

**Southern Brown Bandicoot, Biodiversity and Habitat Report
Port Campbell Headland
for
Port Campbell Community Group Inc & Port Campbell Boardriders
Assoc.**

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Executive Summary

Mal's Environmental & Ecological Services was commissioned by the Port Campbell Community Group Inc. to complete a report on the Southern Brown Bandicoot and other biodiversity, with particular consideration of any possible significant and threatened flora and fauna, of the Port Campbell Headland's Crown Land Reserve. The study site is approximately 4.7 hectares in size and habitat within includes two identified EVC's. The reserve is also part of the coastal bio-link that links with the Otway Ranges and coastal South Australia. The presence of threatened or endangered EVC's, flora and fauna species rates the reserve at a State to National significance rating.

Aims and Objectives

The main purpose of this study was to identify EVC's, flora and vertebrate fauna species within the reserve and to identify threatened species and their essential habitats. The outcomes of this assessment are to guide the managers into sustaining the significant and common fauna and their habitat that have been detected and to identify possible impacts or risks associated with feral animals and other threatening processes.

The brief for this project was to establish the flora and fauna values that occur or could occur within the study site. Flora and fauna values considered in this report include all common and significant species and native vegetation types. Also included were the role of native vegetation in a landscape context to provide habitat and bio-links for biodiversity.

Methods and Results

Flora and fauna surveys and mapping were undertaken during six days field work in both August 2011 and September 2012. Methods, undertaken in accordance with permit conditions included identifying appropriate habitat and identifying all flora and fauna species, Elliot traps, active searching, scat analysis, digging analysis, Scout-guard cameras, spotlighting, Anabat 2 Bat Detector and vocalization identification. A total of 52 vascular plant taxa were recorded in the study area during this survey, of which 28 were indigenous (54%), and 24 (46%) were introduced, planted or naturalized outside their natural range. A total of 79 species of fauna were recorded within the study site. Of these 68 species are native and eleven species are introduced. This includes species of reptiles, birds and mammals.

No flora species of national or state significance were recorded within the study site but the area is suitable habitat for the EPBC listed Metallic Sun Orchid which is hard to detect as it can present one year and not the next. Two Ecological Vegetation Classes were determined, of which both EVC's are considered vulnerable.

During this survey one fauna species was recorded as Nationally endangered and listed under the *Environment Protection and Biodiversity Act 1999*. Five state significant species were recorded during this study. Four of those species are listed under the *Flora and Fauna Guarantee Act 1988* as threatened. In addition, a further 12 species recorded are considered to be of regional significance and five species recorded are considered to be of high local significance. Due to past large-scale fauna populations and habitat losses within

the Corangamite Shire the remaining native fauna can be considered to be at local significance levels.

Vegetation

In the past majority of the reserve has been modified or changed due mostly to clearing of indigenous vegetation for urban development, roads, car parks, walking paths and stock feeding. However the clearing of vegetation phases has stopped and the indigenous vegetation is now consistent within the reserve. Approximately 70% of the headland is considered to be covered in native vegetation, both remnant and re-growth from past disturbances.

The quality of vegetation within the two EVC's is very high, with most areas supporting high quality grassy and sedgy understoreys with a shrubby overstorey. Some habitat-changing weed species have invaded in the past but most are being dealt with accordingly. Most remaining indigenous vegetation sites are almost exclusively indigenous due to recent weeding works by the community group.

Conclusions

The area is of very high ecological significance with state threatened EVC's and fauna species of National, State and Regional significance with species listed on the EPBC Act and the FFG Act as endangered or threatened.

The site contains important breeding habitat for nationally endangered Southern Brown Bandicoot and state threatened Swamp Antechinus and Rufous Bristlebird.

The site provides two types of threatened fauna vegetation, one for breeding the other for foraging.

An integrated and on-going feral control program should be introduced to the study site and surrounding national park. Stake-holders to become involved include Corangamite Shire, DSE, DPI, Parks Victoria, CCMA, Landcare, the community group and wider community members.

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1. SCOPE OF REPORT

Malcolm Legg from Mal's Environmental and Ecological Services was commissioned by the Port Campbell Community Group Inc. To complete a report on the Southern Brown Bandicoot and other biodiversity, with particular consideration of any possible significant flora and fauna, of the Port Campbell Headland's Crown Land Reserve. This continues earlier work and a report on the headland.

On the 27-09-2012 Malcolm Legg was also commissioned to make a presentation to stakeholders at the Port Campbell Surf Life-saving Club on the biodiversity of the headland, and threats, and to make recommendations for management.

2. PERSONS CARRYING OUT REPORT

The flora and fauna survey was conducted by Malcolm Legg.

3. STUDY SITE AND SURROUNDING AREAS

The study site is approx 4.7 hectares.

The site is comprised of two distinct EVC modules:

- Coastal Headland Scrub
- Coastal Tussock Grassland

3.1 THE SITE CHARACTERISTICS:

- The site is a narrow remnant of coastal heath and scrub between the township and the actively receding limestone cliffs.
- The site is a wildlife corridor linking the national park on the east to the west across the foreshore reserve.

The Ecology Australia Report (2003) suggests Module 1(Coastal Tussock Grassland) is of higher significance than Module 2 (Coastal Headland Scrub), however more recent surveys including this survey and threatened fauna monitoring by the community group over two years with remote cameras indicates that EVC module 2 is highly significant as a Southern Brown Bandicoot, Swamp Antechinus and Rufous Bristlebird breeding habitat.

3.2 INTERDEPENDENCE OF MODULES.

3.2.1 GEOLOGY

The Geology at the site and surrounding area occurs on limestone soils, comprising humus-rich marine sands over calcareous clays. The area is of high geological significance due to

Its cliffs, sea caverns and karst tunnels and is part of the commonwealth government *Great Ocean Road and Environs* (national listing); the state government Coastal Spaces (national listing); and the National Trust (national listing). The headland area also has a National Trust (state listing).

The geology is described in detail by specialists in this field: See reports by–

Dr E.C.F. Bird *The Coast Of Victoria: The Shaping of Scenery*. Melbourne University Press. 1993.

Dr Susan White Expert statement re the planned development subdivision at 2 –10 Lord Street, Port Campbell. 2009.

Russell Brown, Geotechnical Report – Southern Ocean Beach House, 10 Nov 2009.

3.2.2 VEGETATION

The headland's existing flora consists of Coastal Heathland Scrub and Coastal Tussock Grassland, rated as of very high ecological significance (Ecology Australia, 2003) as only 46% of the Victoria's original extent of these Ecological Vegetation Classification (EVC) remains. A particularly significant species found here is the Metallic Sun Orchid *Thelymitra epipactoides*, listed as nationally significant under the Environment Protection and Biodiversity Conservation Act (1999).



MAP 1:- shows the two EVC Modules.

The extent of the indigenous vegetation within the reserve and surrounding area during pre European settlement was thought to have been 4245 ha in size. Today only 1971 ha (46%) remains, which is mostly reserved land surrounded by cleared pasture.

Module 1 (Coastal Tussock Grassland) occurs on poorer soils with little humus and exposed to harsher conditions. Shrub vegetation is stunted and usually doesn't exceed the height of the grasses and sedges.

Module 2 (Coastal Headland Scrub) occurs on richer deep humus soils where shrub layer dominates and greatly exceeds the grassy and sedgy understorey in height. It usually has a warmer and more sheltered aspect.

4. FLORA

4.1 FLORA SURVEY METHODS

Flora and Fauna surveys were conducted during field trips over six days in August 2011 and September 2012. Dedicated searches for rare flora species were also made during these fieldwork periods. This involved making observations of habits of all plant species and included searches for significant flora species detected within the general area on database searches.

A flora species list for the entire study area was compiled for inclusion in DSE's Flora Information System (FIS). This included species recorded during fieldwork and incidental sightings of species outside of subject site.

Refer to flora list in Appendix 1 of this report.

4.2 FLORA SURVEY RESULTS

A total of 52 vascular plant taxa were recorded in the study area during this survey, of which 28 were indigenous (54%), and 24 (46%) were introduced, planted or naturalized outside their natural range. Appendix 1 lists all flora species recorded within the study area. Table 1 summarizes plant species recorded in the study area during this survey.

Table 1. Summary of vascular plants recorded in the study area

Plant status	Numbers
Indigenous	28
Exotic	19
Native species outside of natural range	5
TOTAL	52

4.3 SIGNIFICANT FLORA SPECIES

No species of national or state significance were recorded within the study site but the area is suitable habitat for the EPBC listed Metallic Sun Orchid which is hard to detect as it can present one year and not the next.

4.4 ECOLOGICAL VEGETATION CLASSES

The type and quality of vegetation varies throughout the study site ranging from highly valuable habitat (Coastal Headland Scrub) with two significant breeding sites for Southern Brown Bandicoot, Swamp Antechinus and Rufous Bristlebird to Coastal Tussock Grassland which is utilized as foraging and feeding sites for the above three species. Other habitat has been altered or changed due to the construction of roads, car parks and urban subdivisions.

EVCs were assigned to native vegetation based upon resemblance to 1:25,000 EVC mapping (Oates and Taranto 2001). However, there were some differences between EVC mapping and site conditions due to the scale of mapping undertaken by Oates and Taranto (2001).

The study area supports two EVCs. Each EVC and its bioregional conservation status are presented in table 2 below.

Table 2. Ecological Vegetation Classes (EVCs) occurring within the study area.

EVC No.	EVC	Bioregion Status [^]	Conservation	Current distribution within the study area
161	Coastal Headland Scrub	Vulnerable		Dominant native vegetation across some of the study area
163	Coastal Tussock Grassland	Vulnerable		Dominant native vegetation across majority of study area

[^]Taken from DSE (2008)

4.5 EVC SUMMARY SHEET

4.5.1–COASTAL TUSsock GRASSLAND (Module 1)

Structure–Low (30cm to 1m) closed grassland with stunted shrubs.

Environment–Resides on the poorer and more exposed soils with little or no humus. Heavy clays prevent good drainage.

Aspect–Exposed and harsh areas along coastal cliffs and on poor soils inland.

Mean floristic richness– 43 species

Mean weed composition–16 species

Table 3: EVC 163- Coastal Tussock Grassland, character species.

Botanical Name	Common Name
Shrubs	
<i>Banksia marginata</i>	Silver Banksia
<i>Leptospermum scoparium</i>	Manuka
<i>Leucopogon parviflora</i>	Coast Beard-heath
<i>Olearia axillaris</i>	Coast Daisy-bush
Understorey	
<i>Dichondra repens</i>	Kidney-weed
<i>Gonocarpus tetragynus</i>	Common Raspwort
<i>Hibbertia aspera</i> s.l.	Rough Guinea-flower
<i>Oxalis corniculata</i> s.s.	Yellow Wood-sorrel
<i>Pultenaea stricta</i>	Rigid Bush-pea
<i>Viola hederacea</i> sensu Willis (1972)	Ivy-leaf Violet
Graminoides	
<i>Dianella revoluta</i>	Black-anther Flax-lily
<i>Distichlis distichophylla</i>	Australian Salt-grass
<i>Gahnia trifida</i>	Coast Saw-sedge
<i>Lepidosperma gladiatum</i>	Coast Sword-sedge
<i>Poa poiformis</i>	Coast Tussock-grass
<i>Schoenus apogon</i>	Common Bog-sedge

Largish areas of Coastal Tussock Grassland are occurring through-out the site and on some previously disturbed sites.



Both pictures portray Coastal Tussock Grassland on the crown land

4.5.2–COASTAL HEADLAND SCRUB (Module 2)

Structure–High (1m to 4m) semi-closed shrub layer surrounded by scattered understorey.

Environment–Resides on deeper rich humus soils with is usually sheltered and less exposed and usually well drainage.

Aspect–Sheltered sites along the coastal cliffs and inland where deep soils occur.

Mean floristic richness– 22 species

Mean weed composition–12 species

Table 4: EVC 161- Coastal Headland Scrub, character species.

Botanical Name	Common Name
Shrubs	
<i>Acacia verticillata</i>	Prickly Moses
<i>Banksia marginata</i>	Silver Banksia
<i>Cassinia aculeata</i>	Common Cassinia
<i>Leptospermum scoparium</i>	Manuka
<i>Leucopogon parviflora</i>	Coast Beard-heath
<i>Olearia axillaris</i>	Coast Daisy-bush
Understorey	
<i>Acrotriche serrulata</i>	Honey-pots
<i>Gonocarpus tetragynus</i>	Common Raspwort
<i>Oxalis corniculata</i> s.s.	Yellow Wood-sorrel
<i>Clematis microphylla</i> s.l.	Small-leaved Clematis
<i>Viola hederacea</i> sensu Willis (1972)	Ivy-leaf Violet
<i>Gahnia trifida</i>	Coast Saw-sedge
<i>Schoenus apogon</i>	Common Bog-sedge
<i>Dianella revoluta</i>	Black-anther Flax-lily
<i>Ficinia nodosa</i>	Knobby Club-sedge
<i>Distichlis distichophylla</i>	Australian Salt-grass

Coastal Headland Scrub is the less dominant EVC and its original structure resides within the reserve and some private properties. On some properties it is under threat from housing developments.



Both pictures portray Coastal Headland Scrub on the crown land.

4.6 FLORA MANAGEMENT

4.6.1 ADJOINING PROPERTIES

Southern Brown Bandicoot digging sites were observed from the boundary of the crown land on adjoining private properties and the headland scrub appears to be important foraging and breeding sites for Southern Brown Bandicoot, Swamp Antechinus and Rufous Bristlebirds.

Some adjoining private landowners already have indigenous shrub layers within which have been slashed. If these were allowed to grow to their size and structure they would then become important breeding habitat for Southern Brown Bandicoot and would turn back into Coastal Headland Scrub.

Many adjoining properties have weedy trees including Coastal tea tree, Coast Banksia, Norfolk Island Hibiscus, New Zealand Christmas Tree, Sweet Pittosporum and Mirror Bush etc. Many of the street trees are also considered weeds in this area – *Banksia integrifolia*, New Zealand Christmas Tree *Metrosideros excels*, Norfolk Island Hibiscus *Lagunaria patersonia*. Seeds from these species are spread by birds to the crown land and surrounding national park creating a costly ongoing weeding program.

The weedy trees also attract non indigenous birds to the area, such as Wattlebirds which compete with and drive out the indigenous birds such as Rufous Bristlebirds, smaller honeyeaters and leaf-gleaming birds.

It is recommended that weedy street trees are gradually replaced with indigenous and that landowners are educated and encouraged to replace weedy trees with indigenous trees. This will help to extend the habitat for the threatened fauna species.

5. FAUNA

5.1 FAUNA SURVEY METHODS

Visual detection of fauna was conducted on the headland's crown-land reserve. Fauna surveys were deployed using the following methods.

- Reptiles were identified by sight, hand capture and were detected under tin, rubbish or logs and on Scout-guard camera.
- Birds were identified by sight, their calls and deploying Scout-guard cameras.
- Mammals were identified by deploying Scout-guard cameras, conducting one spotlight walk and by sight.

Taxa were identified using reference literature including Cogger (2000), Menkhorst (1996), Simpson and Day (1999) and Strahan (1998).

5.2 FAUNA SURVEY RESULTS

A total of 79 species of fauna were recorded within the study site. Of these 68 species are native and eleven species are introduced.

No species of Decapod Crustaceans, no species of Fresh Water Fish and no species of Amphibian were recorded within the study site.

Six species of reptiles were recorded during this survey of which four species are lizards and two species are snakes.

58 species of birds were recorded during this survey within the site and surrounding area. 52 of these are native species and six species are introduced.

15 species of mammals were recorded during this survey. Five of these species are introduced. There appears to be a medium diversity of mammals still inhabiting the area including breeding and foraging habitat for the Swamp Antechinus and Southern Brown Bandicoot.



Swamp Antechinus. Photo Marion Manifold.



ScoutGuard 01.17.2012 01:09:54
Rufous Bristlebird and Southern Brown Bandicoot. Photo Marion Manifold.



Southern Brown Bandicoot digging. Photo Malcolm Legg.



ScoutGuard 01.19.2012 23:37:0
Short-beaked Echidna. Photo Marion Manifold.



58 AM M 3/3 8°C
RECONYX
Buff-banded Rail. Photo Marion Manifold.



Singing Honeyeater. Photo Malcolm Legg.

6. FLORA & FAUNA SIGNIFICANCE

Assessment methods or criteria used to determine the significance of flora and fauna species, plant communities, fauna habitats and sites are consistent with up-to-date government policies, legislation and publications.

6.1 FLORA

- Two state significant EVC's which are listed as Vulnerable.
- A total of 52 vascular plant taxa were recorded in the study area during this survey, of which 28 were indigenous (54%) and 24 (46%) are exotic species.

6.1.1 PLANT COMMUNITIES

- Two Ecological Vegetation Classes present, of which both EVC's are considered vulnerable
- The vegetation is considered to have *very high* conservation significance. This is based on the presence of shrub cover, low weed cover, reasonable species richness, presence of habitat for threatened species and the high levels of shrub recruitment.
- Due to their intact condition and conservation status the EVCs Coastal Headland Scrub and Coastal Tussock Grassland are considered to be State significant.
- The site is also considered to be "an ecologically intact bioregional representation of habitat within the bioregion.
- The vegetation in the reserve and surrounding private properties is unique in that it contains sufficient vegetation cover for threatened species to breed in.

6.2 FAUNA

- During this survey one fauna species was recorded as Nationally endangered and listed under the *Environment Protection, Biodiversity and Conservation Act 1999*.
- Five state significant species were recorded during this study. Four of those species are listed under the *Flora and Fauna Guarantee Act 1988* as threatened.
- In addition, a further 12 species recorded are considered to be of regional significance and five species recorded are considered to be of high local significance.
- Due to past large-scale fauna populations and habitat losses within the Corangamite Shire the remaining native fauna which don't retain a high local to National significance rating can be considered to be at local significance levels.

High local to national significant species identified during this survey are listed in Table 5 below.

6.2.1 SIGNIFICANT FAUNA SPECIES DETECTED WITHIN THE STUDY SITE

KEY TO DEFINING SIGNIFICANT SPECIES

Signif Significant/status of species is designated by:

N National

S State

R Regional

HL High Local

NRE Threatened Vertebrate in Victoria-2000 (NRE 2000)

FFG *Flora and Fauna Guaranteed Act 1988*

ActPI Action Plan approved by Environmental Australia

EPBC *Environment Protection and Biodiversity Conservation Act 1999*

TR International Treaties, C=China (CAMBA) and J=Japan (JAMBA).

Cen critically endangered

Un Uncommon

End endangered

MC Moderately Common

Vul vulnerable

LC Locally Common

LR lower risk-near threatened

C Common

NT Near Threatened

Lim Limited

DD data deficient

Ls Listed

M Migratory under the EPBC Act

TABLE 5-Significant fauna taxa detected throughout the study site during this survey.

Common Name	Scientific Name	Signi	NRE.	FFG.	ActPI	EPBC	TR
Reptiles							
Eastern Three-lined Skink	<i>Bassiana duperreyi</i>	R	MC				
Weasel Skink	<i>Saproscincus mustelinus</i>	R	MC				
Common Blue-tongue	<i>Tiliqua scincoides</i>	R	MC				
White-lipped Snake	<i>Drysdalia coronoides</i>	R	Un				
Birds							
Pied Cormorant	<i>Phalacrocorax varius</i>	S	LR				
Buff-banded Rail	<i>Gallirallus philippensis</i>	R	Un				
Pacific Gull	<i>Larus pacificus</i>	S	LR				
Crested Tern	<i>Sterna bergii</i>	R	MC				
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	S	Vul	L	Y		
Wedge-tail Eagle	<i>Aquila audax</i>	HL	MC				
Swamp Harrier	<i>Circus approximans</i>	HL	MC				
Common Bronzewing	<i>Phaps chalcoptera</i>	HL	C				
Yellow-tailed Black-Cockatoo	<i>Calyptorhynchus funereus</i>	HL	MC				
Southern Emu-wren	<i>Stipiturus malachurus</i>	R	Un				
Rufous Bristlebird	<i>Dasyornis broadbenti</i>	S	LR	L	Y		
Singing Honeyeater	<i>Lichenostomus virescens</i>	HL	MC				
Eastern Yellow Robin	<i>Eopsaltria australis</i>	R	Un				
Mammals							
Short-beaked Echidna	<i>Tachyglossus aculeatus</i>	R	C				
Swamp Antechinus	<i>Antechinus minimus</i>	S	LR	L	Y		
Southern Brown Bandicoot	<i>Isodon obesulus</i>	N	LR	L	Y	En	
Black Wallaby	<i>Wallabia bicolor</i>	R	MC				
Micro bats	<i>Vespadelus sps.</i>	R	C				
Swamp Rat	<i>Rattus lutreolus</i>	R	C				

6.2.2 FAUNA HABITATS

- The study area is part of an important coastal bio-link (flora and fauna habitat corridor) that extends along the Port Campbell coast to the Otway ranges. This is the only functioning bio-link within the area thus allowing flora and fauna connectivity.
- Forms part of the key regional biolink from the Otway ranges pass Port Campbell to the South Australian border.
- Two sections of the study site contain highly important Southern Brown Bandicoot and Swamp Antechinus breeding sites.
- Supports two different vegetation types suitable for threatened fauna, one a breeding nursery the other a foraging and feeding site.



Tiger Snake. Photo Marion Manifold.

7. DISCUSSIONS

7.1 CRITICAL HABITAT FOR THREATENED FAUNA

The study area is noted as having shrub layer consisting of Coast Beard-heath, Coast Daisy Bush and Boobiella which provide sufficient cover for Southern Brown Bandicoot's, Swamp Antechinus and Rufous Bristlebird to breed. This type of vegetation containing shrub layer is found not only within the study site but also on the adjacent private land through-out the point. However the vegetation changes into grassland along the former Great Ocean Road which is now a track to the point and car park. These grasslands are not sufficient breeding habitat but are important foraging and feeding habitat for the threatened species.

The important breeding habitat is thus reduced to Coastal Headland Scrub itself and has been severely depleted within the nearby housing estate, along the foreshore to the north and at the car park below Beacon Point. The total breeding habitat has been reduced to approximately 20% to 30% of its original extent.



This photo shows important Southern Brown Bandicoot breeding shrub habitat adjacent to the private properties and surrounded by non Southern Brown Bandicoot breeding grasslands. Photo Malcolm Legg.

The large reduction in over-all breeding habitat within the area makes the shrub habitat within the reserve and on adjacent private property extremely important as breeding and nursery habitat for threatened fauna species. This is further highlighted by the extensive photo and video footage taken by myself and Marion Manifold of female Southern Brown Bandicoot and Swamp Antechinus with pouch young coming out of the shrub breeding habitat. This constitutes 100% proof that the threatened fauna species are utilizing the highly valuable breeding habitat within both the reserve and adjacent private property.

In summary, the study area contains the important shrub layer as breeding sites for threatened fauna of National and State significance and is considered at National to State significance levels.

7.2 IMPACTS

7.2.1 LOSS OF HABITAT

The loss of any essential breeding habitat on the headland will add to the over-all decline of habitat and populations of threatened species within the site and local area. The clearing of state threatened EVC's contributes to the continued decline of these EVC's within the area and the state, whether it is cleared on a large or small scale. Both EVC's have been reduced by over 50% within the Shire of Corangamite since European settlement.

Scale of impact: Local, bioregional, state and national levels

7.2.2 NATIONALLY SIGNIFICANT FAUNA

The nationally endangered Southern Brown Bandicoot has been recorded on the study site. The Coastal Headland Scrub vegetation is highly important breeding and nursery sites for the bandicoots.

7.2.3 HUMAN IMPACTS

Walking tracks should be formalized keeping the distance as far from the breeding habitat as possible, that is, as far south as possible.

7.2.4 STATE SIGNIFICANCE SPECIES

The two state significant fauna species were both observed or photographed on the crown land and adjoining private land. They appear to utilize the shrub habitat as a breeding and roosting site while lower vegetation surrounds are used as feeding and foraging sites.

7.2.5 SOUTHERN BROWN BANDICOOT HABITAT

Any removal of state significant vegetation and nationally significant habitat will result in a State – national impact.

The vegetation Modules are co-dependent and considered to be of *very high* conservation significance under *Victoria's Native Vegetation Framework*. It also is important habitat for several fauna species including state and nationally threatened fauna and the removal of any breeding habitat will greatly reduce fauna populations and diversity.

Scale of impact of any vegetation removal: State–National

- The vegetation is high quality – as noted in the DSE letter: 1 Hennessy Street. 28 February 2011.
- Fences dividing the reserve from private properties actually assist the bandicoots survival against predators;

- Photo monitoring demonstrates there is a low predator rate even though the site is in and adjoins the town;
- The Southern Brown Bandicoot breeding colonies inhabits smallish pockets of deep sandy soil, whereas much of the broader area is unsuitable due to clay soils.
- Off site impacts of any proposed development adjacent to the reserve need to be considered, e.g. if a house is built six meters or more from the reserve then fragile high-quality coastal Crown land can or will be destroyed for fire breaks.

Every bandicoot colony that gets destroyed or is taken from its habitat is one step closer to extinction.

Scale of impact: National

7.2.6 FERAL FAUNA

Feral fauna observed at the study site which impact directly upon threatened fauna species includes *Black Rat, *Red Fox, *Feral Cat and *European Rabbit. Most feral species appear to be low to medium in population densities, however *Black Rats along with domestic and feral cats appear to be at a medium to high population level. Scout-guard camera results showed foxes and cats hunting at the same sites where threatened and common fauna species were filmed. The impacts that feral fauna are having upon threatened fauna is probably high and further research is warranted to determine this scenario.

There is currently no feral control programs deployed within the reserve or in the surrounding national park or private farming land. All stakeholders – Corangamite Shire, DSE, DPI, Parks Victoria, CCMA, Landcare, the community group and wider community members – are urged to undertake an integrated and ongoing feral control program for the crown land reserve, Port Campbell township, and surrounding national park and farm lands.



Fox resting in front of Scout-guard camera. Photo Marion Manifold.

Foxes showing courtship display. Photo Marion Manifold.



Feral Cat. Photo Marion Manifold.

7.3 USE OF REMOTE FAUNA CAMERAS

For the last two years the community group has been conducting threatened fauna monitoring on the reserve and within adjacent private property. This consists of deploying Scout-guard cameras to monitor Swamp Antechinus, Southern Brown Bandicoot, Rufous Bristlebird and Buff-banded Rail. These species are known as Iconic Fauna Monitoring Species (IFMS) that regularly cross in the path of the cameras. IFMS's are also adversely affected by high feral predation, displacement and human impacts of a great range.



Female Southern Brown Bandicoot with pouch young.

Swamp Antechinus with pouch young. Both photos Marion Manifold.

The important fauna monitoring information that has been gathered by Marion Manifold & the Port Campbell Community Group includes:

- Consistent records of threatened fauna across two years
- Preferred Southern Brown Bandicoot and threatened fauna habitat, soil types and feeding sites
- Proven breeding sites within the Coastal Headland Scrub vegetation, which acts as nurseries with sunny and protected aspects

- Individual Southern Brown Bandicoots have been recognized and their habits observed
- Feral predator presence, individual habits and population densities.

8. CONCLUSIONS

The following statements are conclusions on the basis of this and other reports

The area is of very high ecological significance with state threatened EVC's and fauna species of National, State and Regional significance with species listed on the EPBC Act and the FFG Act as endangered or threatened.

The site contains important breeding habitat for nationally endangered Southern Brown Bandicoot and state threatened Swamp Antechinus and Rufous Bristlebird.

The site provides two types of threatened fauna vegetation, one for breeding the other for foraging and feeding.

An integrated and on-going feral control program should be introduced to the study site and surrounding national park. Stake-holders to become involved include Corangamite Shire, DSE, Parks Victoria, CCMA, Landcare, and the community group and community members.

9. RECOMMENDATIONS & MANAGEMENT

1. All stakeholders to meet and to co-ordinate or develop a Southern Brown Bandicoot Recovery Program for the South-west of Victoria including the Port Campbell population – Parks Victoria, DSE, councils, Catchment Management Authority, Landcare, community groups and private landholders.
2. All stakeholders to meet to co-ordinate and contribute to an integrated and ongoing feral animal control program – Parks Victoria, DSE, Council, CMA, Landcare, community groups and private landholders, both on and offsite in the surrounding national park and farming properties.
3. Preserve all indigenous vegetation on the headland to protect a highly significant Southern Brown Bandicoot and other threatened fauna breeding site.
4. The remnant Great Ocean Road from Beacon Point to the top of Cairns Street should be revegetated with a pedestrian walking track only. This will increase the Southern Brown Bandicoot and other threatened fauna habitat.
5. Great care should be taken when weeding to prevent removal of large areas of habitat changing weed vegetation at any one time, as Southern Brown Bandicoot's do not differentiate between indigenous and non-indigenous plants as protective cover for breeding ground.
6. Any undeveloped adjoining properties to be bought under a compensation scheme and included in the crown land reserve to extend the habitat and protect the narrow coastal wildlife corridor.
7. Continue to monitor Southern Brown Bandicoot's and other threatened fauna and flora.
8. Limit EPBC and FFG impacts through regular assessment.
9. Any destruction of bandicoot habitat results in penalty criteria to apply. It is disappointing that in an earlier case the Federal Department appears to have allowed seemingly intentional destruction of an endangered protected species and their habitat without any penalty.
 - If there is inadequate scientific knowledge on the bandicoot's greater habitat requirements in an area, such as at Port Campbell, the precautionary principle should be followed until further research is undertaken.
 - Assessment should be subjective and need set assessment criteria and quantitative measures against which an assessment is made.

- The criteria for whether a referral is of National Environmental Significance must be clear and objective and cannot be decided until scientific data on the Southern Brown Bandicoot's habits is fully assessed.
- The Act should require more transparency and accountability by ensuring all forms and parts of department assessments are clear and sent in writing to all parties.

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APPENDIX 1: Vascular Plant Taxa Recorded within the Study Area

Flora surveys undertaken by Malcolm Legg during the following periods 12–08 to 14–08–2011 and 26–09 to 28–09–2012.

Codes for status within Victoria:

- * introduced species
- # ecologically out-of-balance or non-indigenous native species
- r rare in Victoria in Victoria in DSE (2005)
- ® listed as rare in Victoria in DSE (2005), however taxa has been introduced to the site

Family	Botanical Name	Common Name
GYMNOSPERMS		
Araucariaceae		
*	<i>Araucaria heterophylla</i>	Norfolk Island Pine
ANGIOSPERMS		
MONOCOTYLEDONS		
Cyperaceae		
	<i>Gahnia trifida</i>	Coast Saw-sedge
	<i>Lepidosperma gladiatum</i>	Coast Sword-sedge
	<i>Schoenus apogon</i>	Common Bog-sedge
Hemerocallidaceae		
	<i>Dianella revoluta</i>	Black-anther Flax-lily
Iridaceae		
*	<i>Crocasmia x crocosmiiflora</i>	<i>Montbretia</i>
Juncaceae		
	<i>Ficinia nodosa</i>	Knobby Club-sedge
Poaceae		
	<i>Distichlis distichophylla</i>	Australian Salt-grass
*	<i>Dactylis glomerata</i>	Cocksfoot
*	<i>Lagurus ovata</i>	Hare's-tail Grass
	<i>Poa poiformis</i>	Coast Tussock-grass
*	<i>Pennisetum clandestinum</i>	Kikuyu
*	<i>Stenotaphrum secundatum</i>	Buffalo Grass
DICOTYLEDONS		
Apiaceae		
*	<i>Hypochoeris radicata</i>	Cat's Ear
*	<i>Leontodon taraxacoides subsp. Taraxacoides</i>	Hairy Hawkbit
	<i>Olearia axillaris</i>	Coast Daisy-bush
*	<i>Sonchus oleraceus</i>	Common Sow-thistle
Apocynaceae		
	<i>Alyxia buxifolia</i>	Sea Box
Asteraceae		
	<i>Cassinia aculeata.</i>	Common Cassinia
*	<i>Cirsium vulgare</i>	Spear Thistle
*	<i>Gazania linearis</i>	Gazania
*	<i>Hypochoeris radicata</i>	Cat's Ears
	<i>Leucophyta brownii</i>	Cushion Bush
	<i>Senecio lautus</i>	Variable Groundsel
Convolvulaceae		
	<i>Dichondra repens</i>	Kidney-weed

Family	Botanical Name	Common Name
Dilleniaceae		
	<i>Hibbertia aspera s.l.</i>	Rough Guinea-flower
Epacridaceae		
	<i>Acrotriche serrulata</i>	Honey-pots
	<i>Leucopogon parviflora</i>	Coast Beard-heath
Dilleniaceae		
	<i>Hibbertia aspera s.l.</i>	Rough Guinea-flower
Epacridaceae		
	<i>Acrotriche serrulata</i>	Honey-pots
	<i>Leucopogon parviflora</i>	Coast Beard-heath
Fabaceae		
	<i>Pultenaea stricta</i>	Rigid Bush-pea
Gentianaceae		
*	<i>Centaurium erythraea</i>	Common Centaury
Haloragaceae		
	<i>Gonocarpus tetragynus</i>	Common Raspswort
Malvaceae		
*	<i>Lagunaria patersonii</i>	Norfolk Island Hibiscus
Mimosaceae		
*#	<i>Acacia longifolia subsp. Longifolia</i>	Sallow Wattle
*#	<i>Acacia longifolia subsp. Sophorae</i>	Coast Wattle
	<i>Acacia verticillata</i>	Prickly Moses
Myoporaceae		
	<i>Myoporum insulare</i>	Boobialla
Myrtaceae		
*#	<i>Leptospermum laevigatum</i>	Coast Tea-tree
	<i>Leptospermum scoparium</i>	Manuka
*	<i>Metrosideros excelsa</i>	Pohutukawa (New Zealand Christmas Tree)
Oxalidaceae		
*	<i>Oxalis corniculata s.s.</i>	Yellow Wood-sorrel
Pittosporaceae		
*#	<i>Pittosporum undulatum</i>	Sweet Pittosporum
Proteaceae		
*#	<i>Banksia integrifolia</i>	Coast Banksia
	<i>Banksia marginata</i>	Silver Banksia
Ranunculaceae		
	<i>Clematis microphylla s.l.</i>	Small-leaved Clematis
*	<i>Lycium ferrocissimum</i>	African Box Thorn
Roseaceae		
	<i>Acaena ?</i>	Bidgee Widgee
Rubiaceae		
*	<i>Coprosma repens</i>	Taupata
Veronicaceae		
*	<i>Plantago coronopus</i>	Buck's-horn Plantain
Violaceae		
	<i>Viola hederacea sensu Willis (1972)</i>	Ivy-leaf Violet
*denotes introduced species		

Appendix 2: Fauna Species Detected During This Survey

Fauna taxa detected throughout study site during the survey by Malcolm Legg of Mal's Environmental and Ecological Services.

Codes for status within the site and Victoria:

*	introduced species
VU	Vulnerable in Victoria (DSE 2003b)
EN	Endangered in Victoria (DSE 2003b) or Australia (EPBC Act)
NT	Near threatened in Victoria (DSE 2003b)
L	listed as threatened under FFG Act 1988
I	Invalid or ineligible under FFG Act 1988

KEY-Significance/status of species:

N	National
S	State
R	Regional
HL	High Local
L	Local
*	Introduced

Type of record:

h	Heard
s	Seen
I	Incidental (scats, feathers etc.)
t	Trapped/handheld
B	Breeding residential bird
A	Anabat 2 Bat Detector
SC	Scout-guard camera

REPTILES RECORDED WITHIN THE STUDY SITE AND SURROUNDING AREA, September, 2012.

Scientific Name	Common Name	Conservation status within the area	Type of record
LIZARDS			
<i>Bassiana duperreyi</i>	Eastern Three-lined Skink	Uncommon	Rs
<i>Lampropholis guichenoti</i>	Garden Skink	Common	Lst
<i>Saproscincus mustelinus</i>	Weasel Skink	Uncommon	Rst
<i>Tiliqua scincoides</i>	Common Blue-tongue Lizard	Uncommon	Rst
SNAKES			
<i>Drysdalia coronoides</i>	White-lipped Snake	Rare	Rst
<i>Notechis scutatus</i>	Tiger Snake	Rare	Lsc

COASTAL BIRDS RECORDED WITHIN THE STUDY SITE AND SURROUNDING AREA, September 2012.

Scientific Name	Common Name	Conservation status within the area	Type of record
<i>Phalacrocorax varius</i>	Pied Cormorant	Rare	Ss
<i>Phalacrocorax melanoleucos</i>	Little Pied Cormorant	Rare	Ls
<i>Gallirallus philippensis</i>	Buff-banded Rail	Rare	Rhs
<i>Egretta novaehollandiae</i>	White-faced Heron	Uncommon	Ls
<i>Vanellus miles</i>	Masked Lapwing	Uncommon	Lhs
<i>Larus novaehollandiae</i>	Silver Gull	Common	Lhs
<i>Larus pacificus</i>	Pacific Gull	Uncommon	Shs
<i>Sterna bergii</i>	Crested Tern	Common	Rhs

WOODLAND BIRDS RECORDED WITHIN THE STUDY SITE AND SURROUNDING AREA, September, 2012.

Scientific Name	Common Name	Conservation status within the area	Type of record
<i>Elanus axillaris</i>	Black-shouldered Kite	Rare	Lhs
<i>Haliastur sphenurus</i>	Whistling Kite	Rare	Lhs
<i>Aquila audax</i>	Wedge-tail Eagle	Rare	HLs
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Rare	Shs
<i>Accipiter fasciatus</i>	Brown Goshawk	Uncommon	Lhs
<i>Circus approximans</i>	Swamp Harrier	Rare	Rs
<i>Falco peregrinus</i>	Peregrine Falcon	Rare	Lhs
<i>Falco cenchroides</i>	Nankeen Kestrel	Uncommon	Lhs
<i>*Streptopelia chinensis</i>	Spotted Turtle-Dove	Common	hs
<i>Phaps chalcoptera</i>	Common Bronzewing	Uncommon	HLhs
<i>Calyptorhynchus funereus</i>	Yellow-tailed Black Cockatoo	Uncommon	HLs
<i>Eolophus roseicapillus</i>	Galah	Uncommon	Lhs
<i>Cacatua tenuirostris</i>	Long-billed Corella	Common	Lhs
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	Common	Lhs
<i>Trichoglossus haematodus</i>	Rainbow Lorikeet	Common	Lhs
<i>Platycercus elegans</i>	Crimson Rosella	Uncommon	Ls
<i>Platycercus eximius</i>	Eastern Rosella	Uncommon	Lhs
<i>Cacomantis flabelliformis</i>	Fantail Cuckoo	Uncommon	Lhs
<i>Chalcites basalis</i>	Horsfield's Bronze-Cuckoo	Rare	Lhs
<i>Dacelo novaehollandiae</i>	Laughing Kookaburra	Rare	Lhs
<i>Malurus cyaneus</i>	Superb Fairy-wren	Common	Lhs
<i>Stipiturus malachurus</i>	Southern Emu-wren	Rare	Rhs
<i>Dasyornis broadbenti</i>	Rufous Bristlebird	Rare	Shs
<i>Sericornis frontalis</i>	White-browed Scrubwren	Common	Lhs
<i>Acanthiza pusilla</i>	Brown Thornbill	Common	Lhs
<i>Anthochaera carunculata</i>	Red Wattlebird	Common	Lhs
<i>Anthochaera chrysoptera</i>	Little Wattlebird	Common	Lhs
<i>Lichenostomus virescens</i>	Singing Honeyeater	Common	HLhs
<i>Phylidonyris pyrrhoptera</i>	Crescent Honeyeater	Uncommon	Lhs
<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater	Common	Lhs
<i>Acanthorhynchus tenuirostris</i>	Eastern Spinebill	Uncommon	Lhs
<i>Eopsaltria australis</i>	Eastern Yellow Robin	Rare	Rhs
<i>Colluricincla harmonica</i>	Grey Shrike Thrush	Uncommon	Lhs
<i>Pachycephala pectoralis</i>	Golden Whistler	Uncommon	Lhs
<i>Rhipidura fuliginosa</i>	Grey Fantail	Common at times	Lhs
<i>Rhipidura leucophrys</i>	Willy Wagtail	Uncommon	Lhs
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	Uncommon	Lhs
<i>Grallina cyanoleura</i>	Magpie-lark	Common	Lhs
<i>Cracticus torquatus</i>	Grey Butcherbird	Common	Lhs
<i>Gymnorhina tibicen</i>	Australian Magpie	Common	Lhs
<i>Corvus coronoides</i>	Australian Raven	Common	Lhs
<i>Corvus mellori</i>	Little Raven	Common	Lhs
<i>Hirundo neoxena</i>	Welcome Swallow	Common	Lhs
<i>Anthus novaeseelandiae</i>	Richard's Pipit	Uncommon	Lhs
<i>*Passer domesticus</i>	House Sparrow	Common	hs
<i>*Carduelis chloris</i>	European Goldfinch	Common	hs
<i>Zosterops lateralis</i>	Silvereye	Common	Lhs
<i>*Turdus merula</i>	Common Blackbird	Common	hs
<i>*Sturnus vulgaris</i>	Common Starling	Common	hs
<i>*Acridotheres tristis</i>	Common Myna	Common	hs
*Denotes introduced species			

MAMMALS RECORDED WITHIN THE STUDY SITE AND SURROUNDING AREA, September, 2012.

Scientific Name	Common Name	Conservation status within the area	Type of record
MONOTREMES			
<i>Tachyglossus aculeatus</i>	Short-beaked Echidna	Uncommon	Rsl
MARSUPIALS			
<i>Antechinus minimus</i>	Swamp Antechinus	Rare	S
<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot	Uncommon	NISG
<i>Trichosurus vulpecula</i>	Common Brushtail Possum	Rare	Lhs
<i>Pseudocheirus peregrinus</i>	Common Ringtail Possum	Uncommon	Lhsl
<i>Wallabia bicolor</i>	Black Wallaby	Rare	Rhs
PLACENTAL MAMMALS			
MICROBATS			
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat	Common	Rh
<i>Vespadelus darlingtoni</i>	Large Forest Bat	Uncommon	Rh
RODENTS			
<i>Rattus fuscipes</i>	Bush Rat	Common	Ltl
<i>Rattus lutreolus ssp. Lutreolus</i>	Swamp Rat	Common	Rtl
INTRODUCED MAMMALS			
* <i>Mus musculus</i>	House Mouse	Common	s
* <i>Rattus rattus</i>	Black Rat	Common	t
* <i>Oryctolagus cuniculus</i>	European Rabbit	Common	sl
* <i>Vulpes vulpes</i>	Red Fox	Common	sl
* <i>Felis catus</i>	Feral Cat	Common	t
*Denotes introduced species			

APPENDIX 3: Significant Fauna Management Recommendations

Threatened fauna habitat requirements and management recommendations.

Species	Habitat Requirements	Management Actions
Eastern Three-lined Skink	Terrestrial dwelling species found on sandy soils where intact understorey occurs.	Retain fallen timber and grassy understorey. Control vermin and habitat changing weeds.
Weasel Skink	Shade hugging species found amongst fallen timber and leaf-litter where intact understorey occurs.	Retain fallen timber, leaf-litter and grassy understorey. Control vermin and habitat changing weeds.
Common Blue-tongue	Large terrestrial dwelling skink species found where intact understoreys occur. Omnivore in choice of food.	Retain indigenous understorey, fallen limbs and trees throughout. Control vermin and habitat changing weeds.
White-lipped Snake	Terrestrial dwelling species found amongst fallen timber where intact grassy understorey occurs.	Retain indigenous understorey and fallen limbs and trees throughout, free of habitat changing weeds. Control vermin.
Pied Cormorant	Coastal species diving for fish and nests on islands or isolated sites.	Keep humans away from nesting and roosting sites.
Buff-banded Rail	Forages within grasslands and grassy and sedgy understoreys with a shrub or tree component.	Protect habitat and control vermin.
Pacific Gull	Coastal scavenger feeding on a variety of carrion and small prey. Nests on islands or rock shelves on cliffs.	Keep humans and feral fauna away from nesting and roosting sites.
Crested Tern	Coastal, diving to feed on fish and roosts and breeds on isolated islands.	Keep humans away from nesting and roosting sites.
Whistling Kite	Hunts over park, no nesting observed.	Control vermin and habitat changing weeds.
White-bellied Sea-Eagle	Large bird of prey. Coastal and river species soars on stiff upswept wings and hunts for fish and small mammals.	Keep humans and feral fauna away from nesting and roosting sites.
Wedge-tailed Eagle	Seen soaring over the study site. A carrion eater often seen soaring on long, fingered upswept wings.	Maintain bushland as some larger fauna species within or nearby are ideal food sources. Lobby to maintain rural areas around their habitat.
Swamp Harrier	Hunts low over tall grass, reeds, rushes, crops and wetlands. Soars with elevated wings, performs courtship displays and dives high above swamps. Nests close to ground.	Maintain habitat free of habitat changing weeds and vermin.
Common Bronzewing	Feeds on the ground through-out the study site. Builds a flimsy nest of sticks.	Maintain habitat free of habitat changing weeds and vermin and keep humans away from known breeding sites.
Yellow-tailed Black-Cockatoo	A resident of the area where it feeds on the seed of gums, pines, banksias and she-okes.	Erect suitable nesting boxes through-out the township to encourage breeding.
Southern Emu-wren	Prefers coastal heaths, swamps and grasslands with dense cover. Flight feeble	Maintain habitat free of habitat changing weeds and vermin and keep humans away from known breeding sites.
Rufous Bristlebird	Prefers dense coastal heaths, tall thickets, and wet forest.	Maintain habitat free of habitat changing weeds and vermin and keep humans away from known breeding sites.
Singing Honeyeater	Permanent resident of the reserve and surrounds which inhabits the scrub where it forages for insects and nectar amongst the canopy.	Keep breeding and feeding sites free of vermin disturbance and maintain free of habitat changing weeds and die-back.
Eastern Yellow Robin	Prefers the wetter areas where they build their nests. Perch sideways on trunks.	Maintain thicket areas free of die back and habitat changing weeds.
Short-beaked Echidna	Is solitary and occupies a range of habitats that have year-round supply of ants and termites. Needs hollow logs on ground to nest within and for food.	Do not remove fallen limbs or dead trees and retain during controlled burns. Retain ground cover and remove threatening weeds. Control foxes and access by dogs.

Species	Habitat Requirements	Management Actions
Swamp Antechinus	Small nocturnal carnivorous marsupial which rests during the day under fallen timber or in grass and sedge tussocks and ventures out at night to feed on insects and spiders.	Maintain habitat free of habitat changing weeds. Control vermin. Maintain understorey.
Southern Brown Bandicoot	Medium-sized marsupial that makes small conical diggings while foraging for grubs and invertebrates. Constructs nests in thickets above the ground but will utilize rabbit burrows.	Maintain habitat free of habitat changing weeds and vermin and keep humans and development away from known breeding sites.
Black Wallaby	Is solitary in nature and feeds after dark. Hides in dense vegetation during the day.	Maintain dense thickets and habitat free of weeds and die-back. Control foxes.
Micro bat species occurring through-out the island:	Utilize tree hollows and loose bark as roost sites through-out-the area. Feeds on insects at night.	Implement a bat-box program using a variety of designs. Control vermin.
Swamp Rat	Prefers areas of dense undercover e.g. low-lying vegetation and heaths that don't become inundated. Feeds on seeds and rhizomes and excavates runways and burrows. After fire, habitat is not usually suitable for some years.	Protect areas that have intact habitats and understoreys. Control vermin and weeds.

Map 2 Port Headland Crown Land Reserve



Road
Designated Waterway
Parcel

 Crown land reserve boundaries



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0 85.88



meters

Scale: 1:2 286

Map 3

Southern Brown Bandicoot Breeding Sites and Habitat



Road
Designated Waterway
Parcel

SBB breeding habitat



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