrology**
Combined climate changes and sea level rise throughout this cell	This cell presents a complex pattern of habitats sensitive to change	Create a baseline for shoreline, and vegetation change by establishing a rectified aerial photographic record at an appropriate resolution.	
Sea level rise: 2030 : +c.20cm	Beach recession and dune instability due to foredune damage. Increase in dune mobility.	Active management of dunes, where appropriate.	
2070: +c.80cm.	Dune instability and movement further increased. Erosion of bluffs and cliffs accelerated by elevated storm damage.	Monitoring as above	

Climate change element/ scenario	Impacts and implications (for this cell)	Protect and manage habitat threats	Address landscape issues: fire, connectivity, refuges, hydrology
Storms: *Frequency* continues to show great variation on a decadal scale.	2030: Occasional storm tide flooding above highest known tides; damage to foredunes	Continue to monitor shoreline movement. Active management of dunes	
Intensity of large storms increases.			
Warmer average conditions: 2030:+0.3 to.6^{0}C 2070:+1.5 to 2^{0}C	(Impacts uncertain. Existing terrestrial vegetation is found in warmer conditions elsewhere). There will be an increased risk for species that are already vulnerable. Invasive species may become more dominant.		Maintain connectivity of vegetation within the coastal boundary
Drier average conditions: 2030: -2% to 5% 2070: - 10% to 20%	Dune habitats adapt well to drier conditions, but recover more slowly from fire, disease and storm damage. Opportunity created for more frequent weed invasion, notably of dune grasses.	Active dune management, including weed control	Ensure that coastal vegetation blocks are part of the regional fire plan
'Flashy' run off: Drier creeks, but larger rare floods	N/A		
Groundwater lowering; saline incursion:	Aridity lowers fresh groundwater pressure and reduces perched water tables in dunes. Rising sea level increases saline groundwater pressure near the shoreline, with local impact on soil water and vegetation survival	Adaptive management of plant assets	Monitor level and salinity of water table within the calcarenite.
Nearshore sea changes - temperature; acidity; wave climate: 2030: +0.3^{0}C to + 0.6^{0}C 2070: +1.0^{0}C to + 1.50C	Persistent swell wave climate maintains adjustment of beach plan shape to refracted pattern of waves.		

TABLE 6.53 Recommended Actions and Priority for EP85 Cape Adieu

Component	Issue	Proposed Action	Priority of Action	Key Players
Whole cell	Inadequate data on biodiversity and habitat values, particularly fauna.	Undertake coastal flora and fauna surveys to inform future management directions.	High (cons)	DENR, EP NRM
	Beaches, dunes and vegetation distribution subject to change as a result of climate change.	Create a baseline for shoreline, and vegetation change by establishing a rectified aerial photographic record at an appropriate resolution.	High (cons/ threat)	DENR, EP NRM
	Unrestricted access and ORV activity occurs throughout the cell, shown in multiple vehicle tracks, with impact on soil compaction and erosion, vegetation damage, weed introduction, dune stability, disturbance to native fauna species	Develop access/traffic management plan – including review of existing tracks with a view to rationalise unnecessary tracks. Block access (eg. fencing/rocks) to tracks to be closed, rehabilitate (where appropriate) and maintain. Upgrade any tracks that are not well defined, or are causing water run-off erosion. Install directional /educational signage. Community education	High (cons/ threat)	Private land owners, DENR, EP NRM
	Informal camping and car parks occur throughout the cell, with impacts from soil compaction, vegetation damage – trampling and removal, fauna disturbance, soil erosion, increased fire risk, fire wood collection and weed introduction.	Monitor impacts of camping and car parks. Review locations, management and need for camping and car parks in this location. Close, rehabilitate, sign and maintain areas inappropriate for camping and car parks. Formalise, manage & maintain (eg. develop camping management plan, fencing, signs, weed management) areas where camping and car parks are permitted.	Medium (cons/ threat)	DENR, EP NRM, private land owners
	Weed species identified throughout cell	Develop and implement weed management plan (including monitoring and recording weed species, removal and rehabilitation as required).	Medium (cons/ threat)	EP NRM, private land owners, DENR
	Unregistered off-road vehicle use (eg. quad bikes, trail bikes): illegal, vegetation damage and potential dune destabilisation	Install educational signs on dune vegetation, stability and policy on unregistered vehicles e.g. quad bikes. Undertake compliance program	Medium (cons)	DENR, SAPOL, community

Component	Issue	Proposed Action	Priority of Action	Key Players
	Introduced animals; with impact on vegetation degradation, competition for food and habitat and predation on native species, including shorebirds.	Monitor and record existence and impacts of introduced pest animals eg rabbits, foxes, cats. Undertake control program as required. Work with private landowners to ensure that stock are restricted from the coastal zone (eg. ensure fences are adequate and maintained)	Medium (cons/ threat)	EP NRM, private land owners, DENR
	Potential impact on breeding habitat of the endangered Eastern Osprey, particularly during the breeding season.	Develop site management and monitoring strategy, including consideration to closure, relocation or seasonal closures of roads/walking tracks/car parks in the near vicinity. Ensure management/works programs are not undertaken during the breeding season. Community education.	High (cons)	DENR, EP NRM
	Areas within cell identified as being important for rare and endemic plant communities and as habitat for threatened species, little or no protection and impact from recreational activities and land management practices	Review management and land management practices in these areas, investigate and implement actions to improve, protect and mitigate threats to these areas eg. restrict vehicles on beaches and vehicle tracks, dogs on leashes, pest animal and plant control. Install interpretive educational signage. Community education.	High (cons/ threat)	DENR, private land owners, EP NRM
Cliff tops	Numerous informal tracks and informal car parks very close to potentially unstable cliff edge; safety hazard and impact from soil compaction, vegetation damage, weed introduction, fauna disturbance, soil stability and water runoff erosion. Cliff instability increased through sea level rise.	Review with a view to close or reroute tracks and car parks that are too close to cliff edge.	High (Hazard; cons/ threat)	DENR, private land owners, EP NRM

Component	Issue	Proposed Action	Priority of Action	Key Players
Cheetima Beach to western cell boundary	Areas of high conservation values, including rare plant communities. Potential threat from lack of continuity of management with neighbouring conservation park	Review the conservation status of the Crown land with a view to including it into the Wahgunyah CP	High (cons)	DENR
Beaches	Vehicles and dogs on beaches a threat to meiofauna and shorebirds	Develop and implement beach driving strategy to minimise impacts, including review/ rationalise locations, monitoring impacts, consistent speed limits, rules and signage. Develop and implement specific shorebird management plans, including consideration to various permanent, temporary and seasonal options for site protection such as seasonal closures of sections of beach / temporary fencing/ dog free or dog on leash areas. Undertake and/or support ongoing shorebird monitoring programs. Raising community awareness through interpretive signage and other programs.	Medium (cons/ threat)	EP NRM, DTEI, DENR, Tourism SA, Birds Australia, community

BIOTA

Flora

Remnant vegetation area (ha)	2,228.67 ha, 91.04% of cell area
# flora surveys / records	12 surveys, 2 opportune sites, 3 herbarium record sites
# flora in cell	93 (note: includes some marine species)
# conservation rated flora in cell	1
# non-indigenous flora in cell	10
Significant CDCS floristic community	*Maireana oppositifolia* shrubland – 50% of SA records in EP *Melaleuca lanceolata* / *Atriplex paludosa* ssp shrubland – 96% of SA records in EP *Melaleuca lanceolata* / *Atriplex vesicaria* ssp. shrubland – - <20 (17) sites recorded along SA coast, 88% (15) of these in EP *Melaleuca lanceolata* / *Tetragonia implexicoma* shrubland – 72% of SA records in EP *Nitraria billardierei* shrubland – 54% of SA records in EP *Olearia axillaris* / *Tetragonia implexicoma* shrubland – 75% of SA records in EP

Protected area	41.8% of remnant vegetation within Heritage Agreement

Weeds

Species	Common Name	Status	Study rating
Arctotheca populifolia	Beach Daisy	RA	7
Euphorbia paralias	Sea Spurge	RA	5
Limonium companyonis	Sea-lavender	RA	7
Mesembryanthemum crystallinum	Common Iceplant	RA	4
Lycium ferocissimum	African Boxthorn	D, RA	8
Anagallis arvensis	Pimpernel		2
Arctotheca calendula	Cape Weed		1
Avellinia michelii	Avellinia		0
Brassica tournefortii	Wild Turnip		3
Bupleurum semicompositum	Hare's Ear		0

D: Declared weed, RA: Red alert weed

Native flora*

Species	Common Name	Aus status	SA status
Poa drummondiana	Knotted Poa		R
Acacia anceps			
Acacia anceps (NC)	Angled Wattle		
Acacia notabilis	Notable Wattle		
Acacia oswaldii	Umbrella Wattle		
Acrotriche patula	Prickly Ground-berry		
Alyxia buxifolia	Sea Box		
Angianthus tomentosus	Hairy Angianthus		
Anotrichium elongatum			
Areschougia stuartii			
Atriplex cinerea	Coast Saltbush		
Atriplex paludosa ssp. cordata	Marsh Saltbush		
Atriplex vesicaria ssp.	Bladder Saltbush		
Austrostipa sp.	Spear-grass		
Beyeria lechenaultii	Pale Turpentine Bush		
Blennospora drummondii	Dwarf Button-flower		
Calandrinia eremaea	Dryland Purslane		
Carpobrotus rossii (NC)	Native Pigface		
Crassula colorata var. acuminata	Dense Crassula		
Crassula colorata var. colorata	Dense Crassula		
Crassula sieberiana ssp. tetramera (NC)	Australian Stonecrop		
Cystophora platylobium			
Cystophora siliquosa			
Dictyota alternifida			
Diplocladia patersonis			
Disphyma crassifolium ssp. clavellatum	Round-leaf Pigface		
Dodonaea stenozyga	Desert Hop-bush		
Ectocarpus fasciculatus			
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		
Eremophila deserti	Turkey-bush		
Eucalyptus brachycalyx	Gilja		
Eucalyptus gracilis	Yorrell		
Eucalyptus oleosa (NC)	Red Mallee		

Species	Common Name	Aus status	SA status
Eucalyptus oleosa ssp. ampliata	Red Mallee		
Exocarpos aphyllus	Leafless Cherry		
Ficinia nodosa	Knobby Club-rush		
Frankenia pauciflora var. fruticulosa	Southern Sea-heath		
Frankenia sessilis	Small-leaf Sea-heath		
Geijera linearifolia	Sheep Bush		
Goodenia varia	Sticky Goodenia		
Gramineae sp.	Grass Family		
Hemichroa diandra	Mallee Hemichroa		
Janczewskia tasmanica			
Lawrencia squamata	Thorny Lawrencia		
Leucophyta brownii	Coast Cushion Bush		
Liagora harveyana			
Lycium australe	Australian Boxthorn		
Maireana erioclada	Rosy Bluebush		
Maireana oppositifolia	Salt Bluebush		
Mazoyerella australis			
Melaleuca lanceolata	Dryland Tea-tree		
Melaleuca lanceolata ssp. lanceolata (NC)	Dryland Tea-tree		
Nitraria billardierei	Nitre-bush		
Olearia axillaris	Coast Daisy-bush		
Olearia exiguifolia	Lobed-leaf Daisy-bush		
Olearia minor	Heath Daisy-bush		
Pachydictyon paniculatum			
Pimelea serpyllifolia ssp. serpyllifolia	Thyme Riceflower		
Pittosporum angustifolium	Native Apricot		
Plantago sp. B (R.Bates 44765)	Little Plantain		
Plocamium leptophyllum			
Podotheca angustifolia	Sticky Long-heads		
Polysiphonia isogona			
Ptilotus obovatus var. obovatus	Silver Mulla Mulla		
Rhagodia crassifolia	Fleshy Saltbush		
Rhagodia preissii ssp. preissii	Mallee Saltbush		
Samolus repens	Creeping Brookweed		
Sarcocornia blackiana	Thick-head Samphire		
Sargassum decipiens			
Sargassum linearifolium			
Scaevola crassifolia	Cushion Fanflower		
Schenkia australis	Spike Centaury		
Sclerolaena diacantha	Grey Bindyi		
Sclerolaena uniflora	Small-spine Bindyi		
Senecio pinnatifolius (NC)	Variable Groundsel		
Solanum hystrix	Afghan Thistle		
Spinifex hirsutus (NC)	Rolling Spinifex		
Tecticornia pergranulata ssp.	Black-seed Samphire		
Tetragonia implexicoma	Bower Spinach		
Threlkeldia diffusa	Coast Bonefruit		
Ulva australis			
Wilsonia humilis	Silky Wilsonia		
Zygophyllum billardierei (NC)	Coast Twinleaf		

R: Rare, V: Vulnerable, E: Endangered
* note: includes some marine species

Fauna

# of fauna in cell	16 recorded – 16 birds, 0 butterflies, 0 mammals, 0 reptiles, 0 amphibians (an additional 20 reptiles and 25 butterflies identified by experts as possibly occurring)
# of fauna surveys / records	4 opportune sites
# of threatened fauna in cell	4
# of non-indigenous fauna	0 recorded (an additional 1 invertebrate possible)

Non-indigenous fauna

Species	Common Name	Class	Record
Pieris rapae rapae	Cabbage White	Invertebrate	p

x: recorded, p: possibly there as suggested by R. Grund

Birds

Species	Common Name	Aus status	SA status
Pandion cristatus	Eastern Osprey	M	E
Calidris alba	Sanderling	M	R
Haematopus fuliginosus	Sooty Oystercatcher		R
Haematopus longirostris	Australian Pied Oystercatcher		R
Charadrius ruficapillus	Red-capped Plover		
Chroicocephalus novaehollandiae	Silver Gull		
Colluricincla harmonica	Grey Shrike-thrush		
Hirundo neoxena	Welcome Swallow		
Larus pacificus	Pacific Gull		
Lichenostomus virescens	Singing Honeyeater		
Morus serrator	Australasian Gannet		
Phalacrocorax carbo	Great Cormorant		
Phalacrocorax varius	Pied Cormorant		
Sericornis frontalis	White-browed Scrubwren		
Smicrornis brevirostris	Weebill		
Tringa nebularia	Common Greenshank	M	

R: Rare, V: Vulnerable, E: Endangered, M: Migratory

Butterflies

Species	Common Name	Status*	Record
Ogyris otanes	Small Bronze Azure	E	p
Hesperilla chrysotricha cyclospila	Chrysotricha Sedge-skipper	V	p
Antipodia atralba	Black and White Sedge-skipper	R	p
Candalides heathi heathi	Rayed Blue	R	p
Cyprotides cyprotus cyprotus	Cyprotus Pencilled-blue	R	p
Delias aganippe	Wood White	R, Va	p
Jamenus icilus	Icilius Hairstreak	R	p
Trapezites sciron eremicola	Sciron Rush-skipper	R	p
Belenois java teutonia	Caper White	Mi	p
Danaus chrysippus petilia	Lesser Wanderer		p
Erina acasta	Blotched Dusky-blue		p
Erina hyacinthina form simplexa	Western Dusky-blue		p
Eurema (Terias) smilax	Small Grass-yellow	Mi	p

Species	Common Name	Status*	Record
Geitoneura klugii	Common Xenica	LC	p
Hesperilla donnysa diluta	Donnysa Sedge-skipper		p
Junonia villida calybe	Meadow Argus	LC, Mi	p
Lampides boeticus	Long-tailed Pea-blue	LU	p
Motasingha trimaculata trimaculata	Dingy four-spot Sedge-skipper	LU	p
Nacaduba biocellata biocellata	Two-spotted Line-blue	LC	p
Neolucia agricola agricola	Fringed Heath-blue	LU	p
Ogyris amaryllis meridionalis (coastal form)	Amaryllis Azure		p
Theclinesthes miskini miskini	Wattle Blue	LU	p
Vanessa kershawi	Australian Painted Lady	LC, Mi	p
Zizina labradus labradus	Common Grass-blue	LC	p

Vulnerabilitay as per R. Grund, E: Endangered, V: Vulnerable, R: Rare, Va: Vagrant, Mi: Migrant, LC: Locally common, LU: Locally uncommom
x: recorded, p: possibly there as suggested by R. Grund

Mammals

No mammal species recorded

Reptiles

Species	Common Name	Aus status	SA status	Record
Amphibolurus norrisi	Mallee Tree-dragon			e
Ctenotus euclae	Bight Coast Ctenotus			c
Ctenotus orientalis	Spotted Ctenotus			e
Delma australis	Barred Snake-lizard			e
Diplodactylus calcicolus	South Coast Gecko			c
Drysdalia mastersii	Master's Snake			c
Egernia stokesii	Gidgee Skink			e
Gehyra lazelli	Southern Rock Dtella			c
Gehyra variegata	Tree Dtella			e
Hemiergis initialis	Western Earless Skink			c
Lerista dorsalis	Southern Four-toed Slider			e
Lerista edwardsae	Myall Slider			e
Lerista terdigitata	Southern Three-toed Slider			e
Menetia greyii	Dwarf Skink			e
Morethia adelaidensis	Adelaide Snake-eye			e
Morethia obscura	Mallee Snake-eye			c
Nephrurus milii	Barking Gecko			c
Parasuta spectabilis	Mallee Black-headed Snake			c
Pseudonaja affinis	Dugite			c
Pygopus lepidopodus	Common Scaly-foot			c

R: Rare, V: Vulnerable, E: Endangered
x: recorded, e: potentially everywhere (M. Hutchinson pers. comm), c: could occur (M. Hutchinson pers. comm)

Amphibians

No amphibian species recorded

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