COFFS HARBOUR BIODIVERSITY ACTION STRATEGY

2012–2030

FROM THE OCEAN TO THE RANGES

COFFS HARBOUR CITY COUNCIL

November 2015

THIS IS A LOOKING AFTER OUR ENVIRONMENT PROJECT
Helping to achieve the 2030 Community Vision

OVERVIEW

This document constitutes a review and major rewriting of the Coffs Harbour Biodiversity Action Strategy 2002.

It is in three parts, which are available as separate documents:

PART A

From the Ocean to the Ranges: Acknowledging Coffs Harbour's Biodiversity Values

Presents and discusses Coffs Harbour's biodiversity, the threats impacting it, and the policy framework that the Biodiversity Action Strategy sits within.

PART B

From the Ocean to the Ranges: The Landscapes of Coffs Harbour

To provide a better understanding of the past and present land-use patterns and the threats operating on biodiversity, Coffs Harbour LGA has been divided into three distinct landscape units: coastal plains, midland hills and escarpment ranges. These units have been differentiated based primarily on their biophysical features.

PART C

From the Ocean to the Ranges: Taking Action to Protect and Enhance Our Biodiversity Values

Sets the agenda for biodiversity projects and programs which will protect, enhance and restore biodiversity over the next two decades.

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Powerful Owl *Ninox strenua* - Picture supplied by John Young

Coffs Coastal landscape - Picture supplied Rob Cleary Seen Australia ©

Coastal Carpet Python *Morelia spilota* subsp. *mcdowelli* supplied by Darren Moffatt.


Eastern Bearded Dragon *Vive Pogona barbata*


Southern Right Whale *Eubalaena australis*


Glossy Black Cockatoo *Calyptorhynchus lathami*

Abbreviations

CAMBA	China–Australia Migratory Bird Agreement
CHCC	Coffs Harbour City Council
CKPoM	Comprehensive Koala Plan of Management
EEC	Endangered Ecological Community
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
FM Act	*Fisheries Management Act 1994*
GIS	Geographical information system
HVH	High Valued Habitat
JAMBA	Japan–Australia Migratory Bird Agreement
LEP	Local Environmental Plan
LGA	Local Government Area
MPA	Marine Parks Authority NSW
MNC	Mid North Coast
NRCMA	Northern Rivers Catchment Management Authority
NSW	New South Wales
OEH	Office of Environment and Heritage NSW, part of the Department of Premier and Cabinet
PNF	Private native forestry
RCP	Regional Conservation Plan
SDE	Spatial Dataset Engine (corporate dataset)
SEPP	State Environmental Planning Policy
SIMP	Solitary Islands Marine Park
TEC	Threatened Ecological Community
TSC Act	*Threatened Species Conservation Act 1995*

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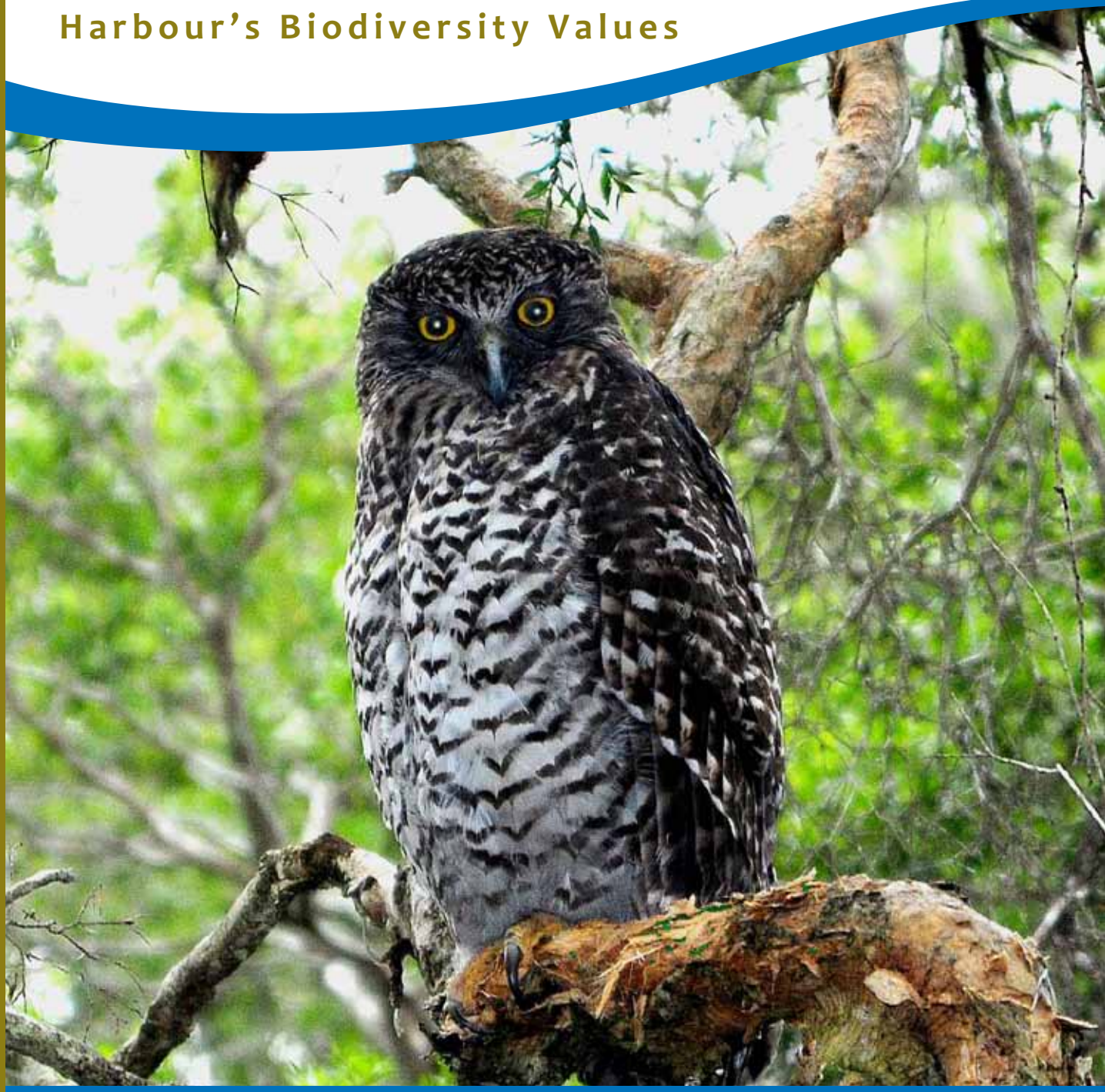
COFFS HARBOUR BIODIVERSITY ACTION STRATEGY

FROM THE OCEAN TO THE RANGES

PART A: Acknowledging Coffs Harbour's Biodiversity Values

Coffs Harbour City Council



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Front Cover Image
Powerful Owl *Ninox strenua Supplied John Young*

FOREWORD

The North Coast of New South Wales is one of Australia's most biologically diverse regions, and Coffs Harbour Local Government Area (LGA) is a focal area for the biodiversity of the Mid North Coast. Coffs Harbour LGA supports biodiversity that is important from national, state, regional and local perspectives. It is one of the few places along eastern Australia where the Great Dividing Range and associated Great Escarpment connect to the coastal plain. The area's unique topography and geography provide for a wonderful diversity of terrestrial and marine ecosystems from Australia's tropical, subtropical and temperate areas. This biologically rich inheritance is recognised and nurtured within Coffs Harbour's renowned marine parks, nature reserves, state parks and natural area reserve systems.

In addition to its natural values, Coffs Harbour LGA is also an area of rapid human population growth. There is a need to provide space, housing and infrastructure for increasing numbers of residents and visitors. Development pressures that are directly and indirectly associated with population growth inevitably impinge on remaining natural areas and their biodiversity.

The landscapes that we see today across the Coffs Harbour LGA are the legacy of past land management practices. While significant elements of biodiversity may have declined within the LGA, the 'Coffs Harbour Biodiversity Action Strategy 2012–2030' sets a direction and framework to protect, enhance and restore biodiversity across all landscapes, for its intrinsic values as well as the benefit and welfare of the Coffs Harbour community.

The Coffs Harbour community's commitment to protecting and enhancing the area's biodiversity remains steadfast. As witnessed during the recent Coffs Harbour 2030 Plan program, the people that live in and visit the Coffs Harbour LGA have a deep affection and respect for its distinctive mix of natural landscapes and habitats and the biodiversity they support. The people want to see the area's natural character maintained. They want its biodiversity protected and nurtured and they want the area to adopt and present a clean and green image (CHCC 2008, 2009a).

Coffs Harbour LGA is not an island—its biodiversity is part of a wider regional network. So too, this Strategy forms part of a wider framework of national, state and local plans and strategies aimed at developing practical actions to address the conservation of biodiversity. The Strategy aims to integrate actions from national and state plans and apply them at the local level using targeted and locally applicable approaches. Integration is also sought with adjoining LGAs to develop coordinated, integrated and sustainable approaches to addressing threats, and conserving, enhancing and restoring biodiversity.

As in other areas, the conservation and ongoing welfare of Coffs Harbour's biodiversity depends on the formulation and application of strategic, innovative and practical approaches to biodiversity planning and management. In line with biodiversity strategies at national and state levels, Coffs Harbour is adopting a more holistic landscape approach that aims to protect and restore ecosystem function and biodiversity viability from the ocean to the ranges.

A1. VISIONS AND PRINCIPLES

A1.1 Coffs Harbour's Community 2030 Vision

Coffs Harbour's community vision, from the Coffs Harbour 2030 Plan, is:

Coffs Harbour is a model of sustainable living. We value, respect and protect our natural environment and acknowledge that it sustains us and future generations. We work together to live sustainably. We have respect for, and learn from, our diverse communities of many ages and cultures. We are healthy, caring and actively engaged in our communities. We move around safely, easily and sustainably. Our economy is strong and diverse and our businesses are leaders in innovation and sustainability. We value all people and use the goodwill in our community to build a better future for our children. We think globally and act locally.

In relation to the 2030 Plan's Looking after our Environment theme, the community vision is:

Our natural environment is protected and conserved for future generations.

Grey-headed Flying-fox *Pteropus policephalus*

A1.2 Principles guiding the Coffs Harbour Biodiversity Action Strategy 2012–2030

- Biodiversity conservation benefits the whole community—we all depend on the health, amenity, resilience and productivity of the land.
- We share the Earth with many other life forms that have intrinsic value and warrant our respect, whether or not they are of benefit to us.
- Our efforts to conserve biodiversity will acknowledge, respect and integrate culture, values, innovations, practices and knowledge of Aboriginal peoples.
- Appreciation of biodiversity comes through a greater understanding of its values and benefits, both intrinsic and economic.
- Biodiversity planning and management needs to be an open and equitable process.
- An ecologically comprehensive and representative reserve system will be the cornerstone for biodiversity conservation.
- Effective whole-of-landscape approach will incorporate habitat connectivity, and protection and restoration of corridors across the landscape.
- High conservation values are to be managed to ensure they are protected or enhanced, not compromised or degraded.
- Identifying, preventing and ameliorating threats and threatening processes are essential to protecting biodiversity.
- The ongoing improvement of knowledge is fundamental to biodiversity conservation, and the lack of knowledge should not be an excuse for postponing actions.
- Ecologically sustainable development, intra- and inter-generational equity, and improved economic valuation of environmental resources are key principles that will guide biodiversity conservation.

A2. INTRODUCTION

Masked Booby *Sula dactylatra*

The maintenance of our biodiverse environment is a major community concern and therefore should be a consideration of all land managers. Biodiversity conservation is in the long-term interests of all Australians. At a local scale the community of Coffs Harbour Local Government Area (LGA) depends on the health, natural beauty, resilience and productivity of the land.

The Coffs Harbour community, through the Coffs Harbour 2030 Plan program (CHCC 2008, 2009a), has expressed its desire to see the region's biodiversity protected and enhanced. This 'Coffs Harbour Biodiversity Action Strategy 2012–2030' ('the/this Strategy') aims to integrate the delivery of national and state strategies at the local level to address community goals using locally applicable approaches.

The Strategy sets the agenda and direction for biodiversity conservation planning and management throughout Coffs Harbour LGA (Figure A2.1) from 2012 to 2030 and beyond.

Biodiversity conservation in general, and this Strategy in particular, are both concerned with the conservation of all biodiversity (i.e. genes, species, populations and ecological processes). However, species and ecological communities that are threatened with extinction are an important focus of conservation actions. As such, this Strategy addresses the following threatened entities (as listed under state or federal legislation) within Coffs Harbour LGA:

- 122 threatened species (32 plants and 90 animals)
- 2 endangered populations
- 11 threatened ecological communities.

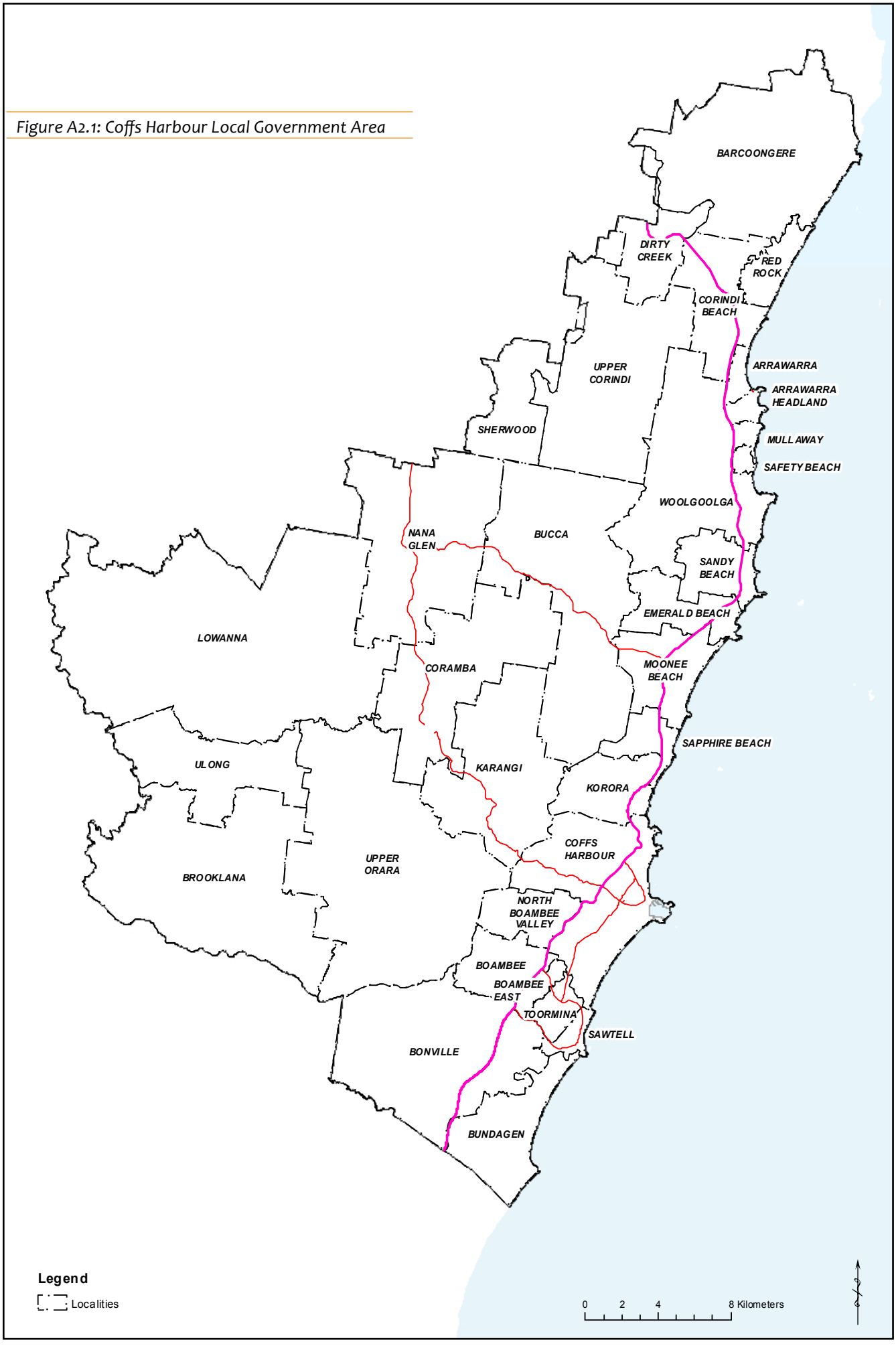
These are listed in Table A3.1 a–d.

Five-leafed Water Vine *Cissus hypoglauca*

The Strategy provides information on Coffs Harbour LGA's biodiversity and includes maps showing where some of the important biodiversity features occur. Threats impacting biodiversity within the Coffs Harbour LGA are also discussed.

Actions (see Part C) are provided as a basis and framework for the targeted allocation of funds for biodiversity planning, inventory, monitoring and management programs across the LGA.

Figure A2.1: Coffs Harbour Local Government Area



A3. WHAT IS BIODIVERSITY?

The term 'biological diversity' (or 'biodiversity' for short) is the variety of all life forms on earth. It is the different plants, animals and micro-organisms; their genes; and the terrestrial, marine and freshwater ecosystems of which they are a part (NRMMC 2010).

It includes genetic diversity within species, the diversity between different species and the diversity of ecosystems (DECCW 2010b).

Biodiversity is simply the variety of life.

Biodiversity enables ecosystems, landscapes and human settlements to function successfully and provide us with essential services. Biodiversity underpins human society and all natural systems and allows the processes upon which all life depends to continue.

Wherever there is life, there is biodiversity (Smithsonian Institute 2000).

A3.1 Three levels of biodiversity

Genetic diversity

..... is the variety of genetic information that is contained in all living things. It is the variety that exists in individuals in a population, in populations of a species, and in all the different species on the planet. It is the basis of continuing evolution and the adaptability and survival of species.

Species diversity

..... is the variety of species on earth. It is a measure of the number of different species and their relative abundance at any given time and place.

Ecosystem diversity

..... is the variety of the earth's habitats, ecosystems and ecological processes. An ecosystem consists of plant, animal, fungal and micro-organism communities and the associated non-living environment interacting as an ecological unit.

(NRMMC 2010; NPWS 1999)

A3.2 The importance of ecosystem services

Ecosystems provide us with 'absolutely indispensable' services. 'While these services are "free", they would, of course, be infinitely costly to replace' (Erhlich in Yencken & Wilkinson 2000). Ecosystem services we all rely on include:

- maintaining the quality of the atmosphere
- ameliorating the climate
- maintaining the water cycle—including controlling floods and providing water to agriculture, industry and homes
- disposing of wastes
- recycling nutrients essential to agriculture and forestry
- generating soils
- pollinating crops
- controlling pests
- providing food from the land and sea (Erhlich in Yenchken & Wilkinson 2000).

A landmark study (Cosatanza et al. in Yencken & Wilkinson 2000) estimated the value of the world's ecosystem services to be US$16–54 trillion per year (average US$33 trillion per year). To give this figure a proper context, they noted that global gross domestic product was around US$18 trillion per year (at that time). The US$33 trillion figure is thought to be a minimum estimate; indeed it is sometimes said that the total value of ecosystem services to the economy is infinite, since without them the economies of the Earth would stop.

Rose Myrtle *Archirhodomyrtus beckleri*

Red-necked Wallaby *Macropus rufogriseus*

Hollow-bearing Eucalyptus

Galah *Eolophus roseicapillus*

Koala *Phascolarctos cinereus*

Platypus *Ornithorhynchus anatinus*

A3.3 Australia's biodiversity

A mega diverse continent

Australia is described as a 'mega diverse' continent (COAG 1996; DSEWPC 2010) meaning that it provides habitat for an extraordinary array of ecosystems and species. This diversity is strongly related to the millions of years that the Australian continent has been isolated.

Australia is home to between 600,000 and 700,000 species, many of which are found nowhere else in the world (i.e. endemic species). About 84% of plant species, 83% of mammal species, and 45% of bird species in the world are found only in Australia (DEWHA 2008 in NRMMC 2010).

Some of the more iconic endemic species include Platypus, Koala, Emu, Spotted-tailed Quoll, Bilby, kangaroos and wallabies. What is even more remarkable is the number of endemic families that are found in Australia. Having endemism at the level of 'family' is of great significance and means that Australia is one of the most ecologically important countries in the world.

Australia has great species diversity. Notable areas include the Great Barrier Reef, the rainforests of north Queensland, the South West Botanic Province of Western Australia and the north-east NSW – south-east Queensland region. Australia's flowering plants, frogs, reptiles, birds and marsupials are well known for their uniqueness and incredible diversity. Our invertebrates have been less well studied and classified, but are also highly diverse.

A3.4 NSW North Coast—an area of high biodiversity

North-east NSW is an area of great biodiversity significance (e.g. NPWS 1994). The region includes the Macleay–McPherson Overlap, an area where a combination of climatic and geographic conditions has resulted in a mix of both temperate and tropical species (Burbidge 1960; DECCW 2010c). The region also supports a high proportion of NSW threatened species and threatened ecological communities (DECCW 2010c).

A3.5 Coffs Harbour's biodiversity

Coffs Harbour LGA is a focal area for important elements of north-east NSW biodiversity. Coffs Harbour LGA supports biodiversity that is important from national, state, regional and local perspectives. Part B of the Strategy provides detailed information on the biodiversity values of Coffs Harbour LGA. The following is a summary of the most significant features.

Coffs Harbour LGA is one of the few places in eastern Australia where the Great Dividing Range and the associated Great Escarpment connect to the coastal plain. The area's unique topography and geography provide for a wonderful diversity of habitats supporting a mixture of tropical, subtropical and temperate species (both terrestrial and marine).

A diverse range of broad vegetation types (as described by Keith 2006) are found in the Coffs Harbour LGA, including:

- subtropical, warm temperate, cool temperate and littoral rainforests
- forests, ranging from Coffs' characteristic tall, wet closed forests to dry open forests
- dry and wet heathlands and shrublands, mostly along the coastal plain
- sedgeland–rushland complexes, mostly associated with coastal wetlands
- mangrove–saltmarsh complexes associated with estuaries
- foredune complexes along the coastal fringe
- headland heaths and grasslands.

Habitat types are usually classified according to vegetation types such as these because vegetation is the dominant life form within habitats. Each of these habitats support a range of plant and animal species including invertebrates, fish, frogs, reptiles, birds and mammals.

Coffs Harbour supports significant tall moist forests considered to be habitat refuge areas for a suite of flora and fauna including a number of threatened species. Important threatened plants associated with these forests include:

- Orara Boronia *Boronia umbellata*
- Moonee Quassia *Quassia* sp. Moonee Creek
- Stinky Lily *Typhonium* sp. aff. *brownii*
- Rusty Plum *Niemeyera whitei*
- Milky Silkpod *Parsonsia dorrigoensis*
- Scant Pomaderris *Pomaderris queenslandica*
- Slender Marsdenia *Marsdenia longiloba*


Moonee Quassia *Quassia* sp. Moonee Creek


Giant Barred Frog *Mixophyes iteratus*


Milky Silkpod *Parsonsia dorrigoensis*


Spotted-tailed Quoll *Dasyurus maculatus*


Rusty Plum *Niemeyera whitei*

Threatened fauna of these forests include:

- Giant Barred Frog *Mixophyes iteratus*
- Stephens' Banded Snake *Hoplocephalus stephensii*
- Sooty Owl *Tyto tenebricosa*
- Masked Owl *T. novaehollandiae*
- Rose-crowned Fruit-dove *Ptilinopus regina*
- Superb Fruit-dove *P. superbus*
- Wompoo Fruit-dove *P. magnificus*
- Spotted-tailed Quoll *Dasyurus maculatus*
- Koala *Phascolarctos cinereus*
- Yellow-bellied Glider *Petaurus australis*
- a number of microbats such as Eastern and Little Bentwing-bats *Miniopterus* spp. and Golden-tipped Bat *Kerivoula papuensis*.

The Moonee–Bindery area, including Guy Fawkes Wilderness Area, has been identified as a potential World Heritage Area in recognition of Tall Eucalypt-dominated vegetation in the area. The eucalypts are widely regarded as globally outstanding features which exemplify the unique character and diversity of the Australia biota (Commonwealth Government 1999).

The Coffs Harbour region also supports a diverse array of aquatic habitats, including freshwater and marine habitats. The marine environment is unique because Coffs Harbour marks the meeting point of two coastal currents and is home to a spectrum of marine life not found elsewhere. The Solitary Islands Marine Reserve is a nationally important reserve off the Coffs coast. The reserve protects and conserves a relatively undisturbed, distinct and species-rich ecosystem associated with open ocean, subtidal reef, and soft sandy habitats.

The Coffs Harbour LGA supports over 35 species that are threatened at a national level. For example, the Coffs Harbour hinterland is the stronghold for the endangered Giant Barred Frog. Our estuaries and beaches also provide incredibly important habitats for a large number of migratory shorebirds that are protected under international conservation agreements. The threatened species that occur in Coffs Harbour LGA and are addressed by this Biodiversity Action Strategy are listed in Table A3.1a–d.

The Coffs Harbour LGA is home to one of only 12 significant Koala populations in NSW. The Koala is threatened at a State level. Historically Koalas occurred across Coffs Harbour's coastal plains but now they appear to be largely confined to habitats south of Korora. The Koala's coastal stronghold is in the Bonville area, but small numbers persist in suitable remnants on the mid and southern coastal plains. In the hinterland forests the most significant habitats are the Orara Valley, Fridays' Creek, west Bonville and Bongil Bongil National Park (see Figure A3.1).

The threatened **Parma Wallaby** *Macropus parma* occurs as an outlier population in Bindarri National Park and in Orara West State Forest where it has been recorded near Coramba Mountain Road.

The **Eastern Freshwater Cod** *Maccullochella ikei* is an endangered fish species which is only found in the Clarence and Richmond river catchments of northern NSW. Its habitat includes the Orara River, Urumbilum River, Bucca Bucca Creek, and their tributaries within Coffs Harbour LGA.

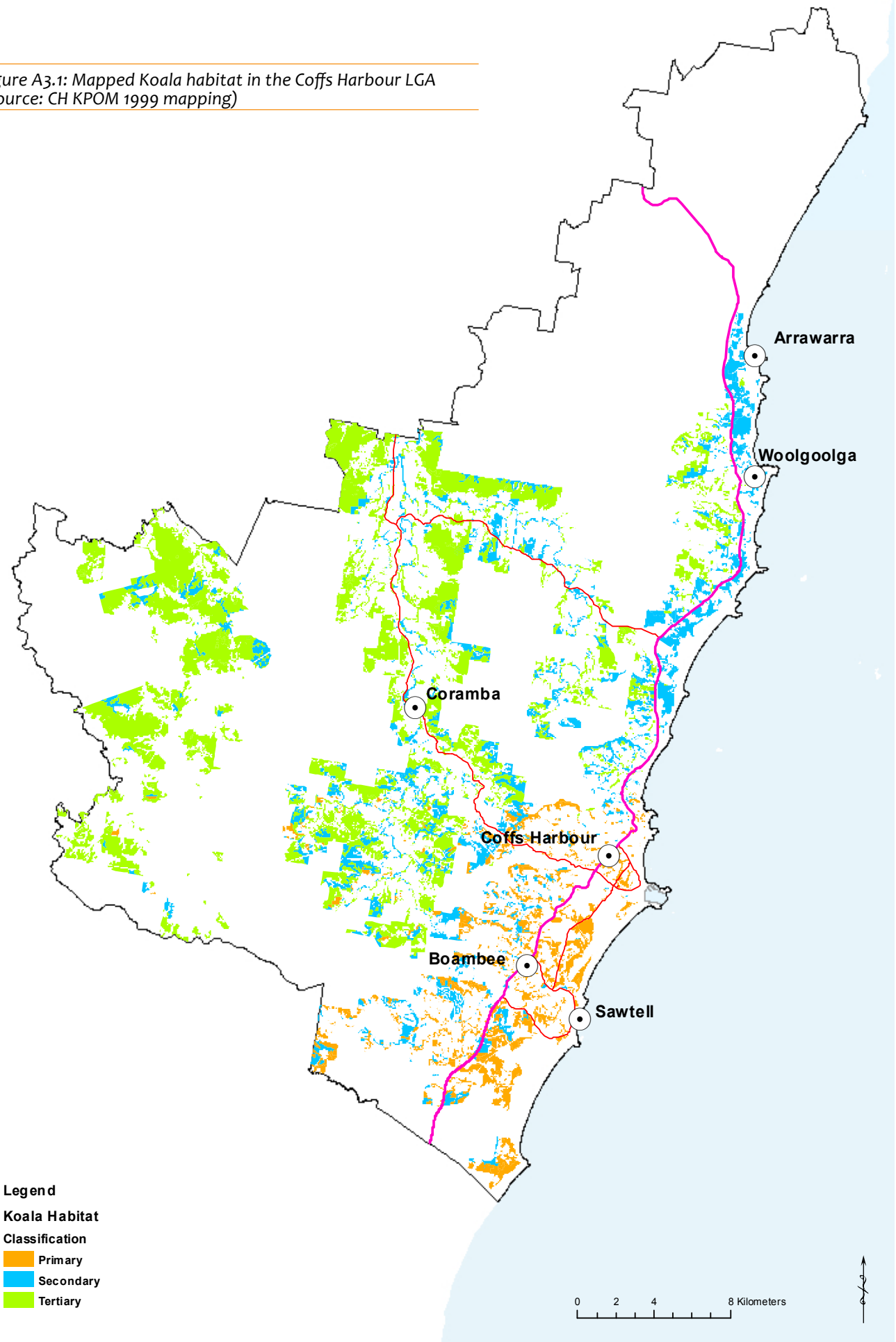
The Lower Corindi River – Dirty Creek area has been identified as a **regional 'conserve priority' area** in the *Northern Rivers Regional Biodiversity Management Plan* (DECCW 2010a–see Figure A3.2). This area supports important coastal wetland habitats, under-represented forest ecosystems, mapped Koala habitat and potential habitat for a range of other threatened species including Wallum Froglet *Crinia tinnula*, Black-necked Stork *Ephippiorhynchus asiaticus* and Squirrel Glider *Petaurus norfolcensis*.

Coffs Harbour's biodiversity inheritance is recognised and nurtured in our national parks, nature reserves, natural areas and the Solitary Islands Marine Park. This biodiversity is located across all land tenures including small remnants and large tracts of vegetation on private land.

Part B of the Strategy provides more information on the biodiversity values of Coffs Harbour LGA. A number of strategic planning documents provide information on the region's geology, climate, rainfall and land use (see DECCW 2010a; DECC 2009; DoP 2009).

Grey Nurse Shark *Carcharias taurus*

Figure A3.1: Mapped Koala habitat in the Coffs Harbour LGA (Source: CH KPOM 1999 mapping)




Moonee Quassia *Quassia* sp. Moonee Creek


Rainforest Cassia *Senna acclinis*


Silver Bush *Sophora tomentosa*


Scented Acronychia *Acronychia littoralis*

The follow series of tables (Tables A3.1a–d) highlight Coffs Harbour's significant biodiversity values by tabulating the number of identified threatened species, populations and ecological communities found within the boundary of the local government area. The status of each species relates to its listing under one or more of the following pieces of legislation:

- *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- *NSW Threatened Species Conservation Act 1995* (TSC Act)
- *NSW Fisheries Management Act 1994* (FM Act).

The tables are separated into:

Table A3.1a Threatened flora
Table A3.1b Threatened fauna
Table A3.1c Endangered populations
Table A3.1d Threatened ecological communities

Abbreviations used to define status are as follows:

CE = Critically Endangered; **E** = Endangered; **V** = Vulnerable; **PE =** Presumed Extinct

Table A3.1a: Threatened flora

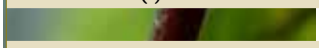
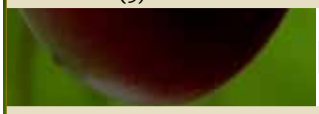
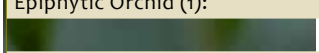
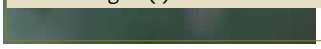
	Common name	Scientific name	Threatened status		
			EPBC Act	TSC Act	FM Act
Herb (5):					
	Austral Toadflax	*Thesium australe*	V	V	
	Sand Spurge	*Chamaesyce psammogeton*		E	
	Square-stemmed Spike-rush	*Eleocharis tetraquetra*		E	
	Stinky Lily	*Typhonium* sp. aff. *brownii*		E	
	Tall Knotweed	*Persicaria elatior*	V	V	
Ground Orchid (5):					
	Brown Fairy-chain Orchid	*Peristeranthus hillii*		V	
	Leafless Tongue Orchid	*Cryptostylis hunteriana*		V	
	Red-flowered King of the Fairies	*Oberonia titania*		V	
	Southern Swamp Orchid	*Phaius australis*	E	E	
	Yellow-flowered King of the Fairies	*Oberonia complanata*		E	
Ground Fern (1):					
	Slender Screw Fern	*Lindsaea incisa*		E	
Grass (2):					
	Floyd's Grass	*Alexfloydia repens*		E	
	Hairy Jointgrass	*Arthraxon hispidus*	V	V	
Shrub (8):					
	Coast Headland Pea	*Pulenaea maritima*		V	
	Creek Triplarina	*Triplarina imbricata*	E	E	
	Dorrigo Daisy Bush	*Olearia flocktoniae*	E	E	
	Headland Zieria	*Zieria prostrata*	E	E	
	Moonee Quassia	*Quassia* sp. Moonee Creek	E	E	
	Orara Boronia	*Boronia umbellata*	V	V	
	Rainforest Cassia	*Senna acclinis*		E	
	Scant Pomaderris	*Pomaderris queenslandica*		E	
Small Tree (3):					
	Dwarf Heath Casuarina	*Allocasuarina defungens*	E	E	
	Rusty Plum	*Niemeyera whitei*		V	
	Silverbush	*Sophora tomentosa*		E	
Tree (2):					
	Red Boppel Nut	*Hicksbeachia pinnatifolia*		V	
	Scented Aronychia	*Acronychia littoralis*	E	E	
Vine (4):					
	Cryptic Forest Twiner	*Tylophora woollsii*		V	
	Milky Silkpod	*Parsonsia dorrigoensis*	E	V	
	Slender Marsdenia	*Marsdenia longiloba*	V	E	
	Tinospora Vine	*Tinospora smilacina*		E	
Epiphytic Orchid (1):					
	Ravine Orchid	*Sarochilus fitzgeraldii*	V	V	
Marine Algae (1):					
	Marine Brown Algae	*Nereia laphocladia*			CE

Table A3.1b: Threatened fauna

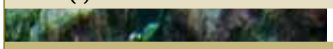
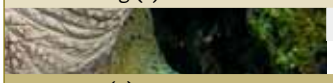
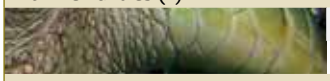
	Common name	Scientific name	Threatened status		
			EPBC Act	TSC Act	FM Act
INVERTEBRATES (3)					
Dragonfly (2):					
	Coastal Petaltail Dragonfly	*Petalura litorea*		E	
	Giant Dragonfly	*Petalura gigantea*		E	
Moth (1):					
	Black Grass-Dart Butterfly	*Ocybadistes knightorum*		E	
FISH (6)					
Freshwater Fish (2):					
	Eastern Freshwater Cod	*Macculochella ikei*	E		E
	Oxyleyan Pygmy Perch	*Nannoperca oxleyana*	E		E
Saltwater Fish (4):					
	Grey Nurse Shark	*Carcharius taurus*			CE
	Green Sawfish	*Pristis zijsron*			PE
	Great White Shark	*Carcharadon carcharias*			V
	Black Cod	*Epinephelus daemelli*			V
AMPHIBIANS (8)					
Ground Frogs (6):					
	Green and Golden Bell Frog	*Litoria aurea*	V	E	
	Green-thighed Frog	*Litoria brevipalmata*		V	
	Wallum Sedge Frog	*Litoria olongburensis*	V	V	
	Pouched Frog	*Assa darlingtoni*		V	
	Sphagnum Frog	*Philoria sphagnicolus*		V	
	Wallum Froglet	*Crinia tinnula*		V	
Stream Frog (2):					
	Giant Barred Frog	*Mixophyes iteratus*	E	E	
	Stuttering Frog	*Mixophyes balbus*	V	E	
REPTILES (5)					
Marine Turtles (2):					
	Green Turtle	*Chelonia mydas*	V	V	
	Loggerhead Turtle	*Caretta caretta*	E	E	
Snakes (3):					
	Pale-headed Snake	*Hoplocephalus bitorquatus*		V	
	Stephens' Banded Snake	*Hoplocephalus stephensii*		V	
	White-crowned Snake	*Cacophis harriettae*		V	
BIRDS (45)					
Forest Birds (12):					
	Barred Cuckoo-shrike	*Coracina lineata*		V	
	Collared Kingfisher	*Todiramphus chloris*		V	
	Glossy Black-Cockatoo	*Calyptorhynchus lathami*		V	
	Little Lorrikeet	*Glossopsitta pusilla*		V	
	Olive Whistler	*Pachycephala olivacea*		V	
	Painted Honeyeater	*Grantiella picta*		V	
	Regent Honeyeater	*Xanthomyza phrygia*	E	E	
	Rose-Crowned Fruit Dove	*Ptilinopus regina*		V	
	Superb Fruit-dove	*Ptilinopus superbus*		V	
	Swift Parrot	*Lathamun discolor*	E	E	
	Varied Sittella	*Daphoenositta chrysoptera*		V	
	Wompoo Fruit-dove	*Ptilinopus magnificus*		V	

Table A3.1b: Threatened fauna (continued)

	Common name	Scientific name	Threatened Status		
			EPBC Act	TSC Act	FM Act
Ground Birds (3):					
	Beach Stone-curlew	*Esacus neglectus*		E	
	Bush Stone-curlew	*Burhinus grallarius*		E	
	Eastern Ground Parrot	*Pezoporus wallicus wallicus*		V	
Nocturnal Raptor (5):					
	Barking Owl	*Ninox connivens*		V	
	Grass Owl	*Tyto capensis*		V	
	Masked Owl	*Tyto novaehollandiae*		V	
	Powerful Owl	*Ninox strenua*		V	
	Sooty Owl	*Tyto tenebricosa*		V	
Raptor (4):					
	Little Eagle	*Hieraaetus morphnoides*		V	
	Osprey	*Pandion haliaetus*		V	
	Spotted Harrier	*Circus assimilis*		V	
	Square-tailed Kite	*Lophoictinia isura*		V	
Marine Bird (6):					
	Flesh-footed Shearwater	*Puffinus carneipes*		V	
	Little Tern	*Sterna albifrons*		E	
	Pied Oystercatcher	*Haematopus longirostris*		V	
	Southern Giant Petrel	*Macronectes giganteus*	E	E	
	Sooty Oystercatcher	*Haematopus fuliginosus*		V	
	Sooty Tern	*Sterna fuscata*		V	
Wading Bird (5):					
	Great Knot	*Calidris tenuirostris*		V	
	Greater Sand-plover	*Charadrius leschenaultia*		V	
	Lesser Sand-plover	*Charadrius mongolus*		V	
	Sanderling	*Calidris alba*		V	
	Curlew Sandpiper	*Calidris feruginea*		E	
Wetland Bird (6):					
	Black Bittern	*Ixobrychus poiciloptilus*		V	
	Black-necked Stork	*Ephippiorhynchus asiaticus*		E	
	Brolga	*Grus rubicunda*		V	
	Comb-crested Jacana	*Irediperra gallinacea*		V	
	Freckled Duck	*Stictonetta naevosa*		V	
	Red-backed Button-quail	*Turnix maculosa*		V	
Woodland Bird (4):					
	Brown Treecreeper (eastern subsp.)	*Melithreptus gularis gularis*		V	
	Grey-crowned Babbler (east subsp.)	*Pomatostomus temporalis temporalis*		V	
	Scarlet Robin	*Petroica multicolor*		V	
	Turquoise Parrot	*Neophema pulchella*		V	

Table A3.1b: Threatened fauna (continued)

	Common name	Scientific name	Threatened status		
			EPBC Act	TSC Act	FM Act
MAMMALS (24)					
Arboreal Marsupial (4):					
	Eastern Pygmy-possum	*Cercartetus nanus*		V	
	Koala	*Phascolarctos cinereus*	V	V	
	Squirrel Glider	*Petaurus norfolcensis*		V	
	Yellow-bellied Glider	*Petaurus australis*		V	
Microchiropteran Bat (10):					
	Eastern Bentwing-bat	*Miniopterus schreibersii oceanensis*		V	
	Eastern False Pipistrelle	*Falsistrellus tasmaniensis*		V	
	Eastern Freetail-bat	*Mormopterus norkolkensis*		V	
	Golden-tipped bat	*Kerivoula papuensis*		V	
	Greater Broad-nosed Bat	*Scoteanax ruepellii*		V	
	Hoary Wattled Bat	*Chalinolobus nigrgriseus*		V	
	Large-eared Pied bat	*Chalinolobus dwyeri*	V	V	
	Large-footed Myotis	*Myotis adversus*		V	
	Little Bentwing–bat	*Miniopterus australis*		V	
	Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*		V	
Megachiropteran Bat (2):					
	Common Blossom-bat	*Syconycteris australis*		V	
	Grey-headed Flying-fox	*Pteropus poliocephalus*	V	V	
Dasyurid (3):					
	Brush-tailed Phascogale	*Phascogale tapoatafa*		V	
	Common Planigale	*Planigale maculata*		V	
	Spotted-tailed Quoll	*Dasyurus maculatus*	E	V	
Macropod (4):					
	Long-nosed Potoroo	*Potorous tridactylus*	V	V	
	Parma Wallaby	*Macropus parma*		V	
	Red-legged Pademelon	*Thylogale stigmatica*		V	
	Rufous Bettong	*Aepyprymnus rufescens*		V	

Table A3.1c: Endangered populations

	Common name	Scientific name	Threatened status		
			EPBC Act	TSC Act	FM Act
	*Zieria smithii* (low growing form) population at Diggers Head	*Zieria smithii* population at Diggers Head		EP	
	Emu population in the NSW North Coast Bioregion and Port Stephens LGA	*Dromaius novaehollandiae* population in the NSW North Coast Bioregion and Port Stephens LGA		EP	

Table A3.1d: Threatened ecological communities

	Common name	Threatened status		
		EPBC Act	TSC Act	FM Act
	Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions		E	
	Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions		E	
	Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	CE		
	Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions		E	
	Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions		E	
	Lowland Rainforest on Floodplain in the New South Wales North Coast Bioregion	CE	E	
	Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion		E	
	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions		E	
	Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions		E	
	Themeda Grassland on Seacliffs and Coastal Headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions		E	
	White Gum Moist Forest in the NSW North Coast Bioregion		E	

A4. STRATEGY OBJECTIVES

The Strategy has used the *Northern Rivers Regional Biodiversity Management Plan* (DECCW 2010a) and the *Mid North Coast Regional Conservation Plan* (DECCW 2010b) as fundamental guiding documents. These plans set regional directions and strategies for biodiversity conservation in northern NSW (see Section A5). The objectives of this Strategy, which reflect those in the two regional plans, are:

1. To maintain and improve biodiversity and ecological processes by protecting, rehabilitating and managing native vegetation across all land tenures.

2. To contribute to identifying and mitigating threats acting on biodiversity values.

3. To promote landscape connectivity as a basis for biodiversity conservation and as a key approach to mitigate the effects of climate change at local, regional, state and national levels.

4. To provide targeted actions that contribute to a consistent, coordinated and prioritised approach to the recovery of biodiversity across all ecosystems.

5. To improve community awareness of biodiversity through education, landowner support and community participation.

6. To recognise and incorporate cultural values into biodiversity landscape planning and encourage ongoing Aboriginal engagement.

7. To work cooperatively to meet priority actions and outcomes of regional, state and federal biodiversity targets.


Humpback Whale *Megaptera novaeangliae*


Netcasting Spider *Deinopis* sp.


Golden Everlasting *Xerochysum bracteatum*


Pink tongue Lizard *Hemisphaeriodon gerrardii*


Superb Fairy Wren *Malurus cyaneus*

A5. THE CONTEXT: LEGISLATIVE AND PLANNING FRAMEWORK

The 'Coffs Harbour Biodiversity Action Strategy 2012–2030' sits within a broader context of legislation, planning policies and strategies that deal with biodiversity conservation. The most important of these are discussed below, and a full list can be found in Part A - Appendix 1. For more information on how these documents relate to biodiversity conservation planning and management, see DECCW 2010a and 2010b.

The Strategy seeks to integrate and consolidate the directions set out in the various national, state and regional biodiversity plans. The Strategy also seeks to develop coordinated and sustainable approaches that address threats to biodiversity and conserve, enhance and restore biodiversity at the regional level.

The Strategy seeks to consolidate and enhance the efforts of community members, Council staff and other groups undertaking biodiversity conservation works in the LGA, including Coffs Harbour Regional Landcare, groups implementing Council's environmental levy projects, Northern Rivers Catchment Management Authority, and other state and federal agencies. The Strategy will not override or duplicate the efforts of these groups. It is intended to identify key projects that build on existing actions and provide an integrated and cooperative approach to reversing the decline of our region's biodiversity.

A5.1 Key planning documents and initiatives

There are a number of key planning documents that relate to the Biodiversity Action Strategy. These are briefly outlined below and their relationship to each other is illustrated in Figure A5.1.

As Figure A5.1 shows, the Biodiversity Action Strategy sits under an umbrella of four key strategic plans:

- *Mid North Coast Regional Strategy (MNC Regional Strategy)*
- *Mid North Coast Regional Conservation Plan (MNC Regional Conservation Plan)*
- Coffs Harbour 2030 Plan: a strategic plan for the Coffs Harbour community (Coffs Harbour 2030)
- *Northern Rivers Regional Biodiversity Management Plan (NRRBMP)*

These four documents (discussed below) determine the objectives and actions of the Biodiversity Action Strategy which is a purely strategic document—the Strategy does not include any on-ground actions.

Rather, it provides a strategic framework to plan for and develop a range of action plans that will deliver on-ground biodiversity outcomes in Coffs Harbour LGA.

The concepts and actions in this Strategy will drive a number of important local strategic plans (discussed below), including plans for managing/conserving:

- High Conservation Value Habitats
- Koalas
- strategic threats
- threatened species.

A5.2 Key strategic regional plans

Mid North Coast Regional Strategy

The *Mid North Coast Regional Strategy* (DoP 2009) applies to eight coastal LGAs including Coffs Harbour. The Regional Strategy will govern where and how growth can occur over the next 25 years (to 2031). It represents an agreed NSW Government position on the future of the Mid North Coast (MNC) and will be reviewed every five years. As such, Council is required to abide by and implement the Regional Strategy, and one of the key roles of this Biodiversity Action Strategy is to facilitate the implementation of relevant aims and actions in the Regional Strategy.

The Regional Strategy aims and actions that are most relevant to biodiversity conservation are as follows.

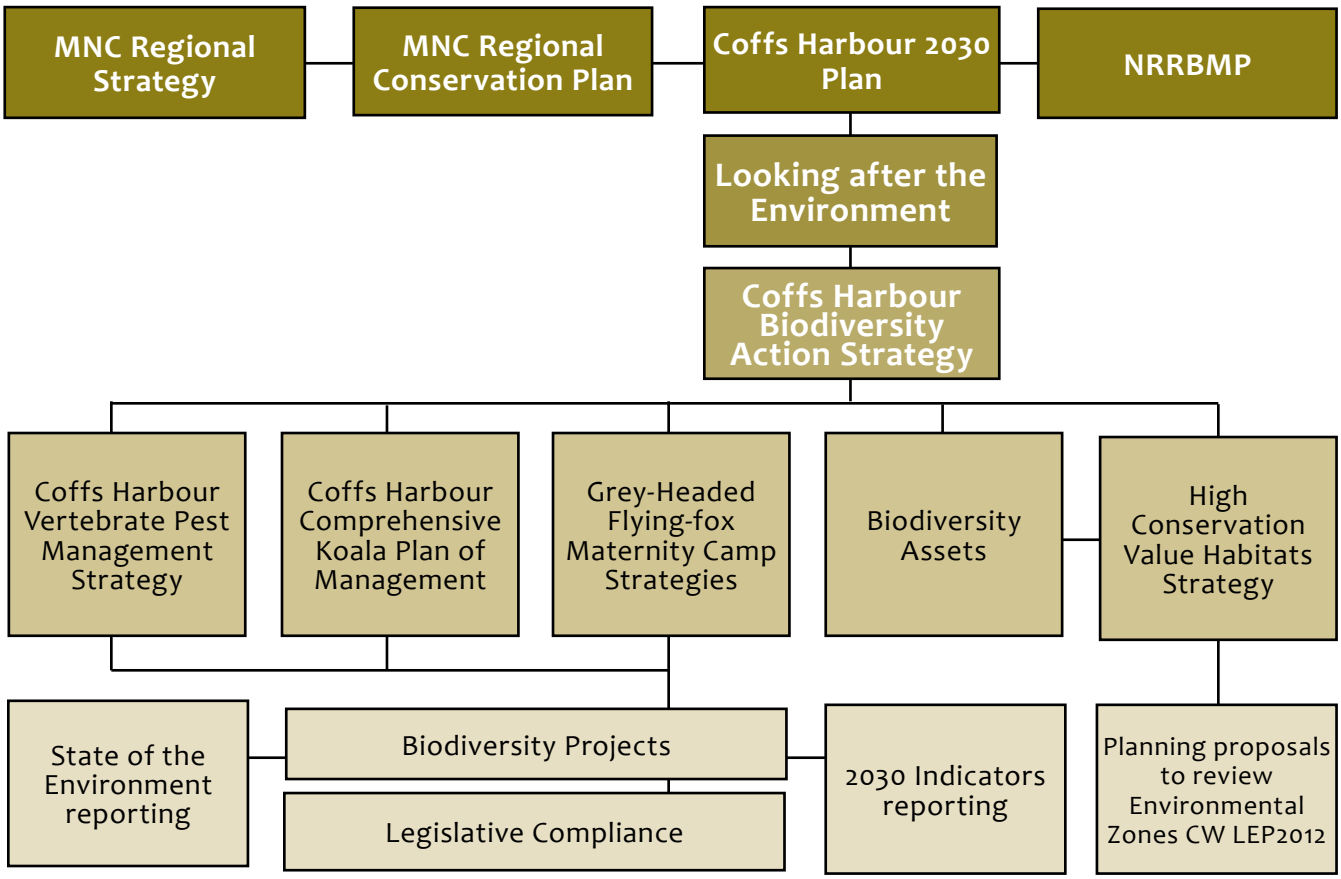
Biodiversity aim: *to protect high value environments, including significant coastal lakes, estuaries, aquifers, threatened species, vegetation communities and habitat corridors by ensuring that new urban development avoids these important areas and their catchments.*

Biodiversity action: local environment plans will protect and zone land with high environmental, vegetation, habitat, riparian, aquatic, coastal or corridor values for environmental protection.

Biodiversity action: local environment plans will include provisions to encourage habitat and corridor establishment in future zoning of land with environmental and rural values.

The MNC Regional Strategy defines the areas where the growing population will live in the future, and areas that will be required for employment growth. The new 'urban growth areas' and 'employment lands' identified by the Regional Strategy in the Coffs Harbour LGA are predominantly on cleared

Figure A5.1: Biodiversity Action Strategy - flow chart showing relationship between strategic planning documents and the Biodiversity Action Strategy



land. However, some identified areas contain significant native vegetation, including habitat for threatened species and threatened ecological communities. Further investigation will be required prior to any rezoning of these lands.

The Regional Strategy also recognises that it will be important to establish appropriate criteria to adequately assess development proposals for land that supports remnant native vegetation. The criteria will need to:

- provide for the protection of areas of known or likely conservation importance, including corridors
- consider offset areas which protect and enhance the long-term viability of priority vegetation and habitat
- consider measures to rehabilitate degraded priority areas (DoP 2009).

Draft Mid North Coast Regional Conservation Plan

One of the biodiversity actions in the MNC Regional Strategy is to prepare a Regional Conservation Plan to help local councils achieve conservation outcomes (see DECCW 2010b). The *Draft Mid North Coast Regional Conservation Plan* (RCP) focuses on protecting and managing biodiversity assets in light of future population growth and changes in land use (both residential and employment).

The RCP identifies the Mid North Coast Region's high conservation value biodiversity assets and maps where these are likely to be found at a regional scale. The RCP identifies a number of high conservation value biodiversity assets, including:

- endangered ecological communities
- threatened species habitat
- over-cleared vegetation communities
- native vegetation in over-cleared landscapes
- all types of rainforest
- old-growth forest
- riparian, wetland and estuarine vegetation
- rare, endangered and vulnerable forest ecosystems
- karst areas.

The RCP makes specific reference to the need for local environment plans to include provisions to encourage habitat and corridor establishment in future zoning of land with environmental and rural values. It also identifies areas (at the regional scale) where rehabilitation of the landscape could be targeted to enhance biodiversity conservation, landscape connectivity and build resilience to climate change.

The Coffs Harbour Biodiversity Action Strategy seeks to facilitate the strategic directions of the RCP, which are developed at the regional scale, and integrate its proposed actions with locally developed strategies, including the 'Coffs Harbour City Koala Plan of Management' and identification of high value environments.

Orara Boronia *Boronia umbellata*

Coffs Harbour 2030 Plan

The Coffs Harbour 2030 Plan: a strategic plan for the Coffs Harbour community ('the 2030 Plan') was adopted by Council in December 2009 (CHCC 2009a). The 2030 Plan is driven by the Community Vision 2030 (CHCC 2008) and outlines the steps needed to create a sustainable future for Coffs Harbour LGA. It is the overarching plan that integrates planning and reporting frameworks, while mapping out the community's aspirations for the future of the Coffs Harbour LGA to 2030 and beyond. The Plan covers five themes including Looking after our Environment and outlines outcomes, objectives and actions for each theme.

The 2030 Plan includes a vision for Looking after our Environment—our natural environment is protected and conserved for future generations—and a number of strategies for achieving that vision, including:

- implementing on-ground programs to restore and improve our environment
- developing mechanisms to adapt to and mitigate the impacts of climate change
- building ecosystem resilience through a system of local and regional habitat corridors.

The Coffs Harbour Biodiversity Action Strategy fundamentally supports, and strives to be consistent with, the aspirations of the Coffs Harbour community as articulated in the 2030 Plan.

Table A5.1 lists the 2030 Plan objectives and strategies for the Looking after our Environment theme. The final column indicates which 'management issue' in the Biodiversity Action Strategy deals with each strategy.

Table A5.1: Coffs Harbour 2030 Plan - Community Strategic Plan outcomes and objectives

Outcome	Objective	Strategy	Council's role	Biodiversity Strategy management issue
LE1 We understand and value our unique natural environment and its cultural connections	LE1.1 We are active ambassadors for our environment and we share our skills and knowledge	LE1.1.1 Identify and promote the region's unique environmental values	Provider, Facilitator, Advocate	**4 & 5** *also 2, 3 & 9*
		LE1.1.2 Develop programs to actively engage communities on environmental issues and solutions	Provider	**3 & 4** *also 1, 5, 6, 8 & 9*
	LE1.2 Our Aboriginal culture and its links to the land are valued and understood	LE1.2.1 Support the Aboriginal community in recording cultural and physical connection to country and land management practices	Facilitator	**3** *also 2, 4, 5, 7 & 9*
		LE 1.2.2 Develop school and community education resources on Aboriginal culture and the land	Facilitator	**2 & 3** *also 4*
		LE1.2.3 Encourage pride in Aboriginal culture and history in the Coffs Harbour community through engagement and partnerships	Facilitator	**2 & 3** *also 7*
	LE 1.3 We have many opportunities for nature experiences and learning through improved access to natural areas	LE1.3.1 Promote connection to the environment through learning in the environment	Provider, Facilitator	**2** *also 1, 3, 4, 5, 6, 8 & 9*
		1.3.2 Create and extend walking trails and other opportunities for environmental experiences	Provider, Facilitator, Advocate	**4** *also 8*

Table A5.1: Coffs Harbour 2030 Plan - Community Strategic Plan outcomes and objectives (continued)

Outcome	Objective	Strategy	Council's role	Biodiversity Strategy management issue
LE2 We protect and restore our environment to conserve its unique biodiversity for future generations	LE2.1 Our forests, beaches, headlands, ocean, rivers, forested mountain backdrop, plants and animals are conserved for future generations	LE2.1.1 Ensure land-use management policies and practices conserve the region's unique environmental and biodiversity values	Provider, Facilitator	**1, 4, 5, 6, 7 & 8** *also 3*
		LE2.1.2 Enhance protection of our marine areas and manage for change	Advocate	**8** *also 4 & 5*
		LE2.1.3 Maintain and conserve biodiversity through protected reserve systems and other land conservation mechanisms	Providers, Facilitator, Advocate	**4 & 5** *also 1 & 8*
		LE2.1.4 Integrate Aboriginal land and sea management practices into programs that protect our environment	Facilitator	**3 & 7** *also 2*
		LE2.1.5 Implement climate change planning, adaptation and mitigation strategies	Provider, Facilitator	**1 & 4** *also 2, 7 & 9*
	LE2.2 We have active programs to restore and improve our environment	LE2.2.1 Create community-based programs (including youth and elderly) through partnerships with the community, schools and Aboriginal people	Provider, Facilitator	**2 & 5** *also 1, 3, 4 & 7*
		LE2.2.2 Manage our catchments effectively and adaptably	Provider, Facilitator	**8** *also 2, 4, 5 & 9*
		LE2.2.3 Build ecosystem resilience through a system of local and regional habitat corridors	Provider	**1, 4 & 5** *also 8*

Table A5.1: Coffs Harbour 2030 Plan - Community Strategic Plan outcomes and objectives (continued)

Outcome	Objective	Strategy	Council's role	Biodiversity Strategy management issue
LE3 We manage our resources and develop sustainably	LE3.1 We are responsible in the use and management of our natural resources and work to reduce our ecological footprint	LE3.1.1 Implement total water cycle management practices	Provider	**8** *also 4 & 2*
		LE3.1.2 Use best practice to prevent pollution impacts on our environment	Provider, Facilitator	**2 & 8**
		LE3.1.3 Ensure our use of natural resources, both marine and terrestrial, is sustainable	Facilitator, Provider	**4 & 5** *also 1, 8 & 9*
		LE3.1.4 Implement programs which make the Coffs Coast region a zero waste community	Provider	**2** *also 8*
	LE3.2 We are independent in our energy production and carbon neutral by using efficient, environmentally friendly renewable sources of power	LE3.2.1 Develop low environmental impact renewable energy systems for the region	Facilitator, Advocate	**1**
		LE3.2.2 Promote and adopt energy efficient practices and technologies across the community	Facilitator, Advocate	**1 & 2**
		LE3.2.3 Make our region a leader in local, low environmental impact, renewable energy production	Facilitator, Advocate	**1, 2 & 9**

Northern Rivers Regional Biodiversity Management Plan

The *Northern Rivers Regional Biodiversity Management Plan* (DECCW 2010a) is essentially a regional recovery plan that addresses multiple threatened species, populations and ecological communities. Many of the actions developed under the Biodiversity Management Plan are directly relevant to biodiversity conservation planning and management in Coffs Harbour LGA and, as such, have been incorporated into this Strategy.

The Biodiversity Management Plan provides an overall strategy for the conservation and restoration of biodiversity in the Northern Rivers Catchment Management Authority (NRCMA) Region. It is intended to guide investment planning and biodiversity management by agencies and groups responsible for natural resource management in the region. It is also intended to inform local planning documents such as local environment plans and development control plans. An important basis of the plan is the formation of linkages and partnerships between agencies.

The Biodiversity Management Plan illustrates opportunities for Council to value-add to its own biodiversity programs and initiatives through cooperative arrangements. Some key examples are:

- threatened species recovery actions
- site-specific management plans, such as shorebird nesting areas and flying-fox camps
- pest management strategies
- management of fragile ecosystems, such as coastal lakes and lagoons
- corridor mapping projects
- identification of priority habitat repair areas
- Great Eastern Ranges Initiative.

Apart from the Regional Biodiversity Management Plan, a number of approved recovery plans for individual threatened species, populations and ecological communities apply within the Coffs Harbour LGA (see Table A5.2). The Strategy aims to facilitate the application of relevant actions from these plans.


Southern Leaf-tailed Gecko *Saltuarius swaini*


Boronia sp.


Native Passionfruit *Passiflora herbertiana*

Table A5.2: Species recovery plans relevant to Coffs Harbour LGA

Common name	Scientific name	NSW		C'Wealth
		TSC Act	FM Act	EPBC Act
Plants:				
Dorrigo Daisy Bush	*Olearia flocktoniae*	Exhibited draft		
Headland Zieria	*Zieria prostrata*	Approved		Approved
Moonee Quassia	*Quassia* sp. 'Moonee Creek'	Approved		
Square-stemmed Spike-rush	*Eleocharis tetraquetra*	Approved		
Fish:				
Eastern Freshwater Cod	*Maccullochella ikei*		Approved	Approved
Oxleyan Pygmy Perch	*Nannoperca oxleyana*		Approved	Approved
Black Cod	*Epinephelus daemelii*		Approved	
Frogs:				
Green and Golden Bell Frog	*Litoria aurea*	Exhibited draft		
Wallum Froglet	*Crinia tinnula*			Approved
Wallum Sedge Frog	*Litoria olongburensis*			Approved
Reptiles				
Green Turtle	*Chelonia mydas*			Approved
Loggerhead Turtle	*Caretta caretta*			Approved
Birds:				
Bush Stone-curlew	*Burhinus grallarius*	Approved		
Gould's Petrel	*Pterodroma leucoptera leucoptera*	Approved		Approved
Little Tern	*Sternula albifrons*	Approved		
Masked Owl	*Tyto novaehollandiaee*	Approved		
Powerful Owl	*Ninox strenua*	Approved		
Regent Honeyeater	*Xanthomyza phrygia*	Approved		
Sooty Owl	*Tyto tenebricosa*	Approved		
Swift Parrot	*Lathamus discolor*			Approved
Barking Owl	*Ninox connivens*	Exhibited draft		
Coxen's Fig Parrot	*Cyclopsitta diophthalma*	Approved		
Mammals:				
Koala	*Phascolarctos cinereus*	Approved		
Yellow-bellied Glider	*Petaurus australis*	Approved		

A5.3 Local strategic plans

High Value Environments and Biodiversity Assests

The Coffs Harbour Biodiversity Action Strategy will provide a framework to identify and map High Valued Environments across the LGA as required under the *Mid North Coast Regional Strategy*. The Regional Strategy states that local environment plans will need to zone land with high environmental values for environmental protection. Based on the Regional Strategy and the Regional Conservation Plan, high valued environments in the Coffs Harbour LGA shall include:

- threatened ecological communities
- Koala habitat
- rare and/or poorly conserved vegetation communities
- over-cleared vegetation communities
- threatened and 'significant species' habitat
- old-growth forests
- wetlands, estuaries, significant aquatic habitats and riparian buffers
- corridors.

Vegetation mapping will be used as a surrogate, or basis, for the delineation of these High Valued Environments. Once created, the High Valued Environments will be referred to under Coffs Harbour City Council Planning Framework as Biodiversity Assets (see Figure A5.3).

Rainbow Bee-eater *Merops ornatus*

There are currently a number of key programs which are identifying and mapping Biodiversity Assets across the Coffs Harbour LGA, including:

- ongoing refinement of existing vegetation mapping to produce the Class 5 vegetation map
- identification, modelling and mapping of High Valued Habitats (HVH)
- monitoring of biodiversity assets
- development of a corridors footprint map.

The *Northern Rivers Regional Biodiversity Management Plan* (DECCW 2010a) provides information on areas of importance to biodiversity including a series of regional maps which cover the Coffs Harbour LGA. Some of the areas identified by the Plan are likely to be of high ecological significance warranting inclusion in environmental protection zones as required by the MNC Regional Strategy.

Corridor footprint

The *Mid North Coast Regional Strategy* identifies the importance of corridors for environmental protection. The Regional Strategy states that local environment plans will need to:

- zone land with corridor values for environmental protection
- include provisions to encourage corridor establishment.

To address these requirements, Council has access to corridors mapped across the Coffs Harbour LGA at broader spatial scales, including:

- continental scale—Great Eastern Ranges Initiative (see below)
- regional scale—climate change corridors (DECC 2007) and Key Habitats and Corridors (Scotts 2003).

At the local scale, Council has commenced preparation of corridor mapping which integrates this broader scale mapping to ensure the end product has the most relevance to biodiversity management in the Coffs Harbour LGA.

Council has also developed a map showing landscape connections that contain areas of conservation priority. These 20 areas, which are discussed and mapped (Figure B1.5) in Part B of the Strategy, will be considered as a priority in the development of the corridors footprint map for Coffs Harbour LGA.

A key action of the Biodiversity Action Strategy is to facilitate the finalisation of the corridors mapping and provide a framework for its implementation and development as a Landholder's Incentives Layer. The Landholder's Incentives Layer will provide opportunities for future investment. Council will also develop procedures so landholders can access incentive funds for biodiversity conservation on their properties.

The **Great Eastern Ranges Initiative** provides a national vision for linking landscapes along Australia's Eastern Ranges. The Great Eastern Ranges Corridor extends from the mountains of Victoria to the Atherton Tablelands in far north Queensland. It stretches for more than 2800 kilometres along the Great Dividing Range and the Great Escarpment of Eastern Australia.

The Coffs Harbour LGA is located approximately halfway along the corridor and is one of only a few places where the corridor meets the sea (shown in figure A5.2). Local programs within the LGA can help meet some of the Initiative's objectives associated with habitat connectivity, restoration, protection of biodiversity and ecological principles.

The Strategy aims to facilitate the application of the Great Eastern Ranges Initiative in the Coffs Harbour LGA.

Habitat fragmentation and connectivity is a fundamental concern in conservation biology as it affects species' vulnerability to extinction (Frankham 2006 in DoP 2009).

Species need habitat and they need it to be of a quality and spatial configuration that allows them to function within their ecological niche. Current accepted approaches to deal with the threats of habitat loss, degradation and fragmentation promote habitat preservation and restoration, including enhanced habitat continuity or connectivity, as conservation planning priorities (e.g. Bennett 1998; Lindenmayer & Franklin 2002; Mackey et al. 2010). It makes good sense to direct conservation and restoration efforts in a way that maximises the benefits to biodiversity while minimising costs to the community. This type of pragmatic approach leads to the adoption of conservation strategies that focus on maintaining or building efficient habitat networks.

A widely accepted model for regional landscape conservation planning involves a network of linked protected areas that integrates:

- large core areas
- buffers
- corridors (e.g. Mackey et al. 1998; Lindenmayer & Fischer 2006).

The most ecologically intact areas must always form the basis for protected area networks. However, core areas, buffers and corridors don't have to be free of past disturbances. Indeed, many productive areas which are important to biodiversity have been cleared or modified (Braithwaite et al. 1984; Reed & Lunney 1990; Eby et al. 1999). For example, clearing for agriculture and human habitation in the coastal plains has been, and remains, particularly intensive. These areas usually retain their productivity, may support remnants habitats, and may be candidates for ecological restoration (Recher 1993; Saunders et al. 1993; Simberloff et al. 1999). For protected area networks to be more representative, they need to incorporate certain disturbed landscapes.

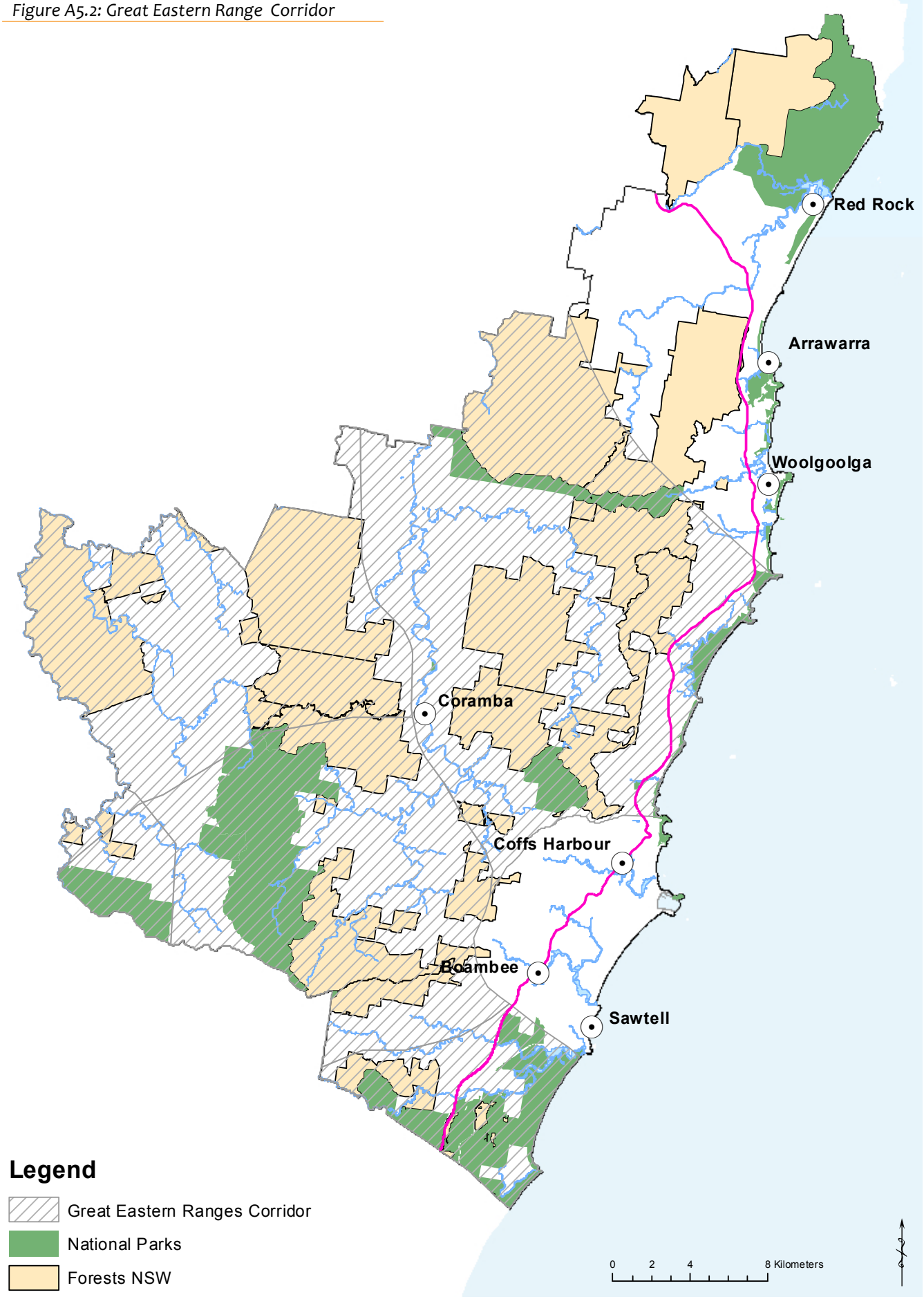
Connectivity conservation retains or enhances natural interconnections of lands between protected areas, and is fundamental to the conservation of natural systems and biodiversity. Through strategic habitat conservation and restoration, corridors provide dispersal and migration routes for species, and facilitate ecological and evolutionary processes. Creating corridors and building ecosystem resilience to change will be key strategies to ensure that natural systems have the capacity to adapt to shifting climatic conditions. Securing and enhancing critical intact habitats throughout the LGA is the most important and immediate step we can take to improve the future sustainability of Coffs Harbour's ecosystems.

Coffs Harbour City Comprehensive Koala Plan of Management

A key action in this Strategy is to facilitate the review and implementation of the updated 'Coffs Harbour Comprehensive Koala Plan of Management' (CKPoM). Key to the implementation of the Koala Plan will be the identification of areas of core Koala habitat as a High Value Habitat. Further refinement of habitat mapping based on community survey, on-ground assessments and application of the new generation vegetation map is required.

Koala *Phascolarctos cinereus*

Figure A5.2: Great Eastern Range Corridor



A6. THREATS TO OUR BIODIVERSITY

Australia, like much of the world, has lost and is continuing to lose its biodiversity. Today, more than 1700 species and ecological communities across the country are known to be threatened with extinction. Even seemingly intact landscapes, such as northern Australia's savannah country, are exhibiting rapid declines in biodiversity.

Biodiversity facts (DECCW 2010c)

Native vegetation provides habitat for our biodiversity, including threatened species. Of the existing native vegetation in NSW:

- 9% is in its original condition
- 26% is significantly modified
- 52% is modified
- 13% has been replaced by non-native species.

Pests

More than 650 species of terrestrial animals have been introduced to Australia since 1788 and 29 of these are considered to pose a threat to biodiversity.

Of the 1650 weed species in NSW, over 300 are likely to have significant impacts on biodiversity.

Threatened species

In NSW more than 1000 native species, populations and ecological communities are threatened with extinction:

- 73 species are presumed extinct
- 51 species are critically endangered
- 426 species are endangered
- 405 species are vulnerable
- 43 populations are endangered
- 95 ecological communities are threatened (OEH 2011; NSW Scientific Committee 2010).

Almost 13% of all plant species in NSW are threatened, and 33 species are presumed extinct.

At the national level, nearly 20% of Australia's mammal species are presumed extinct, and 65% of birds have a moderate or greater risk of extinction.

A6.1 Key threats to Coffs Harbour's biodiversity

Across the country, including the Coffs Harbour region, our biodiversity continues to decline because of the impacts of a range of threats and threatening processes. Lost biodiversity can never be fully recovered, but through our conservation efforts we can help to ensure that species are able to persist. We can restore the capacity of ecosystems to adapt to changes and disturbances—in other words, to build ecological resilience (DSEWPC 2010).

A threatening process is something that threatens, or could potentially threaten, the survival or evolutionary development of a species, population or ecological community. A threat can be listed under the NSW *Threatened Species Conservation Act 1995* (TSC Act) as a 'key threatening process' if it:

- adversely affects threatened species, populations or ecological communities

or

- could cause species, populations or ecological communities that are not threatened to become threatened (OEH 2011).

Key threatening processes that are formally listed under the TSC Act and which are potentially operating across the Coffs Harbour LGA are listed in Part A - Appendix 2.

Apart from legislated key threatening processes, there are a range of other threats which must be acknowledged and managed if we are to sustain and even improve our biodiversity. The *Northern Rivers Regional Biodiversity Management Plan* (DECCW 2010a) describes in detail the threats most prevalent in the Northern Rivers CMA Region. The Plan identifies 14 threat categories including 2 'universal' or overarching threats, and 12 'regional' threats. Each of these categories encompasses a number of individual 'threat activities'. See Table A6.1.

All of the threat categories identified in the Biodiversity Management Plan are relevant to the Coffs Harbour LGA and the regional threats all operate at the LGA level. It should be noted that many of these threat categories and activities are frequently interconnected and can often be exacerbated by each other. Each category is discussed below (refer to DECCW 2010a for more detail). A detailed discussion of threat activities across different parts of Coffs Harbour LGA can be found in Part B of the Strategy.


Camphor Laurel *Cinnamomum camphora*


Cane Toad *Bufo marinus*

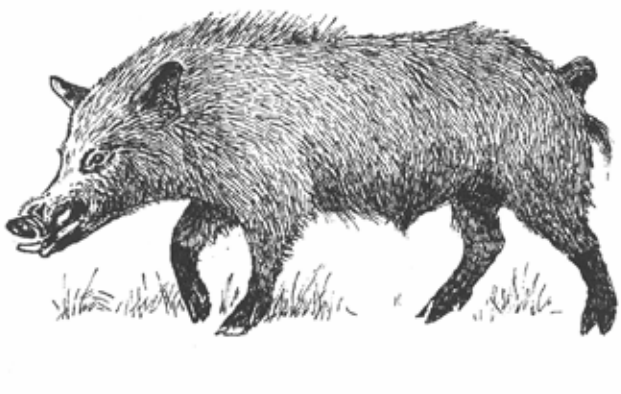

Rabbit *Oryctolagus cuniculus*


European Red Fox *Vulpes vulpes*


Umbrella Tree *Schefflera actinophylla*

Table A6.1: Northern Rivers Region threat categories (from DECCW 2010a)

Threat Category	Number of threat activities
Universal threats:	
Climate change	Overarching
Decision making & knowledge gaps	Overarching
Regional threats:	
Clearing and fragmentation	7
Inappropriate fire regimes	1
Weeds	6
Pests	19
Forestry	1
Dieback	3
Hydrology & water quality	9
Disease & pathogens	6
Human interference	20
Livestock	1
Chemicals & waste	4
Demographic & small population effects	2


Feral Pig *Sus scofa*

A6.2 Universal threats

Climate change

Predictive modelling demonstrates that climate change will inevitably lead to:

- increases in air temperature
- increases in sea level
- altered rainfall and evaporation regimes
- increases in the severity and frequency of storms, rainfall and winds
- increases in wave height
- increased storm surge.

These changes will influence drought and fire patterns and there will be many associated impacts on biodiversity. Species and communities will have to adapt or they will disappear. Ecosystems most at risk of disappearing are those on the coastal lowlands, saline wetlands, higher altitude communities and fragmented habitats elsewhere. Specialised ecosystems, which are typically restricted in distribution, are also likely to be heavily impacted.

If we reduce greenhouse gas emissions we can potentially mitigate the onset and severity of climate change impacts. However, climate change is inevitable and we need an adaptive response to reduce its associated impacts on biodiversity. One way of reducing these impacts is to increase the size, connectivity and quality of habitats—this will improve the resilience of species and communities to change.

Decision making and knowledge gaps

Disjointed approaches to managing weeds, pests, water quality, land clearing and habitat protection have resulted in some past efforts being ineffective and expensive. Biodiversity conservation requires a holistic and coordinated approach combined with the support of the entire community.

Cooperation, communication and information sharing is needed at various levels, including:

- between communities and state and Commonwealth agencies
- between local governments
- between local governments and the community and industry.

Information sharing, complementary management regimes and strategic investment should be key components of an integrated approach to biodiversity conservation planning and management.

Acquiring and applying relevant and detailed knowledge is crucial to rational and strategic biodiversity conservation. New information is needed and existing information needs to be applied in accordance with best practice.

Many important ecosystems and habitats are located on privately owned lands in the Coffs Harbour LGA. As such, we need to inform the community about biodiversity values and encourage them to protect and enhance these values.


Inappropriate fire regimes

A6.3 Regional threats

Clearing, disturbance and fragmentation

Clearing or disturbance of native vegetation and further fragmenting of remnants are the principal factors threatening biodiversity across the Coffs Harbour LGA. Direct impacts of vegetation clearing or disturbance include the loss of individuals and habitat. Indirect impacts include invasion of habitats by feral species and the disruption of ecological functioning. Since European settlement over half the native vegetation on private land in Coffs Harbour LGA has been cleared. In some areas vegetation cover has actually expanded, but many of these areas are covered with riparian weeds such as Privet *Ligustrum* sp. and Camphor Laurel *Cinnamomum camphora*, and forest weeds such as Lantana *Lantana camara*.

In the Coffs Harbour LGA, small-scale clearing for urban, industrial and rural residential development is prevalent along the coast, while rural-based clearing is more predominant in the hinterland and escarpment. Secondary clearing associated with these activities also occurs, for example, under-scrubbing and maintenance of asset protection zones for bushfire control.

Along Coffs Harbour's coastal strip, increasing population growth and urban expansion are placing significant pressure on natural systems. To manage this growth, and ensure we better maintain environmental values in the LGA, systematic and long-term planning is required. The *Mid North Coast Regional Strategy* (DoP 2009) predicts that by 2031 an additional 19,200 dwellings will be required in the Coffs Coast subregion (including Coffs Harbour, Bellingen and Nambucca LGAs). This projected growth and the requirements for associated infrastructure will place greater pressure on the vegetation and biodiversity along the coast.

This point is expanded upon in Part B which highlights 10 landscape connections containing conservation priorities on the Coffs Harbour LGA coastal plains where important biodiversity values coincide with areas where development is expected and/or proposed.

The threatened Grey-headed Flying-fox provides an example of the impact of habitat clearing and fragmentation on the wellbeing of biodiversity. It also illustrates how impacts can extend to influence industry and the community. Over many thousands of years flying-foxes have evolved alongside vegetation communities, developing a delicately balanced and mutually beneficial relationship. In return for enjoying the fruit and nectar provided by certain trees, the flying-foxes play a vital role in pollination and seed dispersal. This benefits tree species and the overall health of the habitats they support. Habitat loss (clearing) and fragmenting vegetation has resulted in:

- flying-fox populations concentrating in smaller, often less-desirable habitats, such as remnants in parks and reserves, where they can create a public nuisance
- flying-foxes changing their diet to include horticultural crops/fruits
- a reduction in flying-foxes' ability to pollinate trees and disperse seed. This has negative impacts on the health of forests and ecosystems.

Inappropriate fire regimes

Many of our plants and animals have evolved under a specific fire regime. The frequency and intensity of fire play an important role in determining the plant species, physical structure and distribution of vegetation communities. Fire frequency and intensity are also reproductive triggers for a variety of species, including banksias and some eucalypts. As such, fire has an important role in the ecology and management of many vegetation communities. For some animals, fire provides/regenerates habitat, and for other animals it destroys their habitat.

Humans have changed natural fire regimes. Aboriginal people introduced a fire regime that benefited some species and probably disadvantaged others. That regime was changed after European settlement. Today, the safety of people and assets is often the priority, and can prevail over the ecological needs of plants and animals. One problem is that we tend to conduct hazard reduction burns in inappropriate seasons and at a frequency that does not suit sensitive species and communities. High frequency fires are listed as a key threatening process in NSW.

Weeds

The impact of weeds on Australian ecosystems is well documented. Weeds are a major threat to Coffs Harbour's biodiversity and affect all of our ecosystems. There are currently 63 scheduled noxious weed species in the LGA along with numerous other environmental weeds. The biggest threats to our ecosystems are:

- Bitou Bush *Chrysanthemoides monilifera* subsp. *rotundata* (in coastal ecosystems)
- Privet and Camphor Laurel (in rainforest and riparian habitats)
- Lantana is also a serious threat.

Weeds displace native plants, can make areas unsuitable for native fauna, and generally impact on the viability of ecosystems. Weeds also have negative impacts on agricultural production and general environmental amenity. Weed removal is a key Biodiversity Action Strategy which will benefit the health of Coffs Harbour's ecosystems.

Although weed removal is generally encouraged, there are instances where weeds provide cover and food for some native animals. In these circumstances, the best strategy is to remove the weeds in stages at the same time as restoring/ planting out native plant species.

Pest animals

Australian ecosystems have undergone significant changes as a result of the spread of pest animals, and Coffs Harbour is no exception. Species such as the European Red Fox *Vulpes vulpes* have caused the extinction or decline of many native species, particularly small terrestrial mammals.

The most serious pest animals in the Coffs Harbour LGA are the European Red Fox *Vulpes vulpes*, Cats *Felis catus*, Indian Mynas *Acridotheres tristis* and Pigs *Sus scrofa*. However, there are others that may pose significant threats in the future (e.g. Cane Toads *Bufo marinus*, species of deer, Plague Minnow *Gambusia holbrooki* and feral honeybees *Apis* sp.). Foxes and feral Cats are a particular concern because they kill an enormous number of individual native animals each year in Coffs Harbour LGA alone.

Climate change impacts may advantage certain pest species, and some native species may also assume pest proportions in certain circumstances (e.g. Noisy Miner, Pied Currawong).

Coffs Harbour Council's 'Vertebrate Pest Management Strategy' (2009) sets out a broad range of Commonwealth and state legislative requirements that relate to pest management. Both Council and the community need to comply with these requirements. The Pest Management Strategy also identifies the various government authorities and community groups currently responsible for vertebrate pest management in the Coffs Harbour LGA.

Cane Toads are yet to become established as a serious threat in the Coffs Harbour LGA but their presence to the north and south means that they are likely to be transported into our area. Vigilance is required and swift action will always be important to negate the impacts of this serious pest species.

Roaming domestic pets (Dogs and Cats) are also serious pests as they can kill and injure native wildlife. For example, Koalas are often harassed by Dogs and may be killed or seriously injured.

Introduced invertebrates also have the potential to become pests within the Coffs Harbour LGA and vigilance is required to monitor pests such as the fire ant which is a major problem in south-east Queensland.

Forestry

Forestry is a major land use on both private and public lands in Coffs Harbour LGA. While providing important forest products, forestry activities (tree harvesting, thinning, and construction of roads, snig tracks and log dumps) also impact biodiversity values. Impacts include:

- loss of habitat resources such as hollow trees
- simplification of forest structure and diversity
- temporary or permanent loss of individual animal and plant species
- increased weed and pest animal invasion
- increased fire hazard
- sedimentation of streams
- reduced water quality
- potential spread of diseases and pathogens.

The protection of biodiversity values requires a balanced approach between maximising wood production and maintaining habitat and ecological process.

Private native forestry (PNF) is regulated by the Environmental Protection Authority, but Council has a role to play when PNF is proposed on lands with known environmental values. Council has a concurrence role for PNF applications concerning lands zoned for environmental protection and lands mapped as core Koala habitat.

Plantation establishment (hardwood and softwood) also has the potential to impact biodiversity. Plantations can support some biodiversity but impacts associated with chemical spray drift, weeds, pests, diseases and pathogens need to be considered and ameliorated.

Dieback

Dieback is the death of trees or the premature and often rapid decline in condition of a large number of trees at once. Dieback can be a natural process but may also be facilitated by human activities. Phytophthora root rot dieback is caused by a fungal disease.

Bell Miner *Manorina melanophys* associated dieback affects wet and dry open forests across our region, including parts of the Coffs Harbour LGA. This type of dieback appears to be facilitated by sap-feeding psyllid insects and the native Bell Miner. Its spread may also be caused by weeds, drought, logging, road construction, pasture improvement, soil nutrient changes, altered fire and grazing regimes, and general biodiversity declines. Bell Miner associated dieback has the potential to impact a range of forest ecosystems, including the White Gum Moist Forest Endangered Ecological Community which occurs in the Coffs hinterland around the north-eastern foothills of the Dorrigo Plateau.

Hydrology and water quality

There are a number of complex processes that affect hydrology and water quality. These processes can in turn impact the biodiversity of Coffs Harbour's catchments, subcatchments, waterways, estuaries and offshore marine areas. Human activities such as agriculture, forestry, fishing, mining and urbanisation all have impacts on these systems.

It is critical that the water quality of Coffs Harbour's catchments and subcatchments is maintained and improved through programs that regulate and manage stormwater run-off, and nutrient, sediment and contaminant loads.

The protection and improvement of aquatic habitats, floodplains, riparian areas, acid sulphate soils and groundwater-dependent ecosystems is also crucial in protecting biodiversity and the integrity of rivers, lakes and wetlands across the LGA.

Disease and pathogens

Diseases and pathogens currently impact on, or have the potential to impact upon, a range of flora and fauna species across the Coffs Harbour LGA. Examples of diseases include the chytrid fungus, which is implicated in the decline of many frog species, and chlamydia, which continues to impact Koalas. Potentially threatening plant diseases and pathogens include *Phytophthera cinnamomi* dieback and the Myrtle Rust *Uredo rangelii*.

Human interference

Examples of human interference that can impact biodiversity include road and traffic collisions, uncontrolled domestic pet killings and harassment, culling, hunting, persecution, fishing, collection, electrocution and general interference. Less-direct impacts include unmanaged or poorly managed tourism and recreation activities (e.g. bushwalking, off-road vehicles, trail bikes, rock climbing, and other visitor-based activities).

Livestock

Grazing, trampling, soil compaction, erosion of riparian areas, reduction of water quality, and stream disturbance can all impact biodiversity where livestock are not managed appropriately.

Chemicals and waste

The release of pollutants into the environment caused by human activities, such as urbanisation and agricultural run-off, can kill organisms outright, degrade habitats, and disrupt ecological processes. Poisons—including chemicals, solvents, detergents, pesticides, herbicides, fungicides, heavy metals, petrochemicals, oils—pervade many aspects of human life and also impact biodiversity.

Similarly, when nutrients enter catchments they have the potential to detrimentally impact human health and also biodiversity. Nutrients enter catchments through fertilisers, sewage, intensive animal husbandry, soil erosion, and discharge of poor quality water.

Other pollutants—like litter, building waste, garden waste, discarded fishing tackle, cigarette butts, noise and light, methane, carbon dioxide and hydrocarbons—all accumulate in the environment and have short- and long-term implications for all life.

Demographic and small population effects

Species that occur in small populations, have highly restricted distributions, or are in rapid decline may be particularly vulnerable to environmental vagaries. Examples include endangered populations (see Table A3.1c) and species whose habitat may be compromised by climate change and associated habitat changes.

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APPENDICES

APPENDIX 1 - Relevant legislation, policies and strategies

Commonwealth legislation

- *Environment Protection and Biodiversity Conservation Act 1999*

NSW legislation

- *Catchment Management Authorities Act 2003*
- *Coastal Protection Act 1979*
- *Companion Animals Act 1998*
- *Contaminated Land Management Act 1997*
- *Environmental Planning and Assessment Act 1979*
  - SEPP 14 Coastal Wetlands
  - SEPP 26 Littoral Rainforests
  - SEPP 44 Koala Habitat Protection
  - SEPP 71 Coastal Protection
- *Fisheries Management Act 1993*
- *Local Government Act 1993*
- *Marine Parks Act 1997*
- *National Parks and Wildlife Act 1974*
- *Native Vegetation Act 2003*
- Native Vegetation Regulations 2005
- *Natural Resources Commission Act 2003*
- *Noxious Weeds Act 1993*
- *Rural Fires Act 1997*
- *Rural Fires and Environmental Assessment Legislation Amendment Act 2002*
- *Rural Lands Protection Act 1998*
- *Threatened Species Conservation Act 1995* (under review)
- *Water Management Act 2000*

Relevant international and national biodiversity policies and strategies

- Australia's Biodiversity Conservation Strategy 2010–2020
- International Convention on Biological Diversity
- Federal recovery plans, threat abatement plans and statements of intent
- Great Eastern Ranges Initiative
- National Biodiversity and Climate Change Action Plan 2004–2007
- Solitary Islands Marine Reserve (Commonwealth Waters) Management Plan

Relevant state and regional policies and strategies

- Bell Miner Associated Dieback Strategy 2004
- Key Habitats and Corridors for Forest Fauna: a Landscape Framework for Conservation in North-east New South Wales (Scotts 2003)
- Mid North Coast Regional Strategy
- (Draft) Mid North Coast Regional Conservation Plan
- North Coast Regional Environmental Plan 1988
- Northern Rivers CMA Priorities Action Statement
- Northern Branch Cane Toad Management Strategy
- Northern Rivers Catchment Action Plan
- Northern Rivers Regional Pest Management Strategy 2007
- Northern Rivers Regional Biodiversity Management Plan 2010
- Northern Rivers Invasive Plants Action Strategy 2009–2013
- NSW State Plan
- NSW Biodiversity Action Strategy (currently under review)
- NSW Invasive Species Plan 2008–2015
- NSW Threatened Species Priorities Action Statement
- NSW Flying-fox Camp Management Policy 2007
- NSW recovery plans, threat abatement plans and statements of intent
- Solitary Island Marine Park Zoning Plan (2002) (under review)

Relevant Coffs Harbour City Council policies and strategies

- Coffs City Council Management Plan 2009–2012
- Coffs Creek Estuary Management Plan
- Coffs Harbour 2030 Plan
- Coffs Harbour Biodiversity Action Strategy 2002
- Coffs Harbour Coastal Reserves Plan of Management 2000
- Coffs Harbour City Koala Plan of Management 1999
- Coffs Harbour Local Environment Plan 2000 (currently undergoing amendment as a Standard Instrument Local Environment Plan)
- Coffs Harbour Natural Areas Plan of Management
- Coffs Harbour Open Space Strategy 2010
- Coffs Harbour Rural Lands Strategy 2009
- Coffs Harbour Vertebrate Pest Management Strategy 2009
- Companion Animals Plan of Management
- Corindi River Estuary Management Plan
- development control plans
- North Coast Regional Botanic Gardens Management Strategy 1997
- Our Living City: A Settlement Strategy for Coffs City to 2031
- Rural Residential Strategy 2009
- State of the Environment Report
- Tree Preservation Order 1999
- Urban Development Strategy 1996
- Urban Stormwater Management Plan 2000
- Woolgoolga Lake Management Plan
- Draft Orara River Rehabilitation Strategy

APPENDIX 2 - Key threatening processes in the Coffs Harbour LGA

As listed under the Threatened Species Conservation Act.

- Alteration to the natural flow regimes of rivers, streams, floodplains and wetlands
- Anthropogenic Climate Change
- Bushrock removal
- Clearing of native vegetation
- Competition and grazing by the feral European rabbit
- Competition and habitat degradation by feral goats
- Competition from feral honeybees
- Death or injury to marine species following capture in shark control programs on ocean beaches
- Entanglement in, or ingestion of anthropogenic debris in marine and estuarine environments
- Forest eucalypt dieback associated with over-abundant psyllids and Bell Miners
- Herbivory and environmental degradation caused by feral deer
- High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition
- Infection of frogs by amphibian chytrid fungus causing the disease chytridiomycosis
- Infection of native plants by *Phytophthora cinnamomi*
- Introduction and establishment of exotic rust fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae
- Invasion and establishment of the Cane Toad
- Invasion and establishment of exotic vines and scramblers
- Invasion of native plant communities by Bitou Bush & Boneseed
- Invasion of native plant communities by exotic perennial grasses
- Invasion, establishment and spread of *Lantana camara*
- Loss and degradation of native plant and animal habitat by invasion of garden plants, include aquatic plants
- Loss of hollow-bearing trees
- Predation and hybridisation by feral Dogs (*Canis lupus familiaris*)
- Predation by feral Cats
- Predation by the European Red Fox
- Predation by the Plague Minnow (*Gambusia holbrooki*)
- Predation, habitat degradation, competition and disease transmission by feral Pigs (*Sus scrofa*)
- Removal of dead wood and dead trees
-

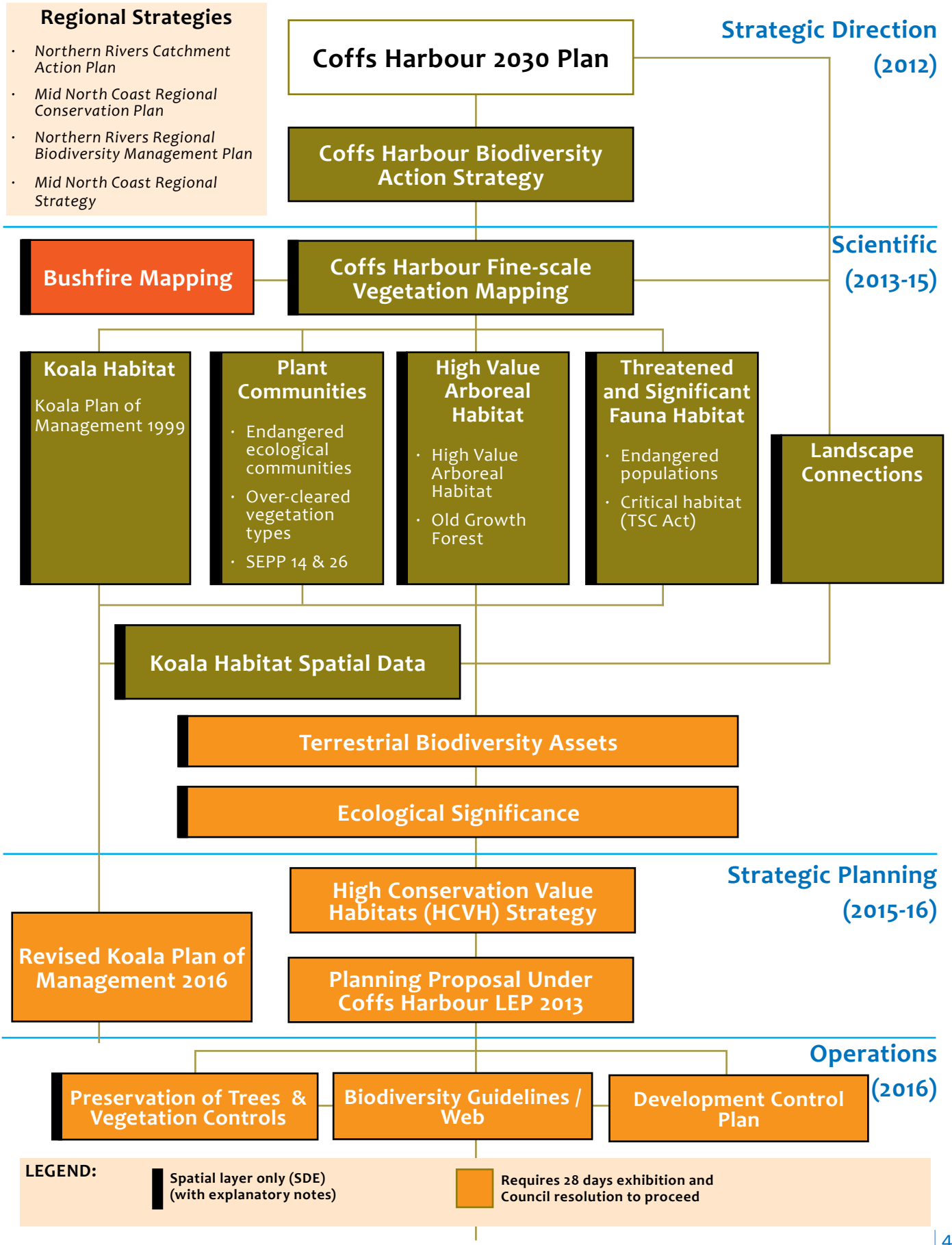
As listed under the Environmental Protection and Biodiversity Protection Act.

- Loss of terrestrial climatic habitat caused by anthropogenic emissions of greenhouse gases
- Land clearance competition and land degradation by rabbits
- Competition and land degradation by unmanaged goats
- Injury and fatality to vertebrate marine life caused by the injestion of, or entanglement in, harmful marine debris
- Infection of amphibians with chytrid fungus resulting in chytridiomycosis
- Dieback caused by the root fungus (*Phytophthora cinnamomi*)
- The biological effects, including the lethal toxic ingestion, caused by Cane Toads
- Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants
- Predation by European red fox
- Predation by feral cats
- Predation, habitat degradation, competition and disease transmission by feral pigs

As listed under the Fisheries Management Act.

- Human-caused climate change
- Degradation of native riparian vegetation along NSW water courses
- The removal of large woody debris from NSW rivers and streams
- Hook and line fishing in areas important for the survival of threatened fish species
- Instream structure and other mechanisms that alter natural flow
- Introduction of non-indigenous fish and marine vegetation to the coastal waters of NSW

APPENDIX 3 - Planning Framework for Biodiversity Assets



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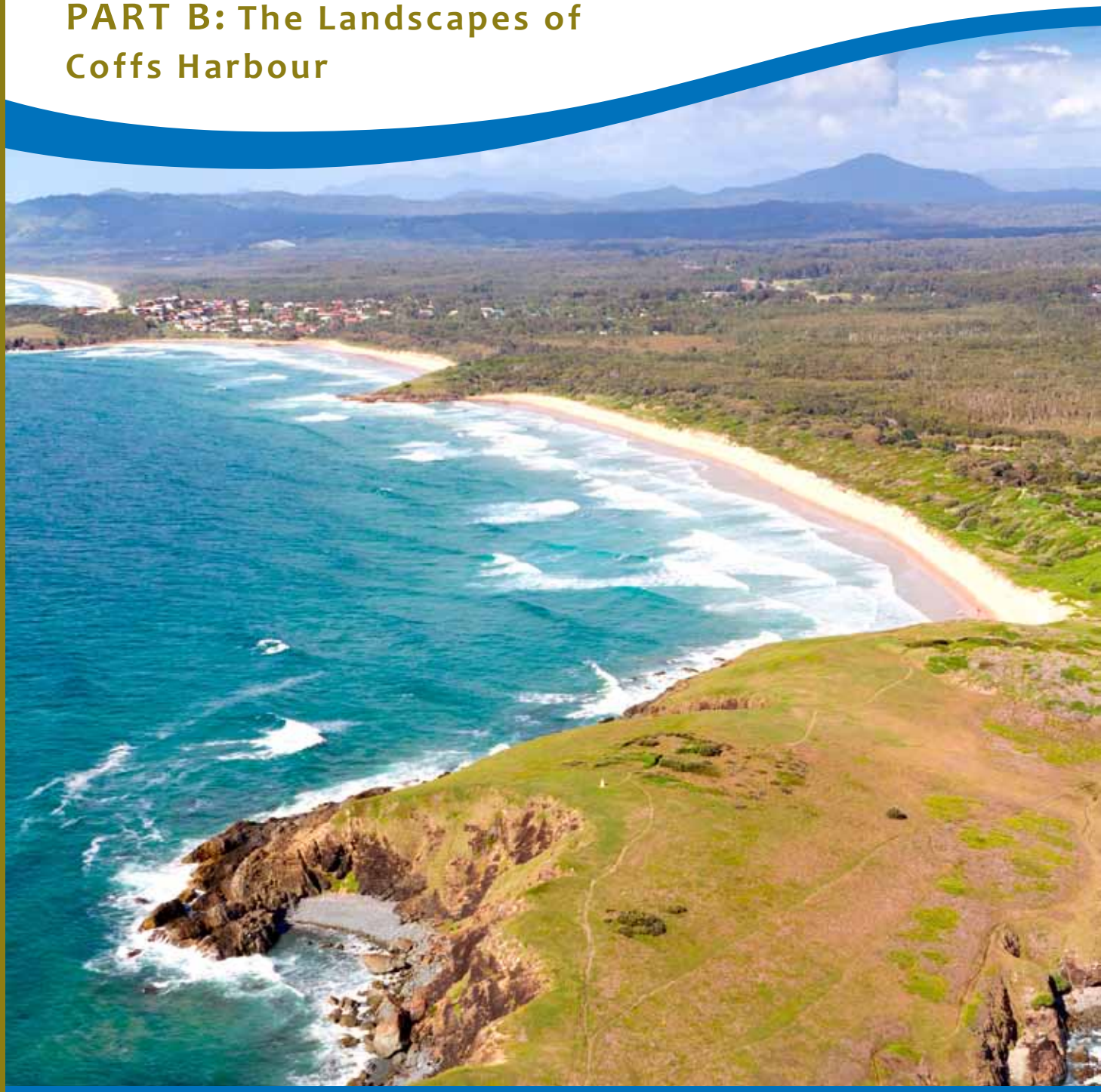
COFFS HARBOUR BIODIVERSITY ACTION STRATEGY

FROM THE OCEAN TO THE RANGES

PART B: The Landscapes of Coffs Harbour

Coffs Harbour City Council



November 2015

THIS IS A LOOKING AFTER OUR ENVIRONMENT PROJECT
Helping to achieve the 2030 Community Vision

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Front Cover Image

Coffs Coastal landscape - Picture supplied Rob Cleary *Seen Australia* ©

B1. INTRODUCTION

B1.1 An introduction to the landscapes of the Coffs Harbour LGA

To provide a better understanding of past and present land-use patterns and threats impacting biodiversity, the Coffs Harbour LGA has been divided into three distinct landscape units:

- coastal plains
- midland hills
- escarpment ranges.

These landscapes have been based primarily on topography and elevation. The graphs (Figure B1.1) below show the area and percentages for each of the landscapes, and Figure B1.2 is a map of the landscapes.

This part of the Strategy details the characteristics, statistics, biodiversity values, landscape connections and key threats of each of the three landscapes.

Figure B1.1: Landscapes as a proportion of Coffs Harbour LGA

The coastal plains supports a significantly higher percentage of the human population in the LGA. This greater population density living near and adjacent to the coast results in an array of threats and disturbances to the biodiversity of this fragile landscape. Conversely the midland hills, and to a greater extent the escarpment ranges, support a much lower density of population per square kilometre. In these landscapes, most people live in rural areas or villages. Threats to biodiversity in these areas are often different and lower in intensity compared to the coast.

The Coffs Harbour LGA has a varied and complex geological history. Broad geological groupings in the LGA are shown in Figure B1.3, including alluvial sediments, claystones, conglomerates, marine sediments, granite, mudstones and sandstone.

Major land uses in the LGA vary across the three landscapes and are broadly depicted in Figure B1.4. The coastal plains are dominated by urban and rural residential areas, with some areas of horticulture, grazing and cropping. The midland hills and escarpment ranges are mostly rural with grazing and forestry, and some areas of horticulture (primarily bananas and blueberries).

Christmas Bells *Blandfordia grandiflora*

B1.2 Landscape connections in the Coffs Harbour LGA

We have identified and mapped 20 'landscape connections' in Coffs Harbour LGA (see Figure B1.5). These areas support important conservation priorities and will be the focus for our biodiversity conservation efforts. There are:

- 10 in the coastal plains
- 5 in the midland hills
- 5 in the escarpment ranges.

These areas are known to support important biodiversity values and they also provide overall habitat connectivity. Parts of these areas are subject to ongoing and proposed development pressures. These pressures are associated with urban and rural–residential subdivisions on the coastal plain, and with ongoing agricultural and forestry activities in the midland hills and escarpment ranges.

The biodiversity values in these key areas persist within remnants of habitat (coastal plains) or broader swathes of habitat (midland hills and escarpment ranges). These habitats may have been modified, but they still retain overall high conservation values.

A range of conservation mechanisms may be appropriate to protect and enhance these values, such as formal reservation, Biobanking and offsetting, conservation agreements, management of weeds and pest animals, and enhancement of riparian areas. Large parts of these areas are freehold and their protection will depend on a range of factors such as the willingness of landowners to be involved in conservation mechanisms, and the availability of funding for biodiversity management.

These 'landscape connections' are significant at local, regional and state scales because:

- they support threatened species (TSC Act, EBPC Act & FM Act), regional core habitats, and conservation priority fauna (after Gilmore & Parnaby 1994; NPWS 1994, 1995)
- they provide critical links between larger, core habitat areas at a landscape and local level—these corridors facilitate the movement of genes, individual plants/animals and species across the landscape
- they provide climate change pathways for biodiversity mitigation and adaptation in the face of likely climate change impacts on species, communities and ecosystems.

Figure B1.2: Landscape units in Coffs Harbour LGA

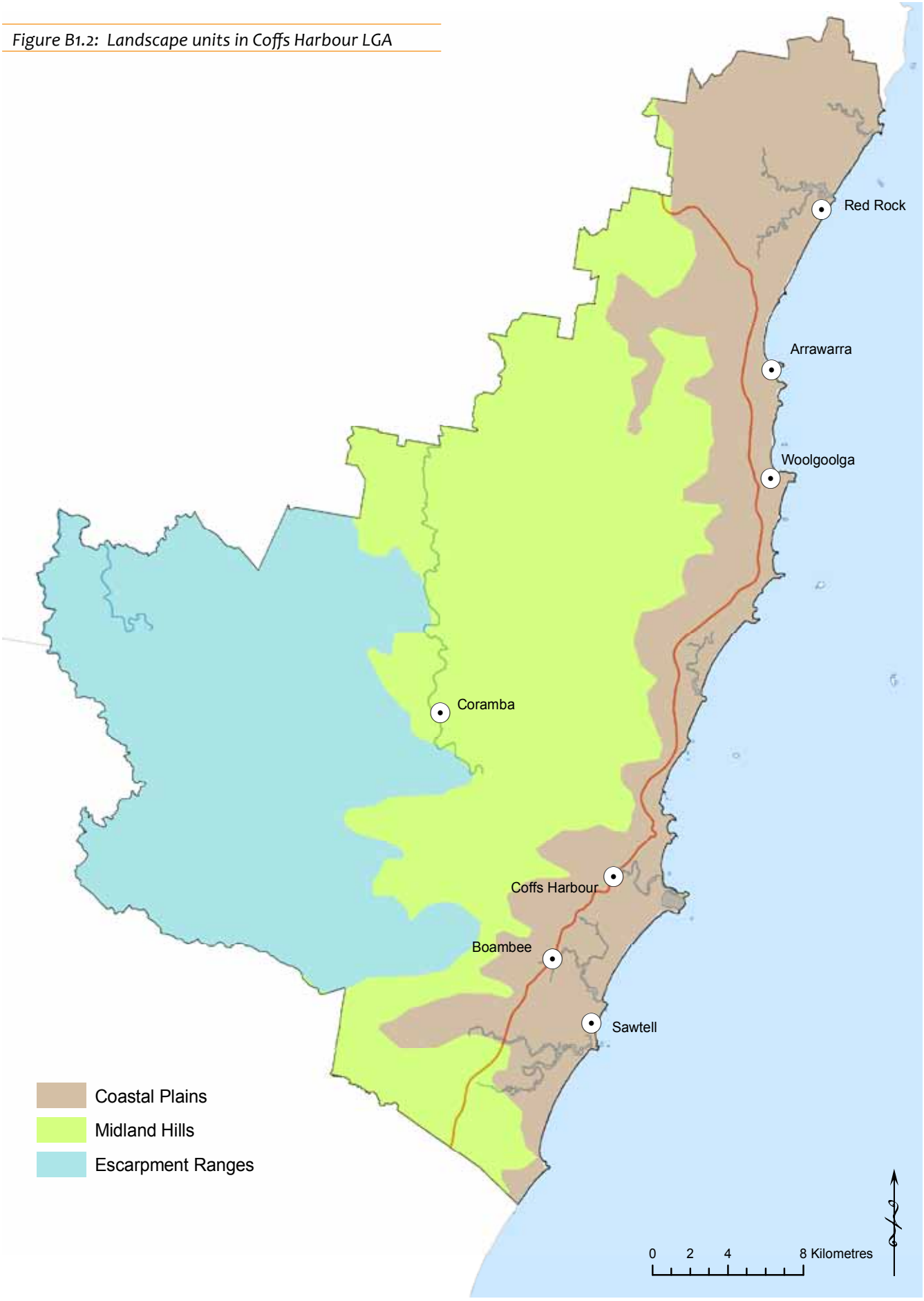
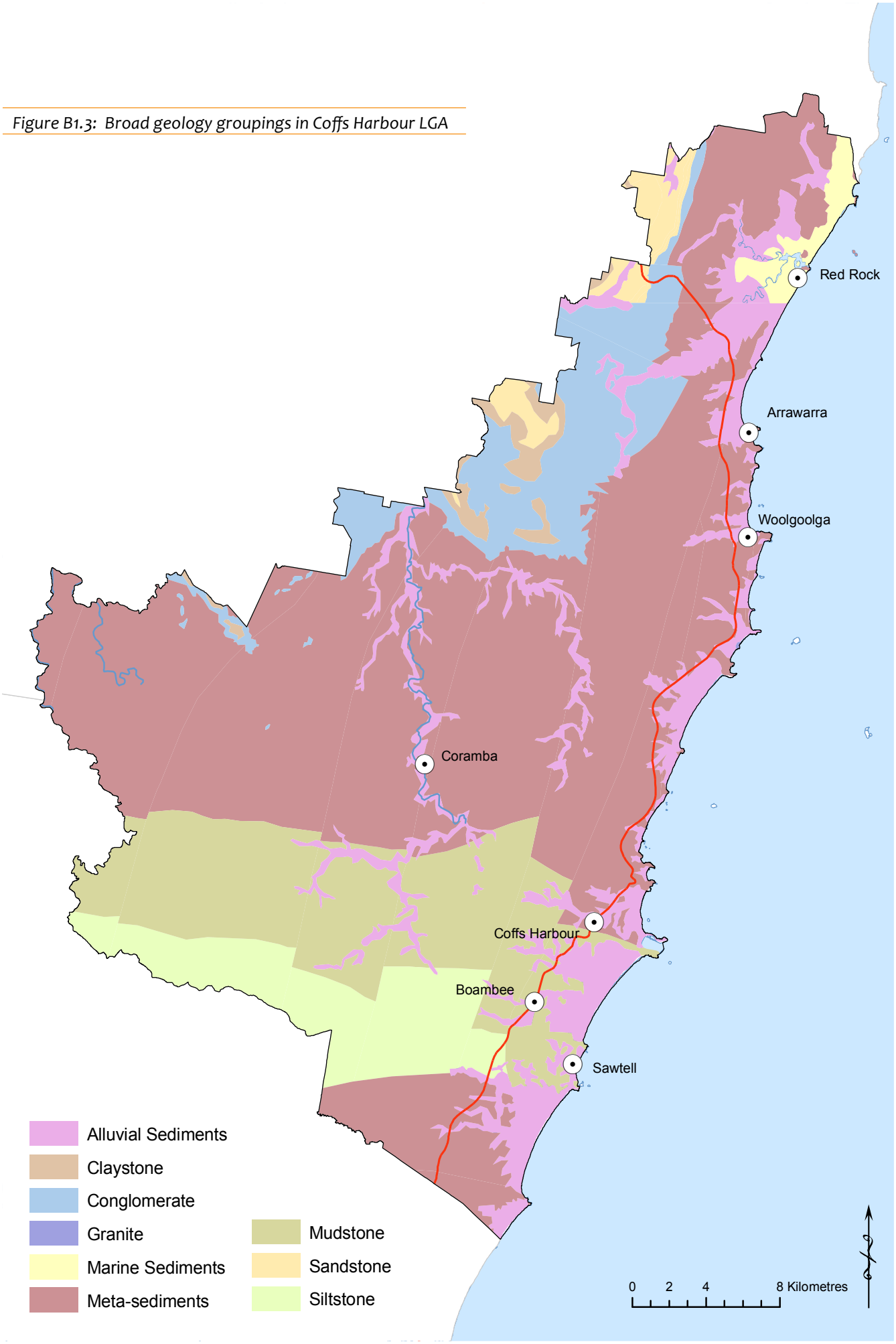


Figure B1.3: Broad geology groupings in Coffs Harbour LGA



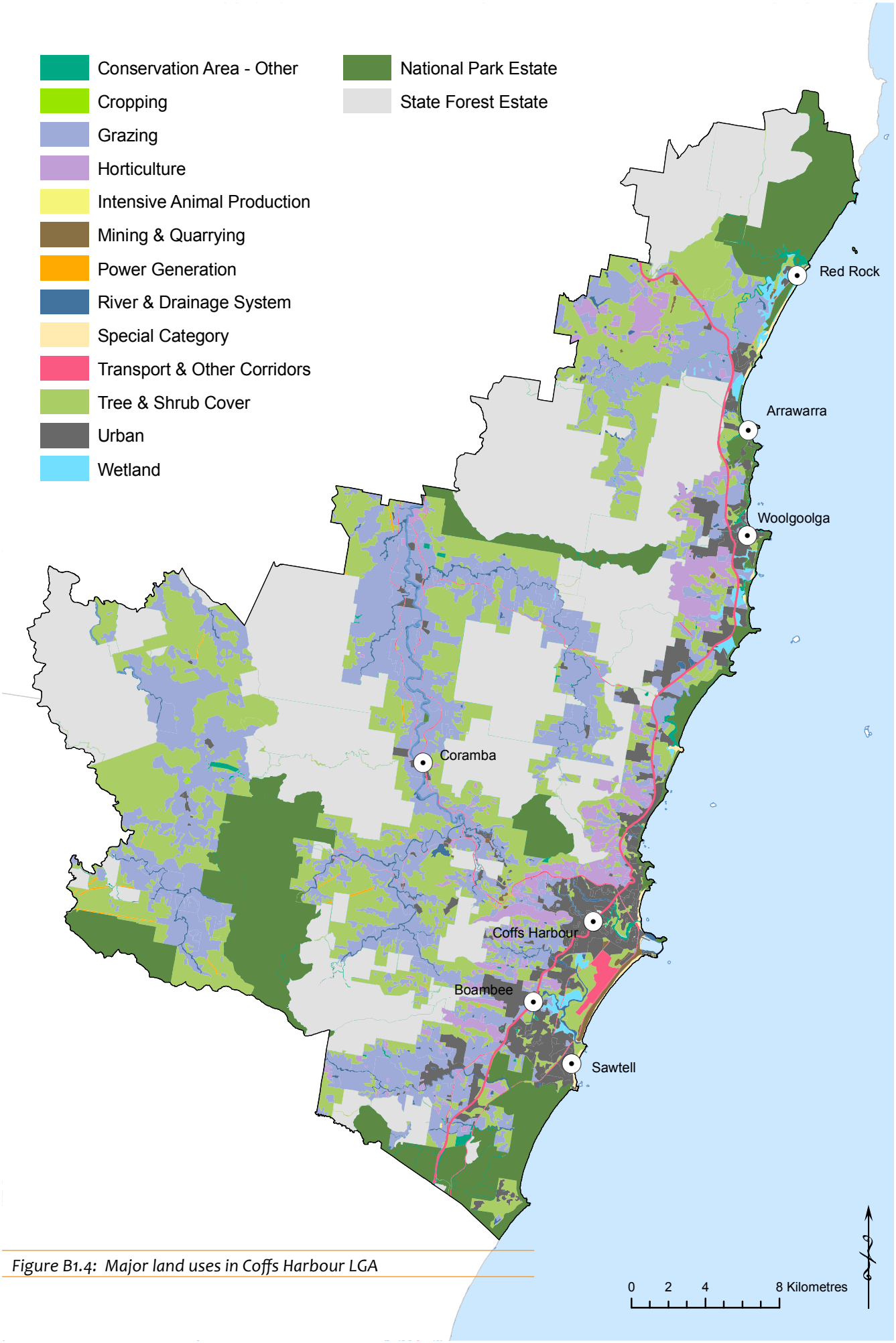


Figure B1.4: Major land uses in Coffs Harbour LGA

Coastal Plains

(1) Corindi Estuary - Dirty Creek

(2) Mullaway – Arrawarra – Darlington

(3) Hearnes Lake - Double Crossing Creek

(4) Emerald Beach - Moonee Creek - Wedding Bells

(5) South Moonee Forest - Wedding Bells

(6) Korora - Korora Basin

(7) Coffs Creek – racecourse – North Boambee Beach

(8) South Boambee Beach - airport – Boambee

(9) Bongil Bongil - Bonville - Tuckers Knob

(10) Bongil – Pine Creek

Midland Hills

(11) Weddings Bells – Corindi River - Conglomerate

(12) Lower Bucca – Bucca Bucca - Sherwood

(13) Nana Creek – Coramba – Lower Bucca

(14) Orara East – Karangi – Orara West

(15) Bongil – Pine Creek – Tuckers Nob

Escarpment Ranges

(16) Gundar – Kangaroo River

(17) Orara West – Wild Cattle Creek

(18) Bindarri – Cascade

(19) Dorrigo – Wild Cattle Creek - Cascade

(20) Bindarri - Dorrigo

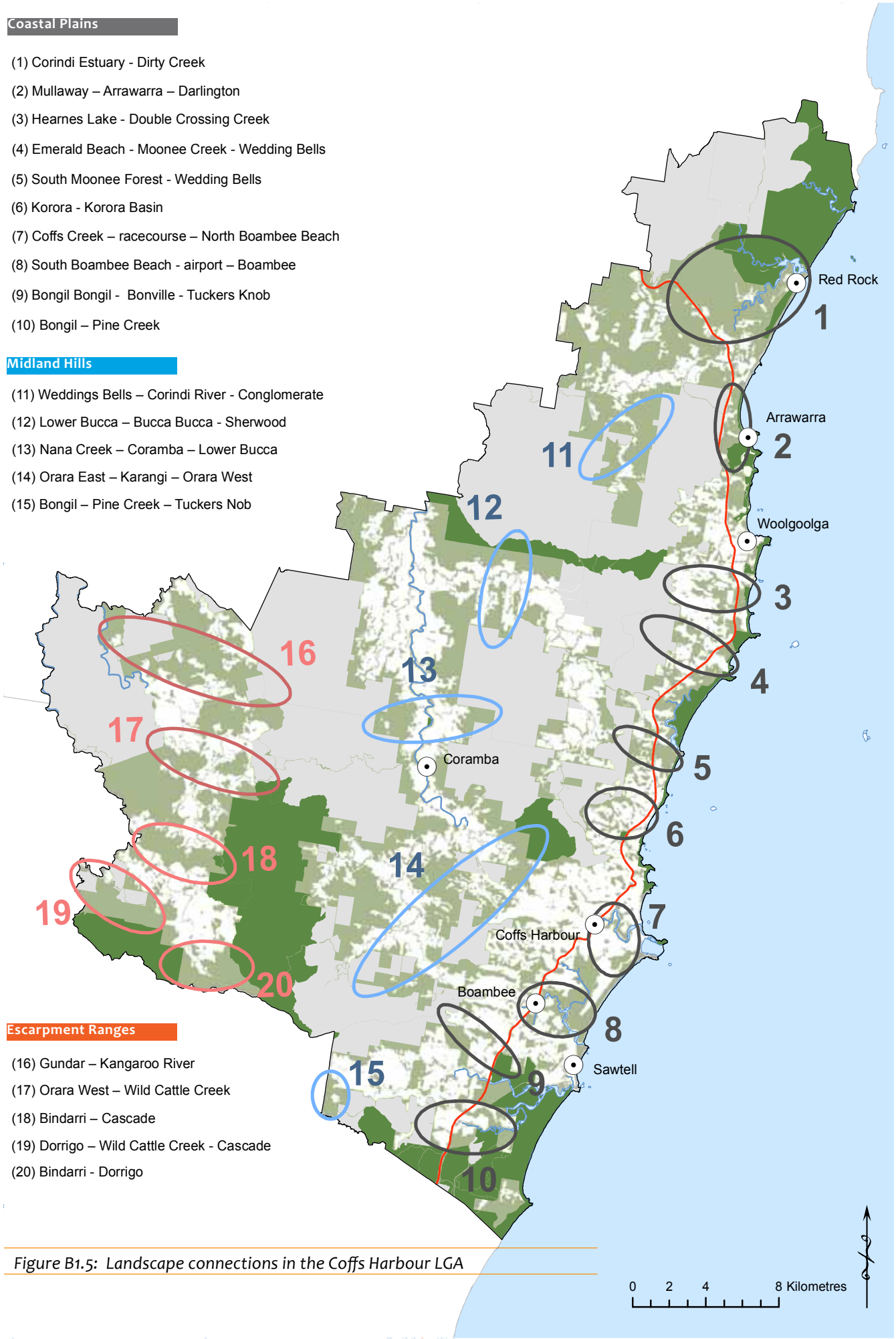


Figure B1.5: Landscape connections in the Coffs Harbour LGA

B2. COASTAL PLAINS

B2.1 Landform

The coastal plains landscape (Figure B1.2) is a low-relief landscape with little variation in altitude. The plains gradually rise from sea level to around 50 metres elevation (the boundary of the midland hills landscape) which is usually within 10 kilometres of the coast. Slopes are predominantly flat to gentle (0–5°), though there are some small hills with steeper slopes. The coastal plain is characterised by low-lying alluvial sediments derived from floodplain deposits and older weathered metasediments of the Coramba formation. The 80 kilometre-long coastline features a series of prominent rocky headlands and beaches.

B2.2 Geology

The coastal plains landscape is dominated by sedimentary geology. The sedimentary units occur as younger Quaternary beach sands, silt, mud and alluvial deposits adjacent to the coastline, creek lines, estuaries and coastal embayments and infills. These overlay older Carboniferous-aged consolidated clastic sediments of the Coramba and Brooklana formations which tend to predominate towards the western edge of the coastal plains landscape.

B2.3 Land use

Most urban residential, industrial and rural residential land in Coffs Harbour LGA is situated on the relatively flat and low-lying coastal plain. These land uses cover about 20% of the coastal plain, mostly within 5 kilometres of the coast. Urban residential and commercial/industrial land uses occur on the eastern side of the coastal plain. Rural residential allotments are further west, toward the midland hills.

The coastal plain also contains a significant number of small horticultural industries. Bananas are traditionally the primary horticultural crop, however, some other fruit tree plantations such as blueberries have been established. Livestock grazing is also distributed throughout the coastal plain with the largest grazing areas occurring towards the southern end of the LGA around Bonville. National park estate occupies a significant portion of the coastal plain, with reserves in the south, north and central areas.

B2.4 Broad vegetation types

The vegetation communities in the coastal plains landscape vary greatly in composition, age and condition. The coastal plains host 12 different vegetation formations (Table B2.2). These formations are based on Keith (2006).

Table B2.1: Coastal plains statistics

Coastal Plains	Hectares
Total Area of Coastal Plains	32,152
Total Area of EECs	5,564
Percentage EECs	17%
Endangered Ecological Communities *	
Coastal Saltmarsh	231
Freshwater Wetlands on Coastal Floodplains	71
Littoral Rainforest	274
Lowland Rainforest	87
Subtropical Coastal Floodplain Forest	2,546
Swamp Oak Floodplain Forest	216
Swamp Sclerophyll Forests on Coastal Floodplains	2,073
Themeda grassland on Seacliffs and Coastal Headlands	66

As Listed under the Threatened Species Conservation Act 1995

Almost 40% of the coastal plains landscape has been cleared of vegetation. Another third is covered with dry or wet sclerophyll forests or semi-mesic forests.

Table B2.2: Vegetation formations in the coastal plains

Formation	% of total
Cleared of vegetation	39
Dry sclerophyll shrub forests	12
Wet sclerophyll forests	11
Semi-mesic forests	10
Swamp sclerophyll forests	9
Plantations	5
Dry sclerophyll shrub/grass forests	5
Sclerophyll grassy woodlands	4
Heathlands	3
Freshwater wetlands	1
Rainforests	<1
Estuarine and saline wetlands	<1

The vegetation along the coastal plain is moderately fragmented, however, there are still some vegetated corridors between the coast and the midland hills. The larger corridors occur in the southern, central and northern parts of the LGA. Corridors are less frequent in areas of higher population density. The larger and more contiguous areas of vegetation are located in the northern parts of the LGA where the coastal plain is widest and land uses are predominantly national park, state forest or private property grazing.

B2.5 Aquatic ecosystems

The coastal plain contains only small- to medium-sized river and creek systems that flow eastwards to the ocean. These systems contain critically important areas of freshwater wetlands and estuarine habitats. The largest estuaries are in Coffs, Bonville and Pine creeks in the south, and Moonee, Corindi and Saltwater creeks in the north. These estuaries provide important habitat for a variety of waders, shorebirds, fish, crustaceans, other invertebrates, and marine and estuarine vegetation. Estuaries are also significant for recreational fishing and the commercial fishing industry.

Solitary Islands Marine Park

The renowned Solitary Islands Marine Park (Figure B2.1) stretches over 75 kilometres, from Muttonbird Island in the south to the Sandon River and Plover Island in the north. The Park incorporates estuaries to their tidal limit, foreshores to the mean high water mark, and it extends offshore to the 3 nautical mile state waters boundary. The estuaries and creeks are generally under a Habitat and Protection Zone, and Saltwater Creek near Red Rock is a Sanctuary Zone. These zonings are in place to protect and manage sensitive fish-breeding areas and aquatic nurseries such as seagrass beds and mangroves.

Researchers have identified a unique biodiversity within the marine park including over 550 species of reef fish, 90 species of hard coral and 600 species of molluscs (shelled animals). Threatened species include the Grey Nurse Shark *Carcharias taurus*, Black Cod *Epinephilus damelii*, sea turtles, whales, seabirds, shorebirds and rare marine algae. The local Aboriginal communities within the Gumbaynggirr Nation maintain cultural links and are actively involved in Marine Park conservation planning.

Solitary Islands Marine Reserve

The Solitary Islands Marine Reserve (Commonwealth Waters) is located off the coast between Coffs Harbour and Plover Island. Although not actually part of the Coffs Harbour LGA, the reserve and adjacent marine park are considered part of the Coffs community's environment. The marine reserve extends from the 3 nautical mile state limit seaward to the 50 metre depth contour.


Sepia sp.


Chromodoris spendida


Green Turtle *Chelonia mydas*

The reserve protects and conserves a relatively undisturbed, distinct and species-rich ecosystem associated with open ocean, subtidal reef, and soft sandy habitats. Pimpernel Rock is the most significant feature in the reserve. It is a submerged pinnacle that rises from the seabed to within a few metres of the surface, providing habitat for benthic communities, pelagic fish, Grey Nurse Sharks, Black Cod, and marine turtles (DSEWPC 2011).

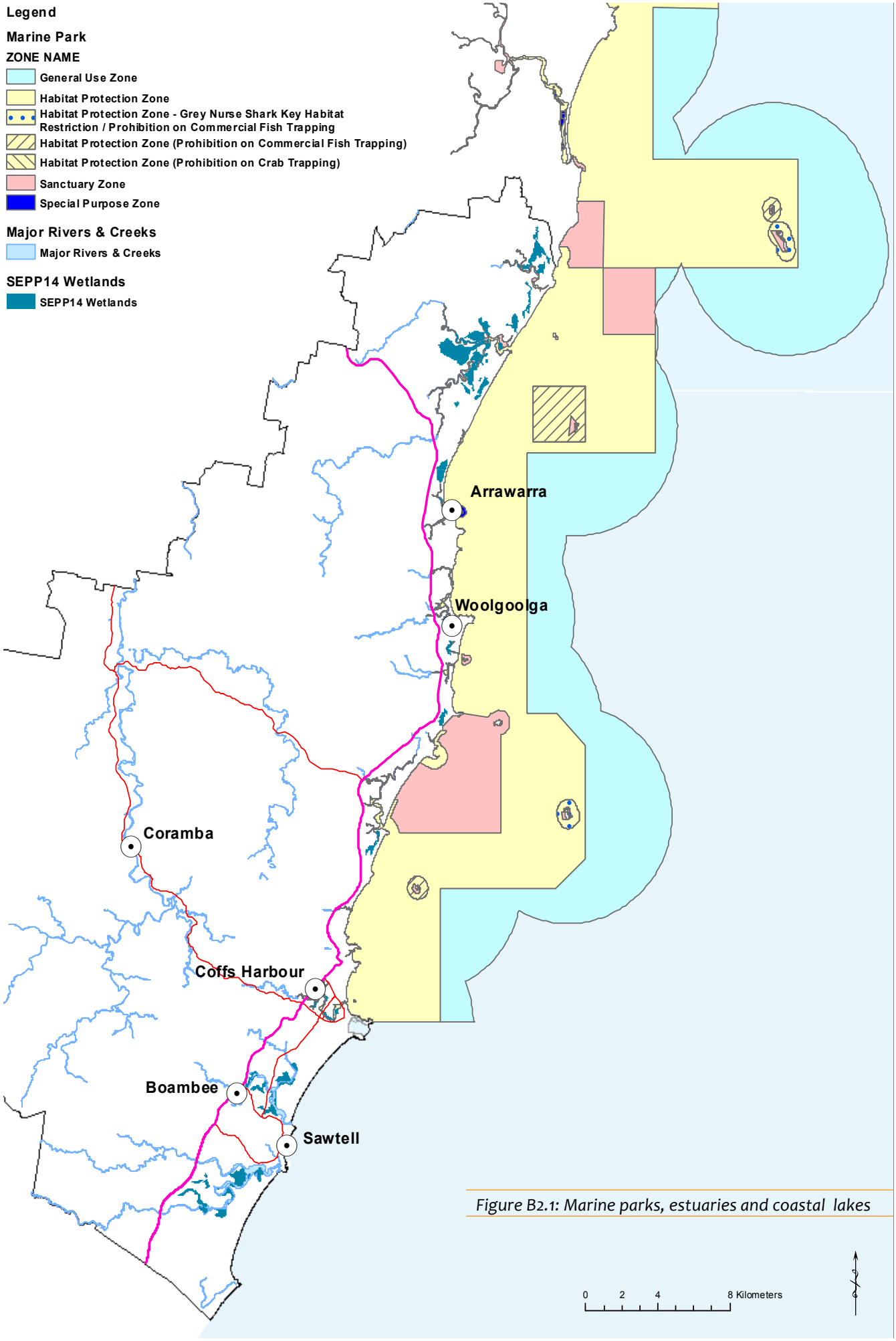


Figure B2.1: Marine parks, estuaries and coastal lakes

The reserve is important for marine conservation and research as it is located in a mixing zone between tropical and temperate environments. Many species in the reserve are at, or are close to, their southern or northern limit. The marine reserve protects and conserves important features, including habitat for a number of species that are listed as endangered or vulnerable under Commonwealth legislation or international agreements, including Humpback Whale *Megaptera novaeangliae*, Grey Nurse Shark *Carcharias taurus*, Black Cod *Epinephelus daemelii*, Bleekers Devil Fish *Paraplesiops bleekeri*, dolphins and many seabirds.

Coastal lakes

Pipeclay Creek, Woolgoolga Lake and Hearnes Lake—all north of Coffs Harbour—are coastal lakes that have, or are likely to have, high conservation values for aquatic flora and fauna.

Coastal complex habitats

Complex combinations of wetlands, swamp forests, open forests, coastal heaths, shrublands and sedgelands along Coffs Harbour's coastal plains support important habitats for a diverse biodiversity including many threatened species.

The Squirrel Glider appears to be most common north of Coffs Harbour. There are known, regionally important glider habitats around the Garby Nature Reserve – Arrawarra area and also around Station Creek in southern Yuraygir National Park.

The Southern Swamp Orchid *Phaius australis* and Square-stemmed Spike-rush *Eleocharis tetraquetra* are endangered plants that occur in the coastal plain.

Coffs Harbour's coastal complex habitats are also important for other threatened species, including: Wallum Froglet, Black Bittern *Ixobrychus flavicollis*, Common Planigale *Planigale maculata*, Common Blossom-bat *Syconycteris australis*, Eastern Ground Parrot *Pezoporus wallicus wallicus* (near Red Rock – Corindi), and raptors like the Osprey *Pandion haliaetus* and Square-tailed Kite *Lophoictinia isura*.

B2.6 Threatened communities, populations and species

Threatened ecological communities

The Coffs coastal plain supports 11 threatened ecological communities (TEC). Two of these communities are listed as critically endangered under the *Environment Protection and Biodiversity Conservation Act 1994* (EPBC Act):

- Littoral Rainforest and Coastal Vine Thickets of eastern Australia.
- Lowland Rainforest of Subtropical Australia.

A further nine TECs are listed as endangered ecological communities (EEC) under the NSW *Threatened Species Conservation Act 1997* (TSC Act):

- Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
- Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
- Littoral Rainforest in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
- Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions
- Lowland Rainforest on Floodplain in the New South Wales North Coast Bioregion
- Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion
- Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
- Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
- Themeda Grassland on Seacliffs and Coastal Headlands in the NSW North Coast, Sydney Basin and South East Corner Bioregions.

Priority areas for threatened ecological communities

A remnant of littoral rainforest that is of state significance is located in Bongil Bongil National Park between Bundagen Headland and the southern boundary of the LGA. This remnant is the second largest remaining area of littoral rainforest in the State.

Lowland Subtropical Rainforest on Floodplain EEC occurs in the LGA mainly within the Orara Valley. Currently the only Lowland Subtropical Rainforest formally conserved is within Coramba Nature Reserve.

Endangered populations

The Coffs Harbour coastal plains support two TSC Act endangered populations:

- Coastal Emu endangered population (NSW North Coast Bioregion and Port Stephens LGA)
- *Zieria smithii* endangered population at Diggers Head

The southern distribution of the endangered coastal Emu population is located in the northern portion of the LGA mainly within Yuraygir National Park and Barcoongere and Newfoundland state forests (see Figure B2.2). There are also a small number of historic sightings south of Red Rock, with the latest record being 2004. Generally, Emu sightings in the Coffs Harbour LGA are rare with the population contracting northwards within Yuraygir National Park.


Coast Headland Pea *Pultenaea maritima*


Pied Oystercatcher *Haematopus longirostris*


Headland Zieria *Zieria smithii*


Wedge-tailed Shearwater *Puffinus pacificus*

The *Zieria smithii* population found on Diggers Head, Coffs Harbour LGA, is distinct from other forms of the species found elsewhere as it is a low growing form. Because of this, it has been listed as an endangered population under the TSC Act.

Its habitat consists of low heath and Kangaroo Grass *Themeda australis*. It is threatened by Bitou Bush, and can be damaged from trampling. Diggers Head Ziera, Headland Ziera and Coast Headland Pea all occur within the Themeda Grassland on Coastal Headlands Endangered Ecological Community.

Threatened species

Some 28 of the threatened species that occur in the Coffs Harbour LGA have the majority of their habitat within the coastal plains. These species are associated with the marine and estuarine environments including beaches, headlands, rivers and creeks. Many of these species occur only in the coastal plains, while others occur primarily in the coastal area, but can also be found in other landscapes.

Migratory shorebird habitats

The coastal plains support a number of shorebirds listed as migratory species under the EPBC Act and/or others listed under migratory shorebird international agreements (JAMBA and CAMBA).

Coffs Harbour LGA includes a number of small- to medium-sized estuaries that support important populations of migratory shorebirds, including Corindi River; Station, Arrawarra, Moonee, Boambee and Bonville creeks; and Hearnes Lake (DECCW 2010d).

Threatened resident and migratory shorebirds

Coffs Harbour's rocky headlands, sandy beaches and estuaries provide important habitats for three resident threatened shorebirds which all breed in the area: Beach Stone-curlew *Esacus neglectus*, Pied Oystercatcher *Haematopus longirostris* and Sooty Oystercatcher *H. fuliginosus* (DECCW 2010d).

Four threatened Little Tern *Sterna albifrons* breeding sites of state significance (Figure B2.3) occur within the LGA: at Station Creek and Red Rock within Yuraygir National Park; Hearnes Lake in the north; and on the sand spit near the entrance to Bonville Creek within Bongil Bongil National Park in the south. This site is one of the most sucessful breeding colonies. The Coffs overall population represents a significant proportion of the species' overall breeding population in north-east NSW.

Muttonbirds

While not listed as a threatened species, the Wedge-tailed Shearwater (or Muttonbird) *Puffinus pacificus* is a migratory bird which is one of the eight shearwater species found in NSW. These birds travel thousands of kilometres from South-east Asia, returning from their annual northerly migration each August. Thousands of Muttonbirds return to nesting

Figure B2.2: Endangered coastal Emu population

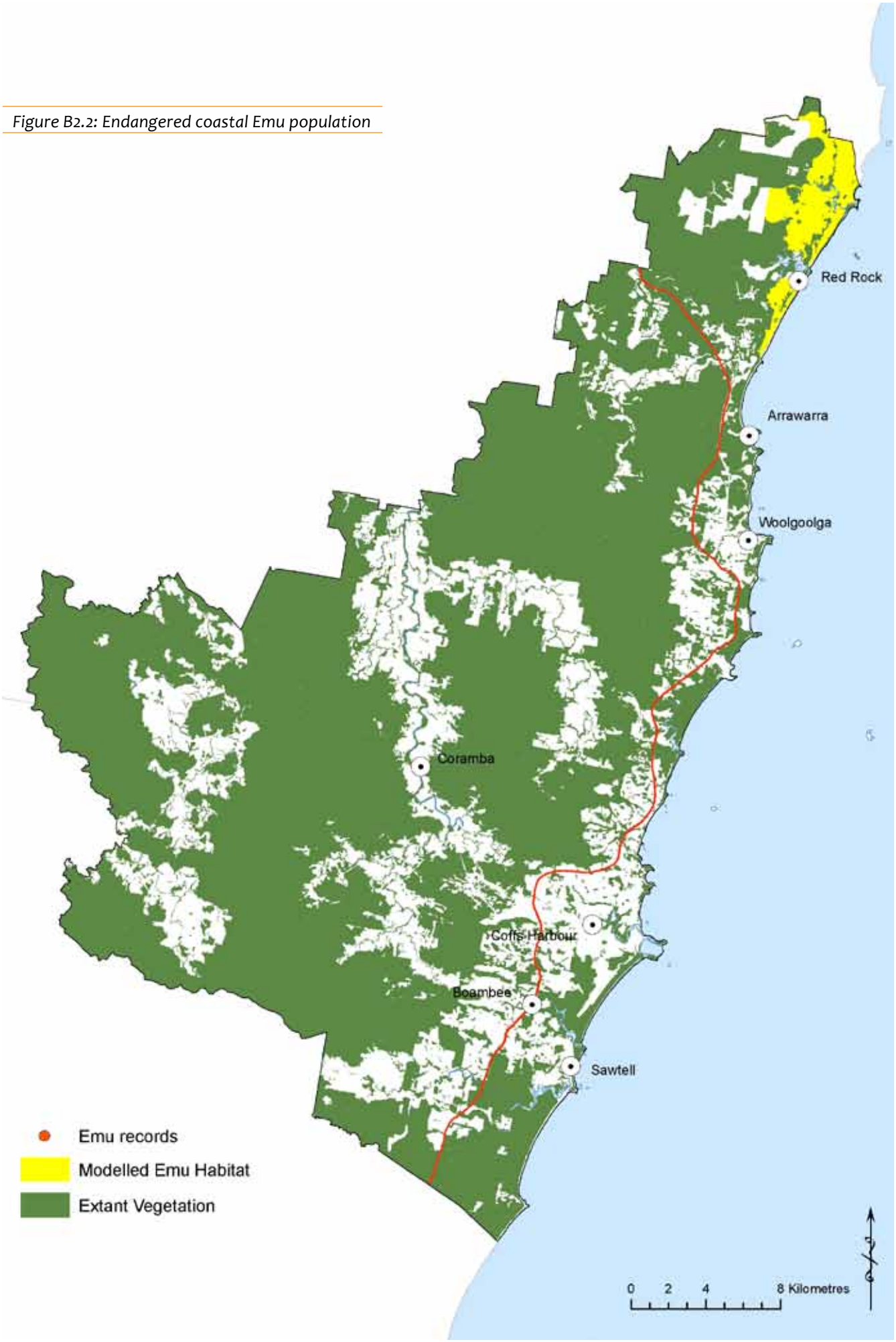
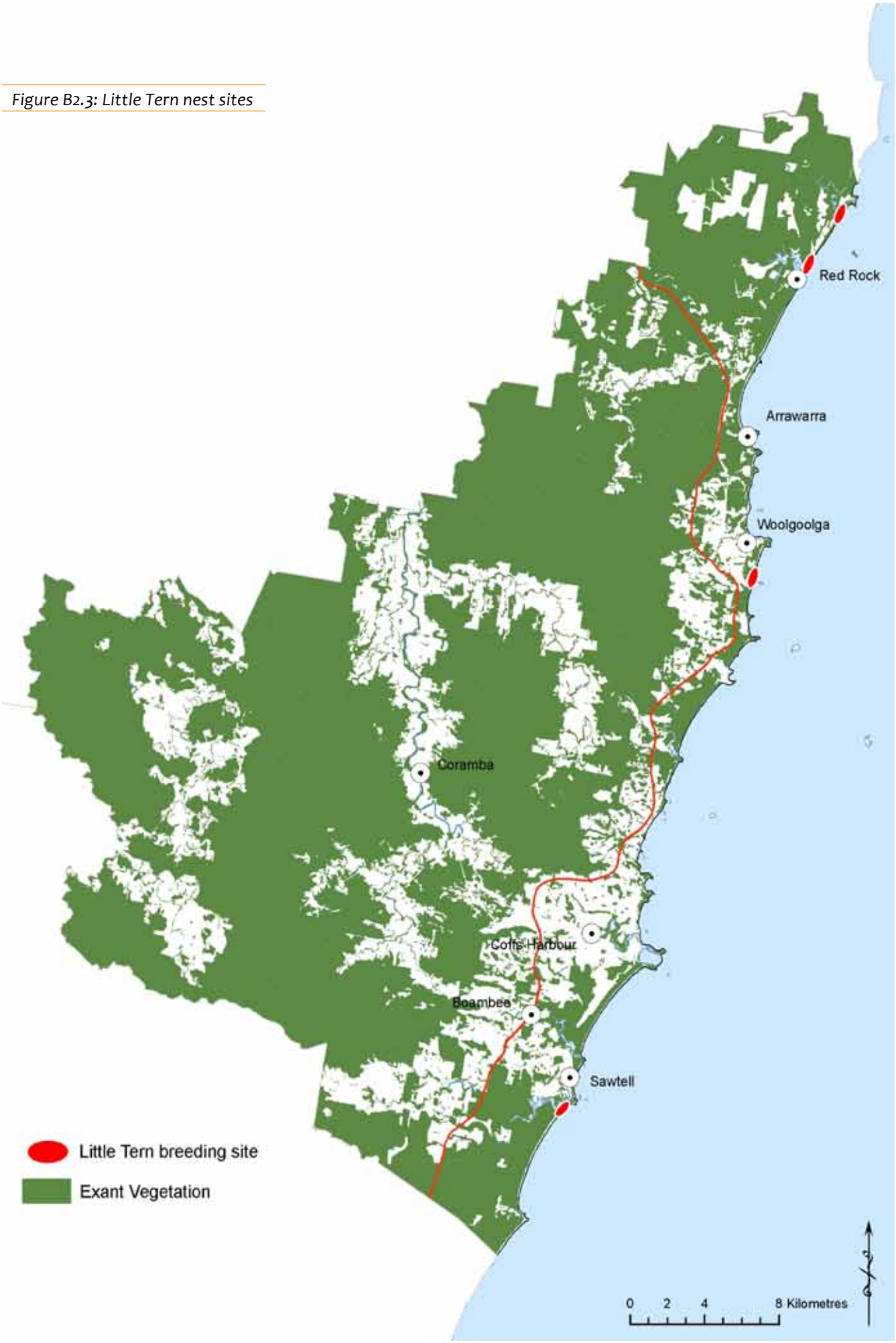


Figure B2.3: Little Tern nest sites



burrows on Muttonbird Island Nature Reserve, Coffs Harbour. While these birds utilise other areas such as the Lord Howe Island group and sites on Australia's east coast, Muttonbird Island conserves the only accessible mainland Wedge-tailed Shearwater nesting site in the State. The Muttonbirds are a distinctive local feature over the summer–autumn period.

Floyds Grass and Black Grass-dart Butterfly

Floyds Grass *Alexfloydia repens* is a highly restricted grass with 99% of its known distribution occurring between Pine Creek and Diggers Headland, within the Coffs Harbour LGA. Currently only about 30 hectares of the grass is known to occur. Floyds Grass was listed as endangered under the TSC Act in 2001. It was first found by local botanist Alex Floyd near Pine Creek in 1987.

The Black Grass-dart Butterfly *Ocybadistes knightorum*, an invertebrate listed as endangered in NSW in 2002, was only described in 1994 after it was found next to Boambee Creek near the Pacific Highway. It was only in the late 1990s that it was discovered that Floyds Grass and the Black Grass-dart Butterfly have a special symbiotic relationship. Floyds Grass is the food plant for the caterpillar stage of the butterfly's life cycle. The Black Grass-dart Butterfly also has 99% of its known distribution occurring within the Coffs Harbour LGA.

These two endangered species are mostly distributed patchily through the low-lying swamp forests of Pine, Bonville, Boambee and Cordwells creeks (Figures B2.4 and B2.5). The overstorey species in these areas are often dominated by Swamp Oak and Broad-leaved Paperbark. Floyd's Grass usually forms a dense understorey and appears to flower mostly in spring. The Black Grass-dart Butterfly is on the wing from about September to March and can sometimes be seen in large numbers flying just above the grass.

While these species generally occur in either Bongil Bongil National Park or environmental protection zones, there are still significant threats to their survival. The most immediate threat is weed invasion, particularly from Broad-leaved Paspalum and Lantana. In the longer term, however, sea-level rise poses a greater threat as the preferred habitat is found at only 1.6 metres above the mean tide level. Most of the current habitat will therefore become too saline should the sea level rise 90 cm, as predicted to occur by 2100.

Crinia species

The Wallum Froglet *Crinia tinnula* is found in suitable low-lying coastal heaths and sedgelands along Coffs Harbour's coastal plains. Surveys in the vicinity of Coffs Creek have identified the presence of a number of threatened species including the Wallum Froglet and an undescribed *Crinia* sp. (Coffs Creek Crinia)


Black Grass-dart Butterfly *Ocybadistes knightorum*


Little Tern *Sternula albifrons*


Emu *Dromaius novaehollandiae*

Figure B2.4: Black Grass-dart and Coastal Petaltail distribution in Coffs Harbour LGA

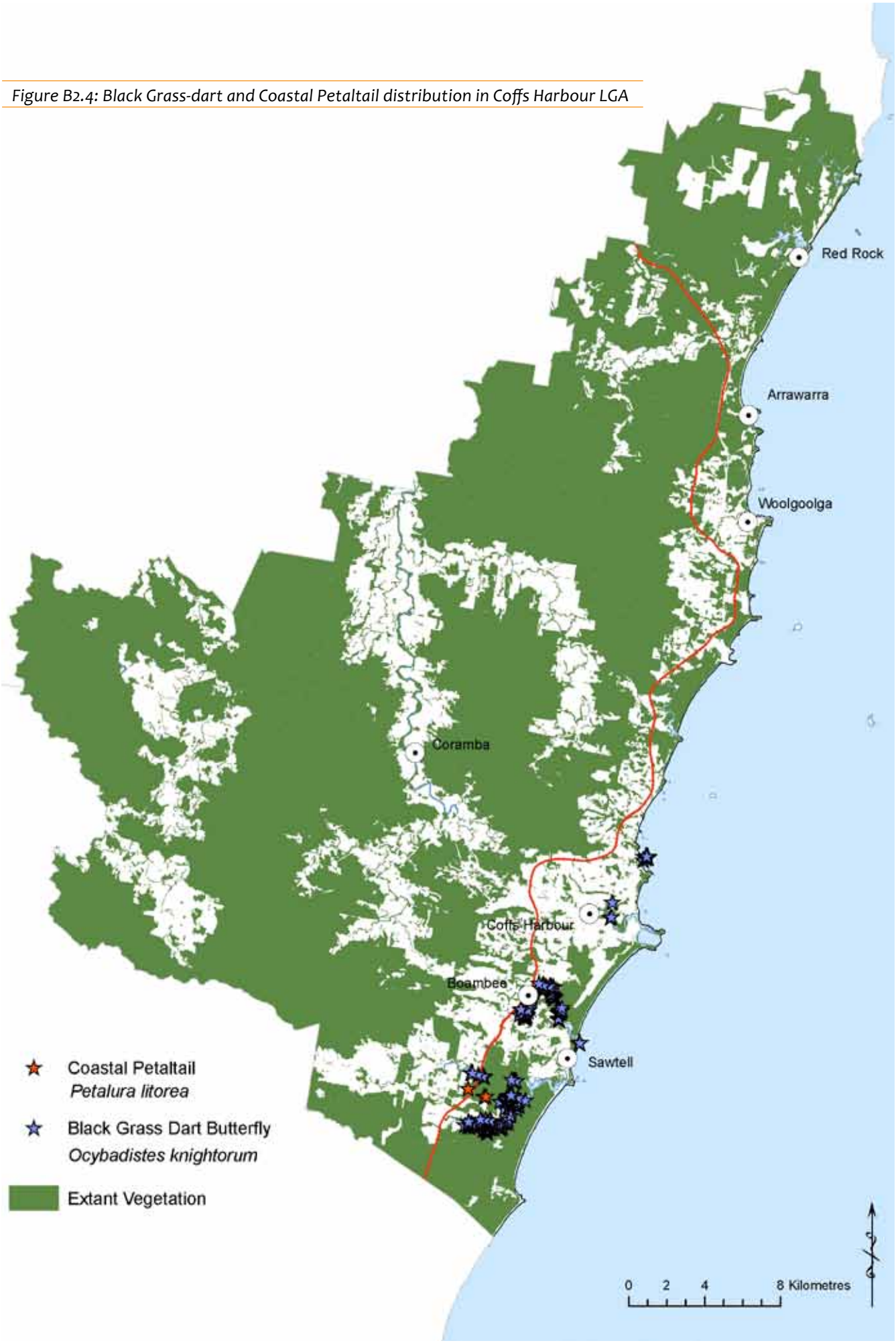


Figure B2.5: Floyd's Grass distribution in Coffs Harbour LGA

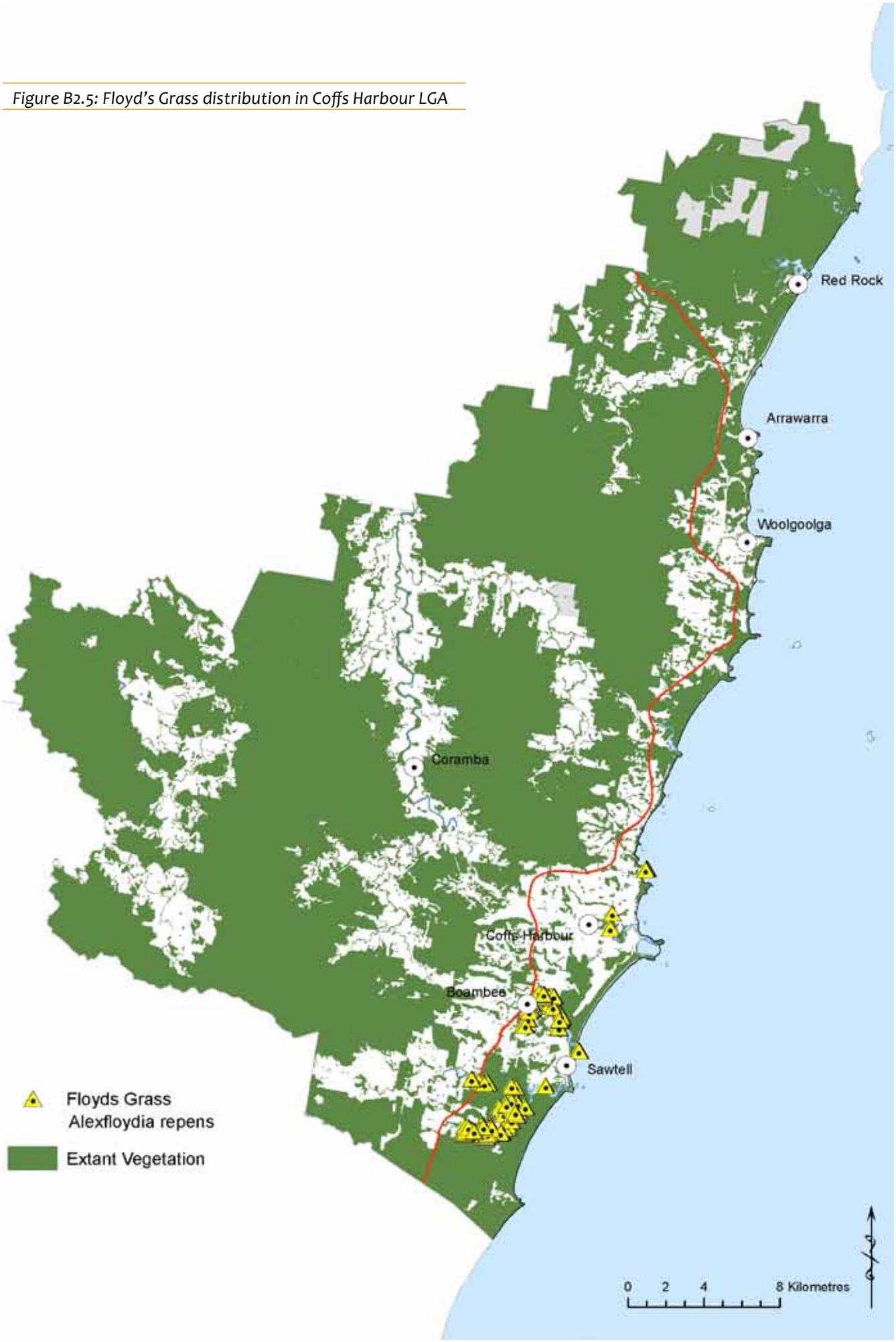


Figure B2.6: Moonee Quassia distribution in Coffs Harbour LGA

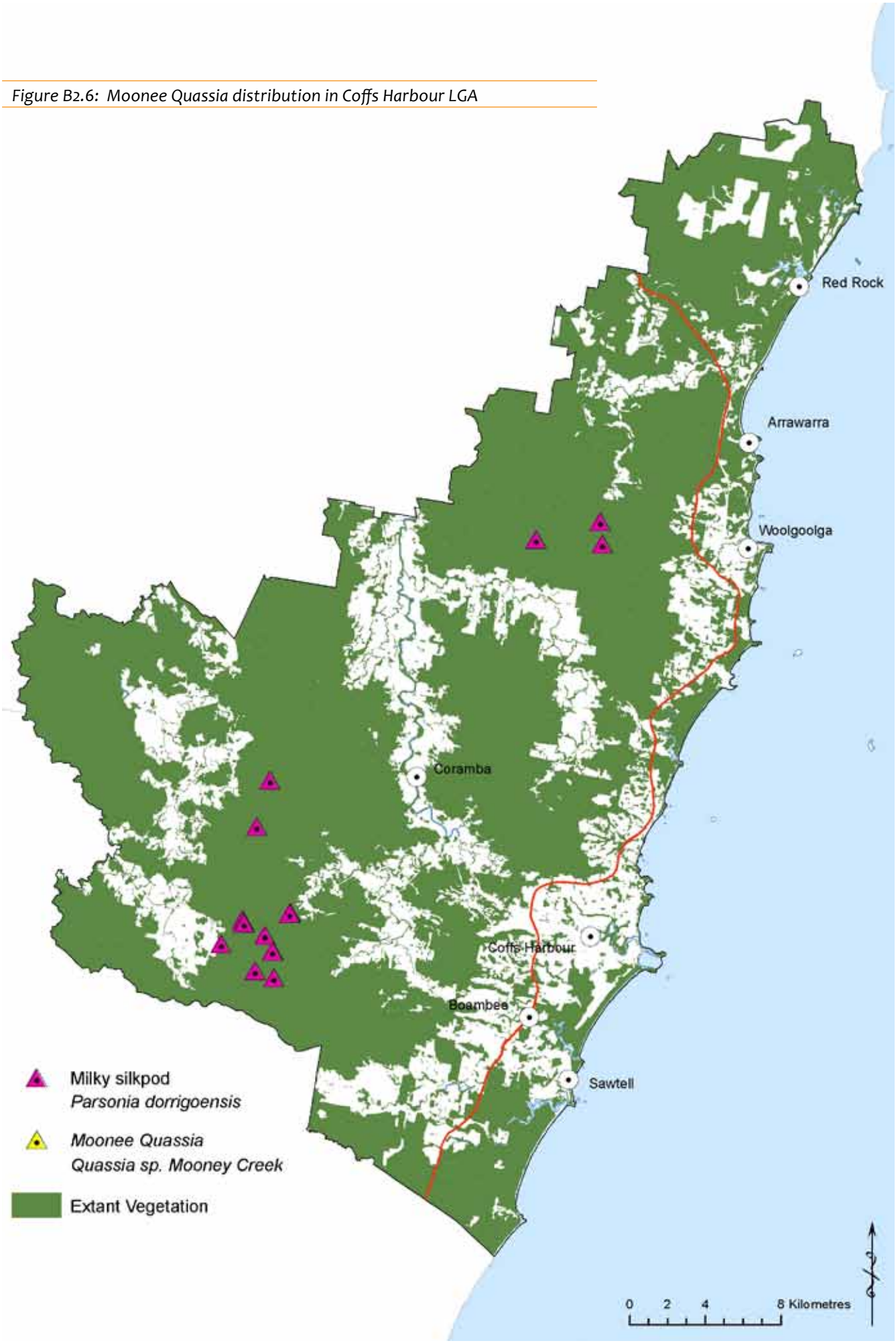
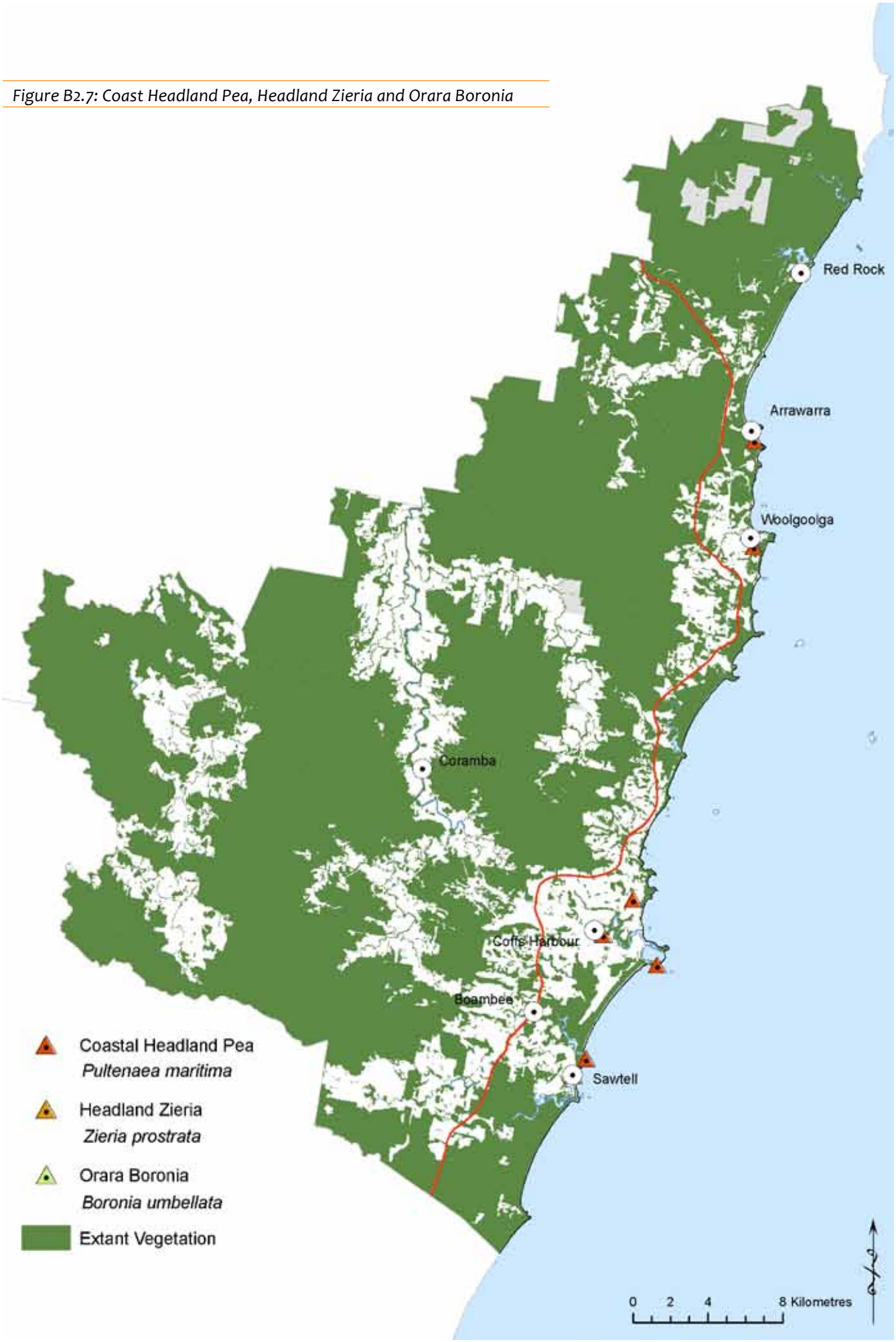


Figure B2.7: Coast Headland Pea, Headland Zieria and Orara Boronia




Green & Golden Bell Frog *Litoria aurea*


Little Red Flying-fox *Pteropus scapulatus*


Moonee Quassia *Quassia* sp. Moonee Creek


Coastal Petaltail Dragonfly *Petalura litorea*

The undescribed *Crinia* sp. was recorded calling in swamp forest to the east of Hogbin Drive on lands between the northern bank of Coffs Creek and Brodie Drive. The undescribed *Crinia* sp. is known from only a small number of records and genetic material collected from individuals has indicated that 'sampling of *Crinia signiferia* from throughout its range revealed what may be a new taxon in the Coffs Harbour region of NSW' (Read et al. 2001). Further work is required to fully describe and analyse this possible new species, including determining its distribution and conservation status. Further genetic and taxonomic work is needed to clarify this species' status and determine its distribution and conservation status. A potentially new frog species is of enormous conservation significance.

Giant dragonflies

Two species of giant dragonfly occur in NSW and both are listed as endangered: the Giant Dragonfly *Petalura gigantea* and the Coastal Petaltail *Petalura litorea* (Figure B2.4). The Coffs Harbour region is the only area where the two species are known to occur in close proximity. The Giant Dragonfly can be found in the swamps of Sherwood Nature Reserve, while the Coastal Petaltail occurs in Bongil Bongil National Park. This is the known southern range limit for the Coastal Petaltail and one of only four known localities for the species in NSW.

The giant dragonflies inhabit coastal swamps and it is thought that the larvae may live for 10–30 years in long, chambered burrows around swamp margins. Adults emerge in October–November and fly until late January.

Green and Golden Bell Frog

The swamps behind the dunes near Station Creek in Yuraygir National Park are an important area for the threatened Green and Golden Bell Frog *Litoria aurea*. A number of populations have been recorded in the freshwater swamps and small creeks in this area. They appear to be isolated from other populations, with the nearest records being some 12 kilometres to the north (Wilsons Headland and Diggers Camp in the Clarence Valley Council LGA).

Moonee Quassia

Moonee Quassia *Quassia* sp. Moonee Creek is a primitive flowering plant almost completely restricted to the Coffs Harbour area (Figure B2.6). The only other place it is known is a site east of Grafton. It is an understorey shrub and mostly occurs in moist eucalypt forest north from Sapphire to the hinterland around Woolgoolga. It generally occurs as scattered small plants. It appears to grow very slowly and dispersal mechanisms are poorly understood. Moonee Quassia is threatened by weed invasion, in particular Lantana, and urban and rural residential development. It is listed as an endangered species under the TSC Act.

Figure B2.8: Flying-fox camp sites

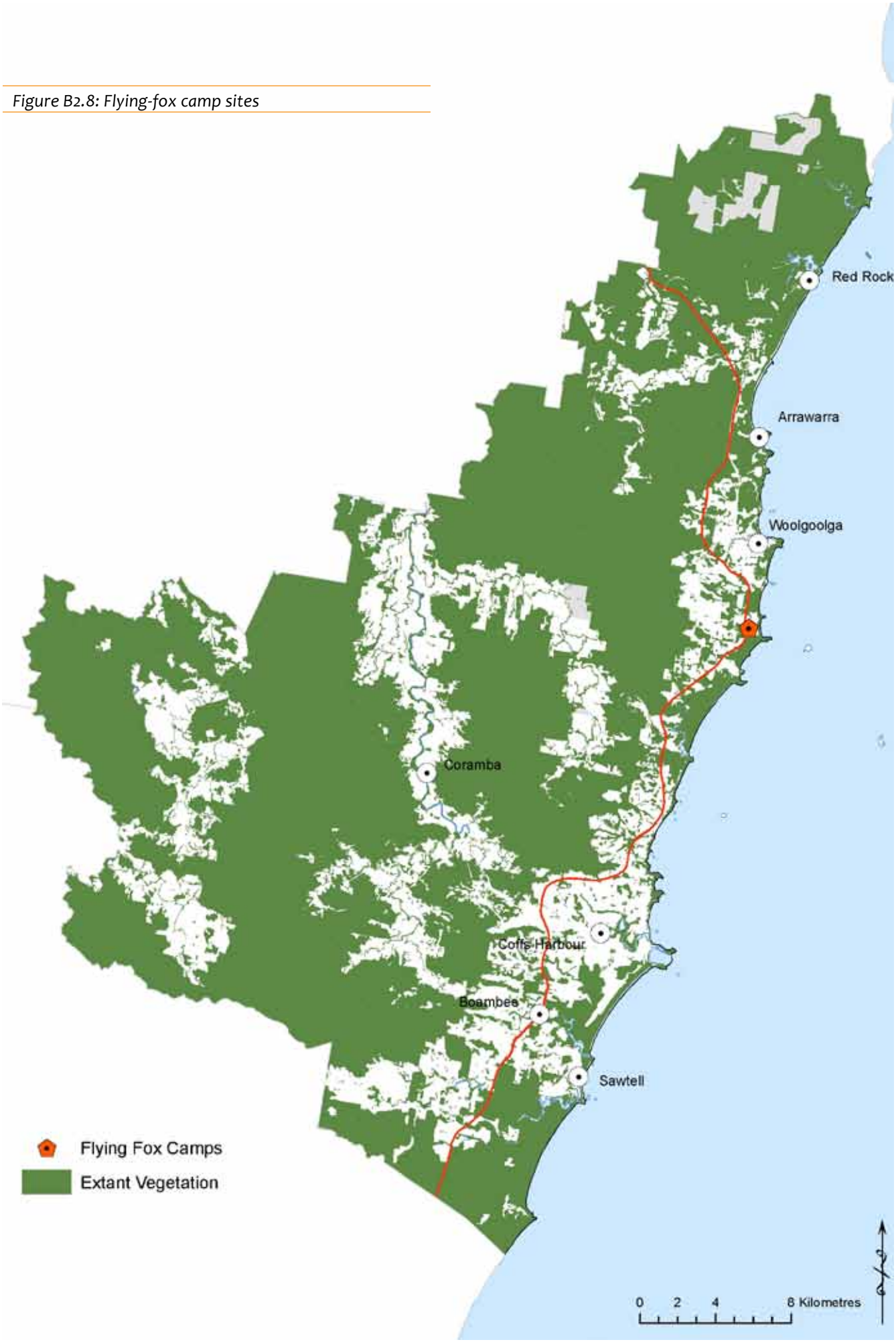
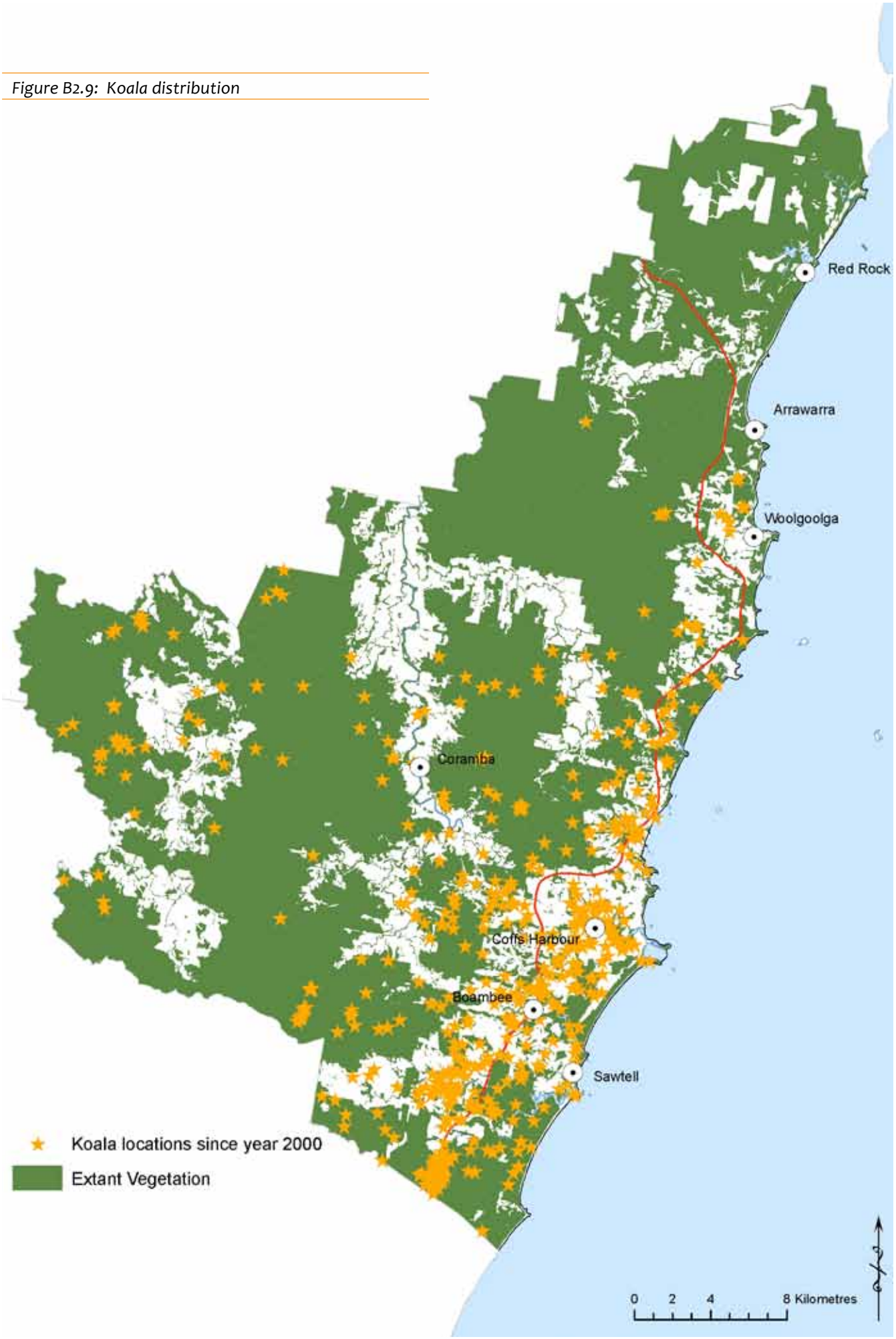


Figure B2.9: Koala distribution



Threatened headland plants

The grassy headlands along Coffs Harbour's coastline support important plant communities including three threatened species (Figure B2.7):

- Headland Zieria *Zieria prostrata*
- Austral Toadflax *Thesium australe*
- Coast Headland Pea *Pultenaea maritima*.

The low-growing form of *Zieria smithii*, is an endangered population and is also restricted to just four headlands along the Coffs coast. This species grows low to the ground and forms mats within the coastal heath and Kangaroo Grass. As with Diggers Head Zieria, it is at risk from trampling, weed invasion and development.

Coast Headland Pea has significant populations on many headlands in Coffs Harbour. Coast Headland Pea also occurs on headlands between Newcastle and Byron Bay. It is a low-growing shrub with hairy stems and yellow pea flowers and, in the Coffs Harbour LGA, is often found in association with Headland Zieria. It has only recently been described and is listed as vulnerable on the TSC Act.

Austral Toadflax is found in association with coastal grasslands and eucalypt woodland where Kangaroo Grass is the predominant ground cover. Austral Toadflax is listed as vulnerable under the TSC Act.

Camps and critical coastal habitats of the Grey-headed Flying-fox

Coffs Harbour LGA supports significant habitat (including roost and maternity camps) for the nationally threatened Grey-headed Flying-fox *Pteropus poliocephalus*. Important camp sites occur at Coffs Creek and Wooloolga lake (Figure B2.8). Abundant nectar food resources are available within remnant coastal habitats during the critical autumn–winter period when the vast majority of the north-east NSW population concentrates its foraging along coastal plains and foothills.

Other coastal threatened species

Other species strongly associated with the coastal plains are the Squirrel Glider (Figure B4.1), Common Blossom Bat, Black Bittern and the Swift Parrot. Yellow-bellied Gliders have been recorded in the western parts of the coastal plains in and adjoining Orara East State Forest and the Koala, whilst historically occurring throughout the coastal plains, is now largely confined to habitats south of Korora with its stronghold being in the Bonville area (Figure B2.9).

Key fauna

Suites of fauna occur within the habitat mosaics of the coastal plains including a number of species listed as endangered or vulnerable under the TSC Act. Certain fauna species are particularly important within the context of high value environments and the corridors footprint in the coastal plains


Koala *Phascolarctos cinereus*


Black-necked Stork *Ephippiorhynchus australis*


Coastal Rainforest


Eastern Forest Bat *Vespadelus pumilus*


Osprey *Pandion haliaetus*


Boambee Creek

landscape as they occupy habitats that are largely outside formal reserves, are often found on private lands and, for some, their core habitats are located in these areas.

Key fauna species of the Coffs Harbour coastal plains include:

- endangered coastal Emu *Dromaius novaehollandiae* population
- Wallum Froglet *Crinia tinnula*
- Black-necked Stork *Ephippiorhynchus asiaticus*
- Brolga *Grus rubicunda*
- Eastern Ground Parrot *Pezoporus wallicus wallicus*
- Osprey *Pandion cristatus*
- Square-tailed Kite *Lophoictinia isura*
- Glossy Black-Cockatoo *Calyptorhynchys lathami*
- Powerful Owl *Ninox strenua*
- Brush-tailed Phascogale *Phascogale tapoatafa*
- Common Planigale *Planigale maculata*
- Koala *Phascolarctos cinereus*
- Squirrel Glider *Petaurus norfolcensis*
- Long-nosed Potoroo *Potorous tridactylus*
- Grey-headed Flying-fox *Pteropus poliocephalus*
- Eastern Blossom-bat *Syconycteris australis*
- Little Bentwing–bat *Miniopterus australis*
- Hoary Bat *Chalinolobus nigrogriseus*
- Coastal Petaltail *Petalura litorea*.

Dispersive fauna (nomads and seasonal migrants)

Conservation efforts are typically focussed on species that are formally listed as threatened. However, the coastal plains of Coffs Harbour are also important to a number of nomadic and migratory birds, bats and flying-foxes which are not listed as threatened. These species follow seasonally available food resources (e.g. nectar and insects associated with flowering plants) across regions and landscapes (see Catterall et al. 1998; Gilmore et al. 2007). Although these are mobile species, they are still likely to be impacted by habitat loss, degradation and fragmentation which reduce habitat quality and availability.

Some of these species, including the threatened Grey-headed Flying-fox and Swift Parrot, are extremely vulnerable to the loss of coastal plains habitats which have traditionally provided foraging resources over the autumn–winter period when flowering is reduced elsewhere (e.g. Eby et al. 1999; Catterall et al. 1998; Gilmore et al. 2007). The protection and enhancement of coastal priority habitats and linking corridors is critical for these nomadic and migratory species.

B2.7 Threats

In the coastal plains of Coffs Harbour, 64 threat activities impact on biodiversity. Of these activities, 24 are encompassed by key threatening processes listed under the TSC Act or FM Act. Table B2.3 lists each threat activity and rating (very high to very low) based on the geographical extent of the activity and its impact on biodiversity within the coastal plains landscape.

The coastal plains landscape—in comparison to the two other landscapes—has the highest number of threat activities and the most number of threats unique to a landscape. This reflects the relatively high population density and diversity of land-use practices.

The more significant threats in the coastal plains include:

- clearing and disturbance of vegetation for urban, rural-residential and industrial development (including setbacks for fire protection)
- invasion from introduced plant species
- the establishment and spread of Bitou Bush and Lantana
- competition and predation by the European Red Fox
- inappropriate fire regimes in some locations
- competition, predation and disease by feral Cats.

While Cane Toads are not yet established in the LGA, they are a potential threat.

The coastal plains provide an attractive 'sea change' lifestyle for many people seeking to move out of capital cities. This shift in demographics is placing a vastly increased pressure on the natural environment, leading to further clearing and fragmentation of existing vegetation and habitats to satisfy an increased demand for urban and rural residential land, infrastructure and services. As well, there is an increased risk of fire, weed invasion, pollution, and predation on wildlife by domestic Cats and Dogs.

European Red Fox *Vulpes vulpes*

Cane Toad *bufo marnius*

Many of these threats are cumulative, caused by a multitude of activities. In some cases they are often exacerbated by, or are a result of, another threat activity. For example, invasion by Bitou Bush is the result of sand mine rehabilitation works along the coastal foredunes.

Additionally, there are a number of significant future threats unique to the coastal plains landscape. These include sea level rise, storm surge and possible increased storm events due to the impacts associated with climate change. Inundation of low-lying areas may fundamentally change the character of the coastline and estuaries, displacing important habitats for shorebirds, estuarine species and littoral rainforest. The ecology of freshwater wetlands is also likely to change dramatically. An increasing number of stochastic events—such as cyclones, storms and floods—may alter or destroy important coastal habitats.

Due to their location in the landscape, riparian areas within the coastal plains are constantly reinvaded by weeds carried downstream during floods. Floods also increase erosion of degraded stream-banks and, following heavy rain, low-lying swampy areas that have been drained can discharge acidic waters which kill fish.

Waterways in the coastal plains are also impacted by stormwater run-off and pollution from urban and industrial lands near estuaries and rivers. The expanding population also increases the pressure on the natural environment, for example, from recreational activities such as boating and fishing.

Many habitats in the coastal plains are highly disturbed and fragmented, and major roads such as the Pacific Highway cause significant barriers to the movement of species. This causes genetic isolation of populations and an inability for species to recolonise areas after local extinctions. Flying-fox camps on the coastal plains are often within or adjoining urban areas, making them vulnerable to disturbances and habitat loss.

Table B2.3: Coastal plains threat activities and ranking

1 Key Threatening Process listed under EPBC Act 1994
2 Key Threatening Process listed under TSC Act 1995
3 Key Threatening Process listed under FM Act 1994

Threat group / Threat activity	Rank
Clearing and fragmentation 1,2	
Clearing for urban and industrial development	Very High
Rural residential	High
Agricultural clearing	Medium
Asset protection zones (fire)	Medium
Removal of hollow bearing trees	Medium
Clearing for plantations 2	Very Low
Fire	
Inappropriate fire regime 2	High
Weeds	
Weed invasion	Very High
Invasion of native plant communities by Bitou Bush & Boneseed	Very High
Invasion, establishment and spread of *Lantana camara* 2	High
Invasion and establishment of exotic vines and scramblers 2	Medium
Invasion of native plant communities by exotic perennial grasses 2	Medium
Pests	
Competition and predation by the European Red Fox (*Vulpes vulpes*) 1, 2	Very High
Competition, predation and disease from feral Cats 1, 2	High
Competition from introduced birds	Medium
Competition, predation and disease from feral Dogs 2	Low
Competition, grazing and land degradation from feral Goats 1, 2	Very Low
Predation by the Plague Minnow (*Gambusia holbrooki*) 2	Very Low
Competition, grazing and degradation from feral Deer 2	Very Low
Competition, predation, grazing, habitat degradation and disease transmission by feral Pigs (*Sus scrofa*) 1, 2	Very Low
Competition, land degradation and grazing from Rabbits 1, 2	Very Low
Competition, predation and mortality from ingestion of Cane Toad (significant potential threat) 1, 2	Very Low
Competition and predation from feral fish	Very Low
Competition from feral Honey Bees 2	Very Low
Predation by introduced rodents	Very Low
Competition and predation by Pandanus Plant-Hopper	Very Low
Forestry	
Forestry	Low

Threat group / Threat activity	Rank
Hydrology and water quality	
Alteration to the natural flow regimes of floodplains from habitat modification and degradation 2	Medium
Alteration to the natural flow regimes of wetlands from habitat modification and degradation 2	Medium
Pollution from stormwater	Medium
Activation of acid sulphate soils	Medium
High nutrient loads, sediment loads, contaminant loads and thermal pollution	Low
Alteration to the natural flow regimes of rivers and streams from habitat modification and degradation 2	Low
Altered groundwater hydrology	Very Low
Siltation/sedimentation	Very Low
Alteration to the natural flow of coastal lakes and estuaries from habitat modification and degradation	Very Low
Diseases and pathogens	
Infection of amphibians with chytrid fungus resulting in chytridiomycosis 1, 2	Low
Dieback caused by the root-rot fungus (*Phytophthora cinnamomi*) 1, 2	Very Low
Human interference	
Removal of dead wood and dead trees 2	Medium
Irresponsible ownership of domestic pets	Medium
Road mortality	Medium
Hunting/fishing	Medium
Loss or degradation of estuarine nursery habitats	Medium
Removal, degradation and disturbance of nests and roosts	Medium
Human induced mortality	Very Low
Human activity by vehicles off road	Very Low
Impediments to movement of fish	Very Low
Dead wood removal from stream 3	Very Low
Human activity by visitors	Very Low
Collection of seed	Very Low
Vandalism	Very Low
Horse recreational use	Very Low
Entanglement in, or ingestion of anthropogenic debris in marine and estuarine environments 1, 2	Very Low
Electrocution	Very Low
Boat mortality	Very Low
Livestock	
Domestic livestock grazing, trampling and competition	Low
Chemicals and waste	
Application and pollution from urban, industrial and rural chemicals	Medium
Poisoning due to pest control	Very Low
Illegal rubbish dumping	Very Low
Rubbish dumping / landfill	Very Low
Demographic effects and small populations	
Demographic effects and small populations	Medium
Genetic contamination/hybridisation	Very Low


Pigface *carpobrotus glaucescens*


Yellow-faced Whipsnake *Demansia psammophis*


Park Beach

B2.8 Landscape connections in the coastal plains

(1) Corindi Estuary – Dirty Creek

An area supporting significant estuarine, coastal lowland and forest habitats including areas of Subtropical Coastal Floodplain Forest EEC and Swamp Sclerophyll Forest EEC. Part of this area is mapped as a Regional Priority Conserve and Repair Area in the *Northern Rivers Regional Biodiversity Management Plan* (DECCW 2010a).

The Corindi Estuary supports important shorebirds including resident species (e.g. Beach Stone-curlew, Pied Oystercatcher) and migratory species (e.g. Red-capped Plover, Whimbrel). The area includes important habitats for threatened species like Wallum Froglet, Eastern Ground Parrot, Powerful Owl, Black-necked Stork, Brolga, Squirrel Glider, Eastern Pygmy-possum, Grey-headed Flying-fox, Common Blossom-bat and Little Bentwing-bat.

Known habitat for the endangered coastal Emu population extends into this area, but the species may have disappeared locally. The area may be the southern range limit for the nationally threatened Olongburra Frog *Litoria olongburensis*. Threatened plant species have been recorded in the area including Scented Acronychia and Slender Screw Fern.

(2) Mullaway – Arrawarra – Darlington

This area includes Garby Nature Reserve, the northern end of Coffs Coast Regional Park, and privately owned habitat remnants linking across the Pacific Highway to Wedding Bells State Forest. The area supports EECs including Subtropical Coastal Floodplain Forest and Swamp Sclerophyll Forest.

The area also includes coastal wetlands, heathlands and old-growth open forests. Known populations of threatened fauna include Wallum Froglet, Glossy Black-cockatoo, Grey-headed Flying-fox, Common Blossom-bat, Little Bentwing-bat and Hoary Wattled Bat. A regionally important Squirrel Glider population occupies the swamp forest – open forest – coastal complex habitat mosaics.

(3) Hearnes Lake – Double Crossing Creek

This area forms a corridor running from Coffs Coast Regional Park through the Hearnes Lake area to Council-owned lands at Double Crossing Creek, and on to Wedding Bells State Forest. The association of coastal complex habitats, wetlands and open forests becomes fragmented by agricultural lands in the west.

Hearnes Lake is considered a regionally important coastal lake in the *Northern Rivers Regional Biodiversity Management Plan* (DECCW 2010a) and is likely to support high conservation value aquatic habitats. Other important habitats include Swamp Sclerophyll Forest EEC, old-growth coastal forests

and known habitats for threatened fauna including the Wallum Froglet, Black-necked Stork and Osprey. The Koala and Squirrel Glider may also occur here. An important Little Tern nest site occurs at Flat Top Point.

Threatened plants recorded from the area include Slender Marsdenia, Rusty Plum and Rainforest Cassia west of the Pacific Highway, and there is a significant population of the Austral Toadflax closer to the coast.

(4) Emerald Beach – Moonee Creek – Wedding Bells

This area extends from Moonee Beach Nature Reserve and links through remnant coastal complex habitats and open forests to Wedding Bells State Forest. The corridor is fragmented by the settlement of Emerald Beach and clearing associated with Moonee Creek. However, it still supports important remnant coastal heaths, wetlands, Swamp Sclerophyll Forest EEC and forest areas that are known to support threatened species.

An important Voluntary Conservation Area supports a population of the nationally endangered Giant Barred Frog. A potentially important Koala population may also persist in the western part of the area along with plants like the Rusty Plum. The Wallum Froglet, Common Planigale, Squirrel Glider, Grey-headed Flying-fox, Common Blossom-bat and Osprey have all been recorded. Part of the area is mapped as a Regional Priority Conserve and Repair Area in the *Northern Rivers Regional Biodiversity Management Plan* (DECCW 2010a).

(5) South Moonee Forest – Wedding Bells

South Moonee Forest is a highly significant forest remnant supporting stands of tall open forest, wetlands and Swamp Sclerophyll Forest EEC and Subtropical Coastal Floodplain Forest EEC. The forest is linked to Wedding Bells State Forest through a corridor of privately owned forest remnants that are known to support threatened species.

The area is core habitat for the threatened plant Moonee Quassia. The Rusty Plum and Slender Marsdenia also occur locally. Significant fauna populations also occur including Green-thighed Frog, Black Bittern, Wompoo Fruit-dove, Glossy Black-cockatoo, Common Blossom-bat, Grey-headed Flying-fox and Eastern Freetail-bat. The nationally threatened Swift Parrot occurs seasonally when nectar resources are suitably abundant.

(6) Korora – Korora Basin

This area is an outlier of Coffs Harbour's renowned tall moist open forests which extend upslope, west from the Basin. It is comprised largely of habitat remnants and riparian-based habitat corridors amid coastal urban and rural-residential areas, but also includes Kororo Nature Reserve and part of Coffs Coast Regional Park.


Mulloway Needle Bush *Hakea actites*


Fungus


Sundew *Drosera spatulata*


Boambee Beach

The forests here support a known, small but important Koala population which extends to Pacific Bay resort on the coast but is bisected by the Pacific Highway. Other threatened fauna species include Stephens' Banded Snake and Wompoo Fruit-dove. The Sooty Owl is occasionally heard and threatened plant species known from the area include Rusty Plum and Slender Marsdenia.

(7) Coffs Creek – racecourse – North Boambee Beach

This habitat complex comprises important remnants within a largely urbanised landscape. Habitats include mosaics of Swamp Sclerophyll Forest EEC and tall open forest along with estuarine wetlands, mangroves, coastal heaths and coastal complex areas. The uniquely associated and endangered Floyd's Grass and Black Grass-dart Butterfly occur along with small but important populations of the Koala and Squirrel Glider.

The Wallum Froglet is associated with low-lying habitats and a potentially new frog species, 'Coffs Creek Crinia', has been recorded in the area. A Grey-headed Flying-fox camp is located further up Coffs Creek. Threatened bats, including Eastern False Pipistrelle and Little Bentwing-bat, have recently been detected. These and other forest bats may roost in remnant, old eucalypts (especially Blackbutts) associated with Coffs Creek and other remnants. The Common Planigale, Osprey and Black Bittern are also known to occur. Threatened plants persist within these remnants including Southern Swamp Orchid, Rusty Plum, Tall Knotweed and Scented Acronychia.

(8) South Boambee Beach – airport – Boambee

Significant estuarine, coastal lowland and forest habitats are found in this area with known occurrences of EECs including Subtropical Coastal Floodplain Forest and Swamp Sclerophyll Forest. A mapped habitat corridor extends to the west connecting these coastal plain remnants with open forest habitats in Boambee State Forest. A locally important Koala population is associated with the habitat remnants of this area.

The uniquely associated and endangered Floyd's Grass and Black Grass-dart Butterfly are found at a number of sites along Cordwells and Boambee creeks. The Wallum Froglet is found in low-lying heaths and sedgelands and a potentially new frog species, Coffs Creek Crinia, is known from the area. Known populations of threatened plants include Southern Swamp Orchid, Tall Knotweed, Scented Acronychia and Rusty Plum. Other known fauna species include Eastern Grass Owl, Black-necked Stork, Common Planigale, Grey-headed Flying-fox, Common Blossom-bat and Little Bentwing-bat.

(9) Bongil Bongil – Bonville – Tuckers Knob

This is an important area of fragmented habitats including a mapped habitat corridor that links the coastal plains to the hinterland. The area extends from the northern end of Bongil Bongil National Park to the urban area of Bayldon–Toormina then crosses the Pacific Highway to Bonville and on to Tuckers Knob State Forest.

Rose Maple *Cryptocarya rigida*

Habitat remnants here support combinations of productive tall open forests and Swamp Sclerophyll Forest and Subtropical Coastal Floodplain Forest EECs. Locally important populations of the Koala and Wallum Froglet occur in the area. Other threatened fauna that have been recorded include Sooty Owl, Masked Owl, Glossy Black-cockatoo, Grey-headed Flying-fox, Greater Broad-nosed Bat and Little Bentwing-bat. The threatened plants Rusty Plum and Slender Marsdenia are also known to occur.

(10) Bongil – Pine Creek

This area includes some significant habitat remnants and an important corridor link from Bongil Bongil National Park to Pine Creek State Forest. Local habitats include productive tall open forests and Subtropical Coastal Floodplain Forest and Swamp Sclerophyll Forest EECs.

An important Koala population occurs and there is a significant occurrence of the endangered Floyd's Grass and Black Grass-dart Butterfly associated with low-lying flats along Pine Creek. The nationally endangered Giant Barred Frog is also known from Pine Creek. Other threatened fauna species known to occur include the Osprey, Masked Owl, Glossy Black-cockatoo, Grey-headed Flying-fox and Little Bentwing-bat. The Cryptic Forest Twiner, a threatened plant species, has also been recorded.

B3. MIDLAND HILLS

Table B3.1: Midland hills statistics

Midland Hills	Hectares
Total Area of Midland Hills	47,587
Total Area of EECs	3,772
Percent EECs	8%
Endangered Ecological Communities *	
Freshwater Wetlands on coastal floodplains	25
Lowland Rainforest	3,282
Subtropical Coastal Floodplain Forest	117
Swamp Sclerophyll Forests on Coastal Floodplains	349

As Listed under the Threatened Species Conservation Act 1995

B3.1 Landform

The midland hills include the foothills and low ranges between the coastal plains and the escarpment ranges. The western boundary corresponds approximately to the 250 metre elevation contour. This landscape unit includes geographic features associated with the coastal ranges (including sandstone escarpments in the north-west), and valleys, creeks and rivers draining northwards to the Clarence River.

B3.2 Geology

The midlands hills encompass a number of geological formations which run generally east–west across the LGA. In the north there are areas of Kangaroo Creek Sandstone interspersed with Walloon Coal Measures. North-west of Coffs Harbour there are mainly Conglomerate formations, and in the south there are metasediments, mudstone and siltstone.

B3.3 Land use

Although there a number of small towns and villages in the midlands hills landscape, the major land uses are rural agriculture and forestry. Small areas of rural residential allotments are located throughout the area. Bananas are traditionally the primary horticultural crop, however, blueberries are also being established. Livestock grazing is also widely distributed throughout the area with most grazing along the valley floors and mid slopes. Forestry, both on private land and Forests NSW estate, occurs throughout the midland hills.

B3.4 Broad vegetation

The vegetation communities in the midland hills (see Table B3.2) vary greatly in composition, age and condition depending on landform, slope and aspect.

On private land, the distribution of vegetation shows that clearing is strongly linked to slope in the midland hills. A significant proportion of vegetation has been cleared or fragmented within the flatter lower-lying areas of generally less than 5°. Some riparian vegetation still exists along major drainage lines. The width of riparian vegetation is generally narrow and variable and can completely disappear from one property to another. A greater proportion of remaining vegetation is on the moderate to steeper slopes. These forests are generally semi-mesic or wet sclerophyll, though there are patches of rainforest vegetation interspersed through them.

Public land in the midland hills landscape tends to be located on the higher elevation hills and slopes. These areas tend to be dominated by wet sclerophyll forest, semi-mesic forest, rainforest and some plantation forest in the southern and central areas. The northern public land areas contain semi-mesic, wet sclerophyll, plantation timber with dry sclerophyll shrub/grass forests occupying the most northerly portion of public land.

Creek Sandpaper Fig *Ficus coronata*

Table B3.2: Vegetation formations of the Coffs Harbour midland hills

Formation	% of total
Wet sclerophyll forests	26
Semi-mesic forests	26
Cleared of vegetation	25
Dry sclerophyll shrub forests	6
Plantations	5
Rainforests	5
Dry sclerophyll shrub/grass forests	4
Swamp sclerophyll forests	2
Freshwater wetlands	<1
Heathlands	<1
Sclerophyll grassy woodlands	<1
Introduced	<1

The valley floor vegetation in the midlands hills landscape has been moderately fragmented by clearing for agricultural activities such as grazing. Vegetated corridors remain along many of the ridge lines and link the coastal plain, midland hills and escarpment ranges landscapes. Corridors across valley floors and along creeks and rivers are often thin and/or fragmented and in some cases may only comprise scattered paddock trees.

The larger and more contiguous areas of vegetation are located mostly within public lands, including Bindarri National Park, Wedding Bells and Conglomerate state forests and Sherwood Nature Reserve in the north; and Orara East and Boambee state forests and Ulidarra National park in the centre; and Pine Creek State Forest and Bongil Bongil National Park in the south.

B3.5 Aquatic ecosystems

The majority of the drainage systems in the midlands hills flow westward and north into the Clarence River. A number of small- to medium-sized creeks and streams—including Bucca Bucca Creek, Sherwood Creek and Fridays Creek—flow into the Urumbilum River and the larger Orara River. These rivers, creeks and streams contain important freshwater and riparian habitat for a number of threatened species, including the Giant Barred Frog.

Freshwater wetlands associated with the rivers and creeks occur in the valley floors. While many are degraded by grazing or from alterations to their hydrology, they provide important habitat for a number of threatened species, including the Black-necked Stork, Brolga and Comb-crested Jacana.

The larger streams and the Orara River are significant habitat for the endangered freshwater fish, the Eastern Cod.

B3.6 Threatened communities, populations and species

Threatened ecological communities

The midland hills supports four threatened ecological community (TEC) listed as endangered under the TSC Act:

- Freshwater Wetlands on Coastal Floodplains of New South Wales North Coast, Sydney Basin and South East Corner Bioregions
- Lowland Rainforest in the New South Wales North Coast and Sydney Basin Bioregions
- Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion
- Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions.

Endangered populations

There are no listed endangered populations in midland hills landscape.

Threatened species

Many of the species of significance within the midland hills are associated with the larger tracts of forests within the national parks and state forests of this area. The wet sclerophyll forests and subtropical rainforests of Bruxner Park Flora Reserve and Bindarri National Park are key areas for the Giant Barred Frog (Figure B3.1) and Stephen's Banded Snake. These areas and other larger tracts of wet sclerophyll forest and subtropical rainforest are important habitat for the Rose-crowned Fruit-dove, Superb Fruit-dove and the Wompoo Fruit-dove as well as the large forest owls (Sooty Owl and Masked Owl). The Koala also occurs widely across the midland hills landscape, although the

most significant habitats occur generally south of Sherwood Nature Reserve with the Orara, Fridays Creek, west Bonville and Bongil Bongil National Park in the south being the most significant areas. Other species strongly associated with the midland hills are the Powerful Owl, Spotted-tailed Quoll, Yellow-bellied Glider, Glossy Black-cockatoo and a number of microbats including the Eastern and Little Bentwing-bats and the Golden-tipped Bat.

Mixophyes frogs

The Giant Barred Frog *Mixophyes iteratus* is listed as endangered at state and national levels. It has declined drastically in distribution and abundance across large parts of its range. The Coffs Harbour hinterland is a stronghold for the species, particularly tall wet and moist open forests associated with permanent rivers and creeks (Figure B3.1).

A related species, the Stuttering Frog *M. balbus*, is also threatened at state and national levels and also occurs within the Coffs Harbour LGA. The two species can be found in close proximity in the Bindarri National Park – Urumbilum River – Fridays Creek area (Figure B3.1).

Stinky Lily

Stinky Lily *Typhonium* sp. aff. *brownii* occurs mainly in moist eucalypt forest in the ranges west of Woolgoolga and Coffs Harbour. It is a very restricted species known from only a few small populations. It is a deciduous herb about 20 cm tall and it sprouts a few leaves each year from an underground tuber. Timber harvesting, road works and weed invasion are significant threats for this endangered species.

Rusty Plum

Rusty Plum *Niemeyera whitei* occurs outside the Coffs Harbour LGA, but the species' stronghold is in the moist forests and rainforests of the Coffs Harbour area (Figure B3.2). It is a medium sized tree with firm textured leaves. Rusty Plum is a vulnerable species and is threatened by weed invasion, forestry practises and urban and rural residential development.

Other threatened plants

Other threatened plants that have significant distributions in the Coffs Harbour LGA include:

- Orara Boronia *Boronia umbellata* (Figure B3.2)
- Dwarf Heath Casuarina *Allocasuarina defungens*
- Milky Silkpod *Parsonsia dorrigoensis*
- Sand Spurge *Chamaesyce psammogeton*
- Scant Pomaderris *Pomaderris queenslandica*
- Slender Marsdenia *Marsdenia longiloba* (Figure B3.2)
- Square-stemmed Spike-rush *Eleocharis tetraquetra*.


Giant Barred Frog *Mixophyes iteratus*


Stinky Lily *Typhonium* sp. aff. *brownii*


Red Bloodwood & Stringy Bark Heathy dry Sclerophyll Forest

Figure B3.1: Giant Barred Frog and Stuttering Frog records

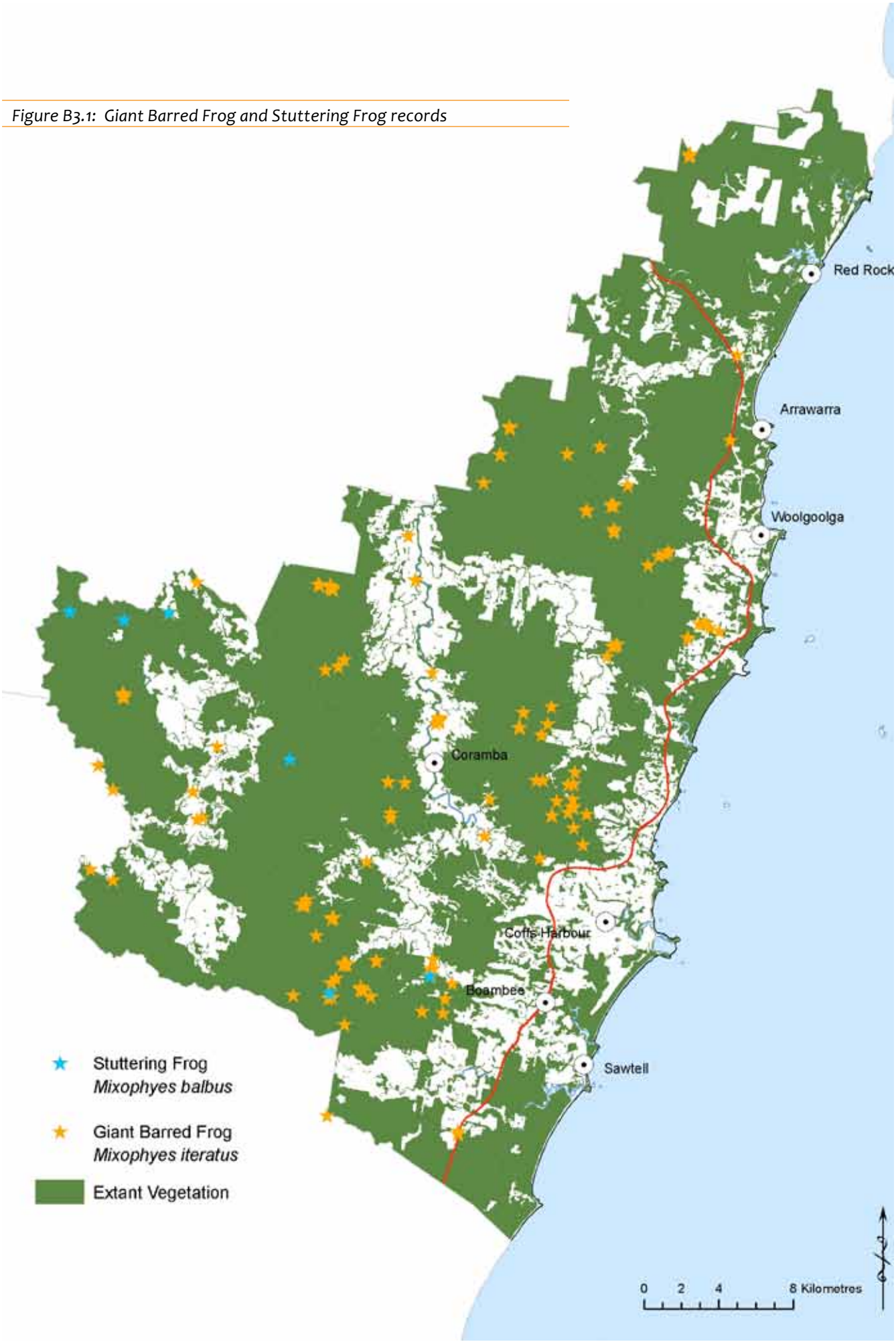
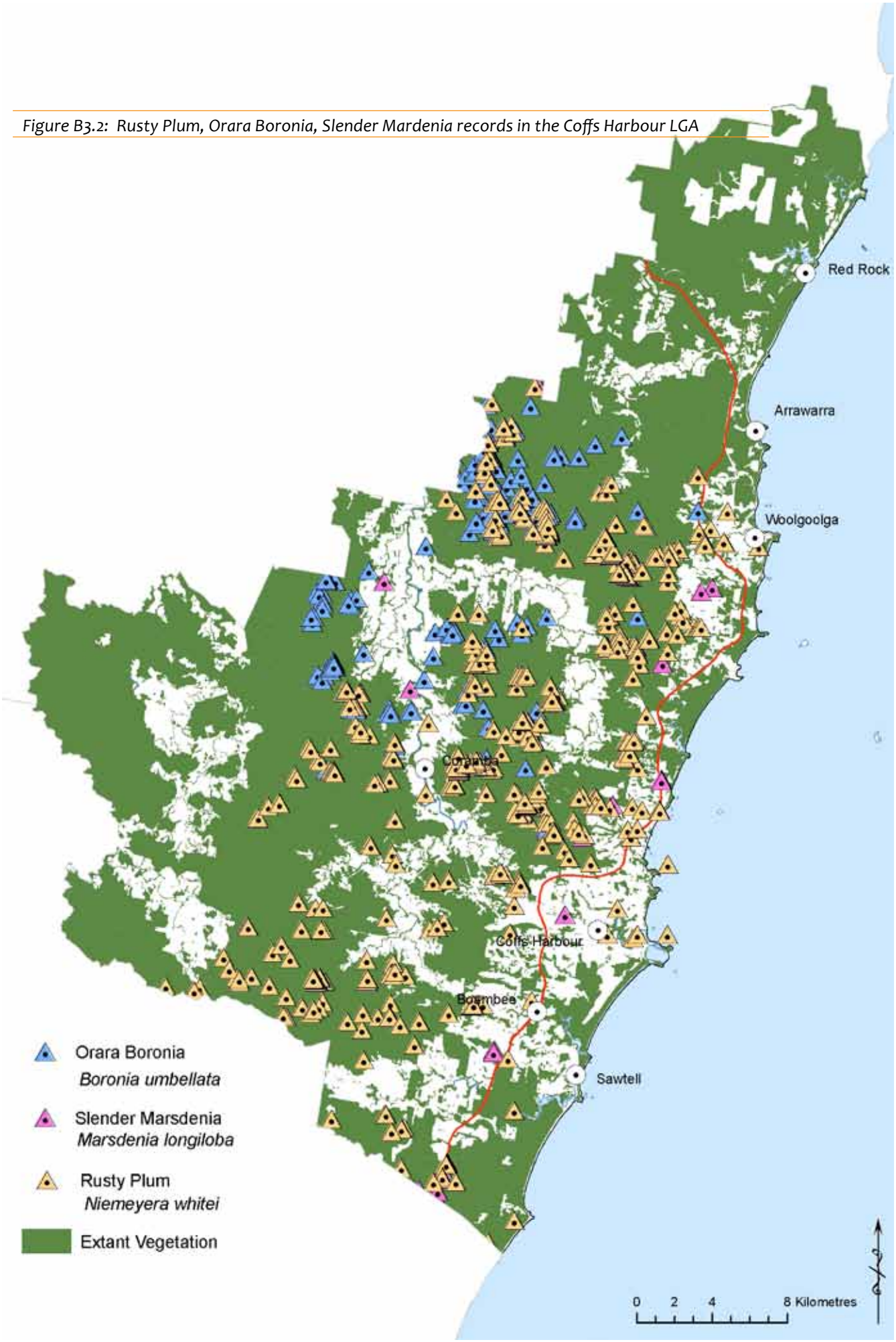


Figure B3.2: Rusty Plum, Orara Boronia, Slender Mardenia records in the Coffs Harbour LGA




Habitat simplification - clearing for grazing


Vine Weed Infestation


Removal of hollow-bearing trees

B3.7 Threats

In the midland hills, 60 threat activities impact on biodiversity. Of these, 24 are encompassed by key threatening processes listed under the TSC Act (see Table B3.3) and one is listed under the *Fisheries Management Act 1994* (FM Act).

In comparison to the coastal plains, the midland hills landscape has less overall threat activities reflecting the relatively lower population density. Land-use practices are mainly associated with agricultural activities, primarily cattle grazing, with some areas of bananas and blueberry crops. Forestry is also widespread on both private land and Forests NSW estate.

The main threats include:

- clearing and disturbance of vegetation for agriculture
- invasion from introduced plant species
- the establishment and spread of Lantana
- competition and predation by the European Red Fox
- inappropriate fire regimes in some locations
- competition, predation and disease by feral Cats.

While Cane Toads are not established in the LGA, they are a potential threat. Some areas are also subject to urban, rural–residential and industrial development (including clearing setbacks for fire protection).

Table B3.3 lists each threat activity and rating (very high to very low) based on the geographical extent of the activity and its impact on biodiversity within the midland hills landscape.

Many of these threats are cumulative, caused by a multitude of activities. In some cases they are often exacerbated by, or are a result of, another threat such as the invasion of Lantana which results from clearing and disturbance to native vegetation.

The impacts associated with climate change are likely to be less in the midland hills than in the coastal plains landscape. There may, however, be impacts from increased wildfire potential and the invasion of new weeds and pest species such as the Cane Toad. Some plant species and the floristics of some vegetation communities may also change as a result of changes in temperature and rainfall. Increasing stochastic events such as cyclones, storms and floods may also alter or impact important habitats.

Some habitats in the midland hills are highly disturbed and fragmented and/or have roads or cleared lands that cause significant barriers to the movement of species. This can cause genetic isolation of populations and an inability for species to recolonise areas after local extinctions.

Table B3.3: Midland hills threat activities and ranking

1 Key Threatening Process listed under EPBC Act 1994
2 Key Threatening Process listed under TSC Act 1995
3 Key Threatening Process listed under FM Act 1994

Threat group / Threat activity	Rank
Clearing and fragmentation 1, 2	
Agricultural clearing	High
Removal of hollow bearing trees	High
Rural residential	Medium
Clearing for plantations 2	Low
Asset protection zones (fire)	Low
Clearing for urban and industrial development	Very Low
Fire	
Inappropriate fire regime 2	Medium
Weeds	
Weed invasion	High
Invasion, establishment and spread of Lantana camara 2	High
Invasion and establishment of exotic vines and scramblers 2	Medium
Invasion of native plant communities by exotic perennial grasses 2	Low
Pests	
Competition and predation by the European Red Fox (*Vulpes vulpes*) 1, 2	High
Competition, predation and disease from feral Cats 1, 2	High
Competition, land degradation and grazing from Rabbits 1, 2	Medium
Competition, predation and disease from feral Dogs 2	Medium
Competition from feral Honey Bees 2	Low
Predation by the Plague Minnow (*Gambusia holbrooki*) 2	Very Low
Competition, grazing and degradation from feral Deers 2	Very Low
Competition, predation, grazing, habitat degradation and disease transmission by feral Pigs (*Sus scrofa*) 1, 2	Very Low
Competition, grazing and land degradation from feral Goats 1, 2	Very Low
Competition, predation and mortality from ingestion of Cane Toad (significant potential threat) 1, 2	Very Low
Competition and predation from feral fish	Very Low
Competition from introduced birds	Very Low
Predation by introduced rodents	Very Low
Forestry	
Forestry	High

Threat group / Threat activity	Rank
Hydrology and water quality	
Alteration to the natural flow regimes of wetlands from habitat modification and degradation 2	Medium
Alteration to the natural flow regimes of rivers and streams from habitat modification and degradation 2	Low
Altered groundwater hydrology	Very Low
Siltation/sedimentation	Very Low
Diseases and pathogens	
Infection of amphibians with chytrid fungus resulting in chytridiomycosis 1, 2	Medium
Dieback caused by the root-rot fungus (*Phytophthora cinnamomi*) 1, 2	Low
Infection by *Psittacine circoviral* (beak & feather) disease affecting endangered psittacine species 1, 2	Very Low
Exotic fungi red pored fungi	Very Low
Phelliuis noxious	Very Low
Lethal yellowing	Very Low
Human interference	
Removal of dead wood and dead trees 2	Medium
Irresponsible ownership of domestic pets	Medium
Road mortality	Low
Hunting/fishing	Low
Removal, degradation and disturbance of nests and roosts	Low
Collection illegally	Very Low
Human induced mortality	Very Low
Human activity by vehicles off road	Very Low
Roadside, track and waterway maintenance	Very Low
Impediments to movement of fish	Very Low
Dead wood removal from stream 3	Very Low
Human activity by visitors	Very Low
Bushrock removal 2	Very Low
Collection of seed	Very Low
Vandalism	Very Low
Horse recreational use	Very Low
Electrocution	Very Low
Livestock	
Domestic livestock grazing, trampling and competition	Medium
Chemicals and waste	
Application and pollution from urban, industrial and rural chemicals	Low
Poisoning due to pest control	Very Low
Illegal rubbish dumping	Very Low
Rubbish dumping / landfill	Very Low
Demographic effects and small populations	
Demographic effects and small populations	Medium
Genetic contamination/hybridisation	Very Low


Green Leaf Tree Frog *Litoria phyllochroa*


Southern Boobook *Ninox novaeseelandiae*


Fairy Paint Brush *Archidendron grandiflorum*

B3.8 Landscape connections in the midland hills

(11) Weddings Bells – Corindi River – Conglomerate

Linking two state forests across the upper Corindi Valley, this area includes mapped Subtropical Coast Floodplain Forests EEC and tall open old-growth and disturbed old-growth forests. The forests here provide habitat for many threatened species like Giant Barred Frog, Glossy Black-cockatoo, Powerful Owl, Masked Owl, Koala and Grey-headed Flying-fox—all of which are know from the state forests fringing the valley. The Squirrel Glider may also occur. The Corindi River floodplain is known habitat for the Black-necked Stork, and the Brolga is occasionally seen in the area.

The threatened plant species Moonee Quassia and Orara Boronia have been recorded at Madmans Creek Flora Reserve which is in Conglomerate State Forest in the midland hills. The Rusty Plum is also known to occur in the general location and other threatened plant species are likely to occur along the privately owned floodplains.

(12) Lower Bucca – Bucca Bucca – Sherwood

This habitat corridor is fragmented by clearing adjacent to Bucca Bucca Creek but still provides a seemingly functional and important forest-based link between Sherwood Nature Reserve in the north and Lower Bucca State Forest in the south. The southern fall from Sherwood Nature Reserve supports important stands of rainforest and old-growth wet and moist tall open forests.

Bucca Bucca Creek is fringed by riparian forest, including tall stands of Cunningham's Sheoak. The remainder of the corridor supports tall open forest variously dominated by Blackbutt, Tallowwood, Grey Ironbark and Flooded Gum.

Recent clearing and logging have impacted the corridor in a number of places but it still retains connectivity and habitat values for threatened species including Wompoo Fruit-dove, Koala, Glossy Black-cockatoo, Greater Broad-nosed Bat and Little Bentwing-bat—all of which have been recorded nearby in Lower Bucca State Forest. The three large forest owls—Sooty, Masked and Powerful Owls—have all been recorded in the general area indicating it to be an important and productive location for forest fauna. The Yellow-bellied Glider has also been recorded in the adjacent state forest. The corridor area is important known habitat for the Orara Boronia, and other threatened plants like Moonee Quassia and Rusty Plum are also likely to occur.

(13) Nana Creek – Coramba – Lower Bucca

This habitat corridor is fragmented by large areas of clearing associated with the Orara River but is still considered an important link across the Orara Valley. It includes the Coramba Nature Reserve which is a known refuge for threatened species including

very high numbers of the nationally threatened Giant Barred Frog. Subtropical Coastal Floodplain Forest EEC, including subtropical rainforest, occurs as remnants along the river. The remainder of the corridor supports tall open forest variously dominated by Blackbutt, Tallowwood, Grey Ironbark and White Mahogany.

A number of threatened fauna species have been recorded using the remnant habitats of this corridor, including the Rose-crowned Fruit-dove, Grey-headed Flying-fox and Koala. It is of great interest that a Spotted-tailed Quoll was sighted in the area not long ago. Other species that may occur include Stephens' Banded Snake, Wompoo Fruit-dove and even the Parma Wallaby which has been recorded just to the west of this location.

(14) Orara East – Karangi – Orara West

This important area includes a network of corridors and habitat remnants linking Bindarri National Park, Ulidarra National Park and Bruxner Flora Reserve in the north, across Red Hill and Boambee State Forest and on to the Fridays Creek area and Orara West State Forest in the south. This area is an important location for Coffs Harbour's signature tall moist forest habitats and supports a high diversity of forest ecosystems including stands of old-growth forest and rainforest.

Many records of threatened fauna have come from the area, including Stephens' Banded Snake, Wompoo Fruit-dove, Rose-crowned Fruit-dove, Sooty Owl, Koala, Glossy Black-cockatoo and Grey-headed Flying-fox. A known important population of the nationally threatened Giant Barred Frog occurs in the Friday Creek area. There are sporadic reports of the Long-nosed Potoroo occurring here as well. This area also appears to be core habitat for the threatened Rusty Plum for which there are many known records.

(15) Bongil – Pine Creek – Tuckers Nob

This is a privately owned component of a broader landscape corridor linking Bongil Bongil National Park through Pine Creek State Forest to Tuckers Nob State Forest. The area supports mosaics of wet and moist forest including rainforest patches and stands variously dominated by Flooded Gum, Tallowwood and Blackbutt.

This corridor is core habitat for the local Koala population. It is also known to be important habitat for the Masked Owl, Sooty Owl and Yellow-bellied Glider. The nationally threatened Giant Barred Frog is known from Pine Creek further to the east and from Tuckers Nob State Forest, and it is likely to occupy stream habitats in this hotspot. Threatened plants which have been recorded from the general vicinity of this hotspot are also likely to occur here, including Rusty Plum and Ravine Orchid *Sarcochilus fitzgeraldii*.


Rainforest


Stephens' Banded Snake *Hoplocephalus stephensii*


Fungi

B4. ESCARPMENT RANGES

Table B4.1: Escarpment ranges statistics

Escarpment Ranges	Hectares
Total Area of Escarpment Ranges	37,632
Total Area of EECs	3,841
Percent EECs	10%
Endangered Ecological Communities *	
Lowland Rainforest	3,675
White Gum Moist Forest	156

As Listed under the Threatened Species Conservation Act 1995

B4.1 Landform

The escarpment ranges landscape stretches from the western boundary of the LGA to roughly the 250 metre elevation contour.

The escarpment ranges landscape includes striking geographic features of the Great Eastern Ranges, including Mount Moombil (at 1042 metres, the highest point in the LGA), Tuckers Nob (920 metres), and Bonville Peak.

Slopes are predominantly moderately steep to very steep (16–45°) with small areas of precipitous slopes along some cliffs associated with gorges. Undulating slopes occur on the elevated plateaus and in the upper river valleys. The southern boundary of the escarpment ranges runs along the ridgeline around the Gleniffer and Crossmaglen valleys.

B4.2 Geology

The geology of the escarpment ranges is complex and variable. Metasediments, mudstones and siltstones are the predominant geologies. The area to the west of Coffs Harbour and south to Dorrigo is characterised by the Carboniferous greywacke metasediments of the Coramba beds, mudstones of the Brooklana beds and siltstones of the Moombil beds.

B4.3 Land use

The primary land use on the escarpment ranges is state forest which occupies almost 40%, or around 15,000 hectares. National parks account for approximately 16%. Livestock grazing on pasture land occupies another 7400 hectares (19.5%), although some areas under tree cover (9400 ha or 25%) may also be used for grazing. Only a very small proportion of the escarpment ranges is used for horticulture or cropping pursuits (less than 0.5%).

The population of the escarpment ranges is sparse in comparison with the rest of the LGA. Urban or built-up areas cover about 50 of the 37,600 hectares of the escarpment ranges. These figures reflect the large areas of national parks and state forests in the landscape, together with the rugged topography, difficult access and relatively greater distances from urban service centres.

B4.4 Broad vegetation

The forests in the escarpment ranges tend to be fairly contiguous in comparison with the midland hills and coastal plains, and there is less evidence of fragmentation. In the predominantly cleared areas used for grazing, riparian vegetation adjacent to creeks and drainage lines tends to be narrow and discontinuous. Well over half of the vegetation in the escarpment ranges (Table B4.2) is wet sclerophyll forest or rainforest.

Table B4.2: Vegetation formations of the Coffs Harbour escarpment ranges

FORMATION	% of total
Wet sclerophyll forests	37
Rainforests	28
Cleared	17
Semi-mesic forests	11
Dry sclerophyll shrub/grass forests	4
Plantations	3
Swamp sclerophyll forests	<1
Heathlands	<1
Sclerophyll grassy woodlands	<1
Introduced	<1
Freshwater wetlands	<1

B4.5 Aquatic ecosystems

The escarpment ranges contain the upper–middle reaches of the major rivers and the headwaters of many small tributaries. Waterfalls, gorges and cascades feature in the more rugged areas.

As many of the rivers and streams in the area are within state forest or national parks, they are considered to have only minimal disturbance and require only conservation management strategies. Around a quarter are regarded as having moderate disturbance and recovery potential. The escarpment ranges contain many barriers to fish passage, including some of high priority for remediation. Most of the riparian areas are in reasonable condition due to the steep topography and predominance of public land in this landscape.

The escarpment ranges landscape supports the habitat of the endangered Eastern Freshwater Cod. Since the late 1960s, only small numbers have been caught and only from tributaries of the Clarence River where some pristine habitat still exists (such as the Nymboida, Little Nymboida, Guy Fawkes, Boyd and Mann rivers). The Cod is now considered extinct in the Richmond River system, and very rare or absent in the major northern tributaries of the Clarence River system (the Clarence, Rocky and Cataract rivers). It is also no longer found in the Orara River, where it was once very common (DPI 2004).


Waterfall


Rose Myrtle *Archirhodomyrtus beckleri*


Bush-stone Curlew *Burhinus grallarius*


Rainforest

B4.6 Threatened species, populations and communities

Threatened ecological communities

The escarpment ranges contains two threatened ecological communities listed as endangered under the TSC Act:

- Lowland Rainforest on Floodplain in the New South Wales North Coast Bioregion
- White Gum Moist Forest in the NSW North Coast Bioregion

Priority areas for endangered ecological communities

The north-east foothills of the Dorrigo Plateau, extending into the Coffs Harbour LGA to the north-west of Coramba, support important habitat for the White Gum *Eucalyptus dunnii* Moist Forest EEC.

Endangered populations

There are no listed endangered populations in the escarpment ranges landscape.

Threatened species

Many of the species of significance within the escarpment ranges are associated with the larger tracts of forests across private lands and in national parks and state forests. For example, a significant


Golden Orb Spider *Nephila* sp.


Trailing Guinea Flower *Hibbertia dentata*


Purple Coral Pea *Hardenbergia violacea*


Squirrel Glider *Petaurus norfolcensis*

outlier population of the Pouched Frog *Assa darlingtoni* occurs along Frontage Creek within Orara West State Forest in the south-west of the LGA. This species has a patchy distribution with about five isolated populations, including one in the Dorrigo Plateau region. The closest other records are from Dorrigo National Park, Mount Hyland Nature Reserve and Wild Cattle Creek State Forest.

The Stuttering Frog also occurs across areas of the escarpment ranges landscape with records in Wild Cattle Creek, Orara West and Kangaroo Creek state forests. It has also been recorded in the headwaters of the Urumbilum River in Bindarri National Park (Figure B3.1).

The lower sections of the Urumbilum River are also significant habitat for the Giant Barred Frog. The densest population of this species was recorded here during field surveys for the Urunga – Coffs Harbour Forest Management Areas (Smith et al. 1995). A total of 18 individuals were recorded along a 100 metre stretch of the river.

The Parma Wallaby is a rare species which occurs as an outlier population in Bindarri National Park and in Orara West State Forest where it has been recorded near Coramba Mountain Road (Figure B4.1). The Rufous Bettong reaches its southern stronghold distributional limit in the Coffs Harbour LGA (Figure B4.1) but is known from a few disjunct locations further south.

B4.7 Threats

In the escarpment ranges, 29 threat activities impact on biodiversity. Of these, 21 are encompassed by listed key threatening processes (Table B4.3). The number of threats impacting on this landscape is less than in the midland hills, and significantly less than in the coastal plains landscape. Threat ratings are generally also lower in the escarpment ranges. This reflects the low levels of human settlement, difficulty of the steep terrain for undertaking agriculture, and the relatively large area of national parks and state forests.

The table below lists each threat activity and rating (very high to very low) based on the geographical extent of the activity and its impact on biodiversity within the escarpment ranges landscape.

Figure B4.1: Parma Wallaby, Rufous Bettong and Squirrel Glider records

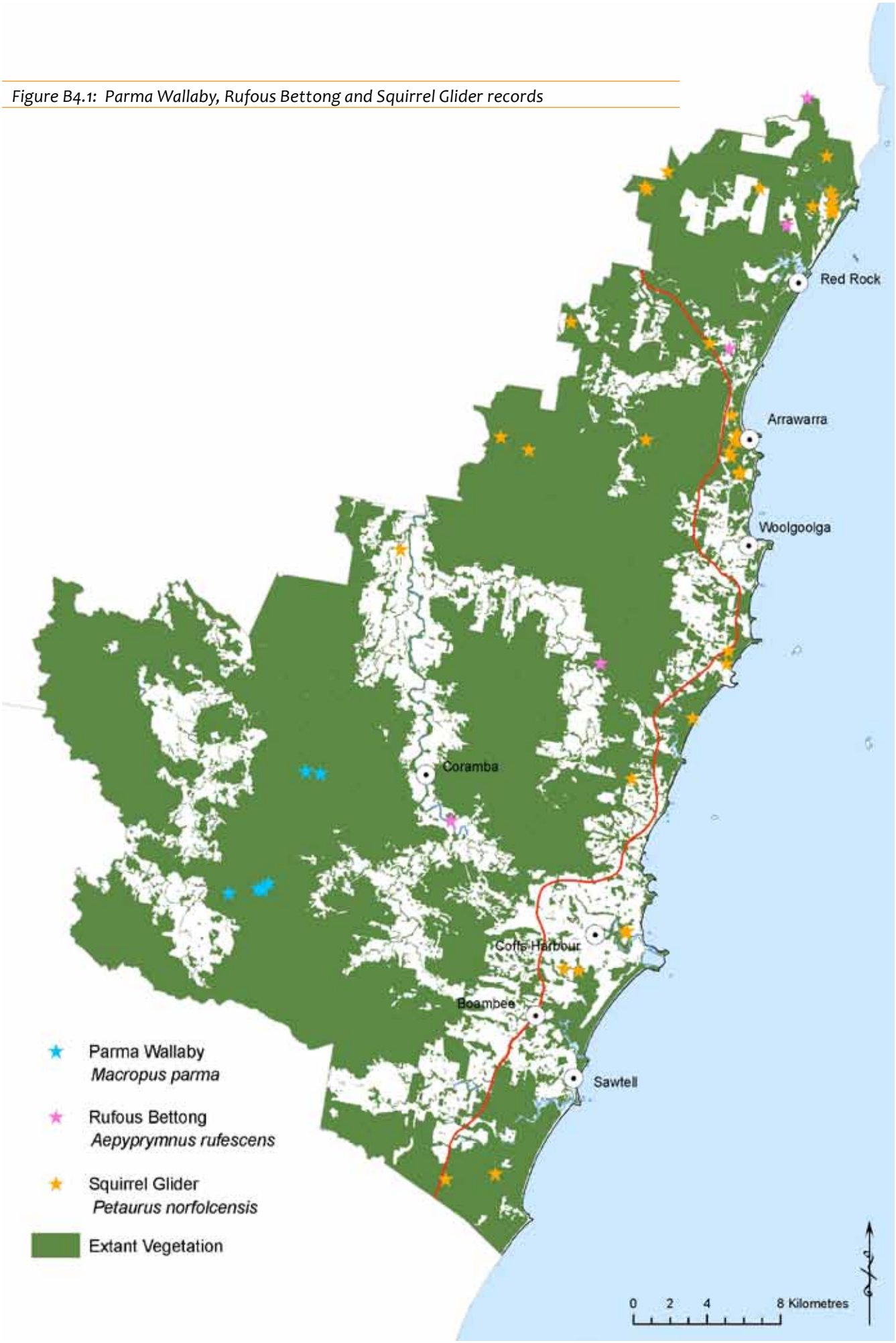


Table B4.3: Escarpment ranges threat activities and ranking

1 Key Threatening Process listed under EPBC Act 1994
2 Key Threatening Process listed under TSC Act 1995
3 Key Threatening Process listed under FM Act 1994

Threat group / Threat activity	Rank
Clearing and fragmentation 1,2	
Agricultural clearing	Medium
Removal of hollow bearing trees	Medium
Asset protection zones	Low
Rural residential	Very Low
Clearing for plantations 2	Very Low
Fire	
Inappropriate fire regime 2	Medium
Weeds	
Weed invasion	High
Invasion, establishment and spread of *Lantana camara* 2	Medium
Invasion and establishment of exotic vines and scramblers 2	Low
Invasion of native plant communities by exotic perennial grasses 2	Very Low
Pests	
Competition and predation by the European Red Fox (*Vulpes vulpes*) 1, 2	Medium
Competition, predation and disease from feral Cats 1, 2	Medium
Competition, predation, grazing, habitat degradation and disease transmission by feral Pigs (*Sus scrofa*) 1, 2	Very Low
Competition, grazing and land degradation from feral Goats 1, 2	Very Low
Competition, predation and mortality from ingestion of Cane Toad 1, 2 (significant potential threat)	Very Low
Competition, grazing and degradation from feral Deers 2	Very Low
Competition, land degradation and grazing from Rabbits 1, 2	Very Low
Competition, predation and disease from feral Dogs 2	Very Low
Competition from feral Honey Bees 2	Very Low
Forestry	
Forestry	Very High

Threat group / Threat activity	Rank
Dieback	
Forest eucalypt dieback associated with over-abundant Bell Miners and psyllids 2 (significant potential threat)	Low
Hydrology and water quality	
Alteration to the natural flow regimes of rivers and streams from habitat modification and degradation 2	Low
Alteration to the natural flow regimes of wetlands from habitat modification and degradation 2	Very Low
Diseases and pathogens	
Infection of amphibians with chytrid fungus resulting in chytridiomycosis 1, 2	Low
Dieback caused by the root-rot fungus (*Phytophthora cinnamomi*) 1, 2	Very Low
Human interference	
Removal of dead wood and dead trees 2	Low
Hunting/fishing	Very Low
Human activity by vehicles off road	Very Low
Livestock	
Domestic livestock grazing, trampling and competition	Low

The escarpment ranges is a dramatically different landscape to the other landscapes in the region due largely to the steep, rugged landforms. These have precluded, in many areas, the extensive development of land uses that are major threats to biodiversity in the other landscapes. Larger areas are also within national park.

Threats to the conservation lands in this landscape, although much less than threats to other lands, are still present and include inappropriate fire regimes as a result of wildfires. These can result in the burning of large inaccessible areas, including rainforest under extreme conditions. Inappropriate fire regimes encompass those that are too frequent, or not frequent enough, dependent on the ecosystem. Predation from Foxes, and feral Cats and Dogs can also occur throughout these areas, predominantly in disturbed forest areas, along forest edges and in rural agricultural lands. Feral Goats and Deer may be an emerging issue in some areas.

Grazing is one of the major industries in the escarpment ranges. It is limited in area and generally less intensive than other landscapes. Too-frequent fires may be a problem on some private land where graziers burn annually to control shrubs and promote palatable grasses and seasonal green pick for stock. This frequent burning may also lead to increased erosion if burning occurs just prior to heavy rainfall events. Other threats include weed invasion, and grazing and trampling of native vegetation by livestock.

Forestry is the other major industry in the escarpment ranges and it occurs on both state forests and private land. Potential threats include loss of hollow-bearing trees, increased erosion, inappropriate fire regimes, Bell Miner associated dieback, firewood collection and increased predation and human interference. Plantation establishment occurs in only small areas.

Overall the escarpment ranges are more likely to be resilient to the potential impacts of climate change because of the highly variable topography and the mosaic of vegetation communities. Nevertheless, restricted vegetation communities such as upland wetlands, rocky outcrops, dry rainforest and cool temperate rainforest will be vulnerable to the consequences of climate change, including extended dry periods, increased fire and/or storm intensities.

Bell Miner associated dieback is an emerging threat on the escarpment ranges. Chytrid fungus is another emerging, serious threat to the frogs that inhabit the streams and moist forests in the escarpment ranges. Weed invasion is prevalent in the lower altitudes where Lantana and exotic vines are the most widespread. To the north in the Clarence Valley LGA, Cane Toads are beginning to colonise the escarpment ranges in the Upper Clarence Valley and may be an emerging threat over time.

Coastal Carpet Python *Morelia spilota mcdowelli*


Crystal Falls, Dorrigo National Park

B4.8 Landscape connections In the escarpment ranges

(16) Gundar – Kangaroo River

This area is a broad swath of forested ridges and slopes linking state forests in the vicinity of Moleton. The vegetation comprises tall wet and moist forest variously dominated by Blackbutt, Flooded Gum and Blue Gum. There are also patches of warm temperate rainforest.

Many threatened fauna species have been recorded from the surrounding state forests, including Stuttering Frog, Giant Barred Frog, Glossy Black-cockatoo, Sooty Owl, Koala, Yellow-bellied Glider and Golden-tipped Bat. Many of these are likely to occupy suitable habitats in this area. The endangered shrub Creek Triplarina has been recorded growing adjacent to the Little Nymboida River in the vicinity.

(17) Orara West – Wild Cattle Creek

This is an area of fragmented habitat forming a stepping stone corridor linking Orara West and Wild Cattle Creek state forests across the Little Nymboida Valley. The vegetation comprises mosaics of tall wet forest interspersed with important stands of rainforest including warm temperate rainforest and patches of cool temperate rainforest.

The privately owned forests here are likely to provide habitats for threatened species such as Stuttering Frog, Giant Barred Frog and Spotted-tailed Quoll. Others known from the area include the Sooty Owl, Red-legged Pademelon, Koala and Yellow-bellied Glider. Threatened plants that are known from the surrounding state forests and that are considered likely to occur in this area include the Milky Silkpod, Slender Marsdenia, Dorrigo Daisy Bush and Rusty Plum.

(18) Bindarri – Cascade

The rugged ridges and slopes of this area constitute a habitat corridor linking Bindarri and Cascade national parks. The vegetation is mainly warm temperate rainforest with mosaics of wet sclerophyll forest.

These wet forests provide habitat for many threatened species including Glandular Frog, Pouched Frog, Stephens' Banded Snake, Spotted-tailed Quoll, Parma Wallaby, Red-bellied Pademelon, Eastern Pygmy-possum, Golden-tipped Bat and Greater Broad-nosed Bat. Threatened plants that are known to occur in the vicinity include Dorrigo Daisy Bush, Rusty Plum and Milky Silkpod.

(19) Dorrigo – Wild Cattle Creek – Cascade

This is an important habitat corridor linking Dorrigo National Park, Wild Cattle Creek State Forest and Cascade National Park. It is largely comprised of warm temperate rainforest with patches of tall wet forest dominated variously by eucalypts like Blue Gum, Flooded Gum and Tallowwood.

This area constitutes regional core habitat for fauna that live in wet forest habitats. Examples include Sooty Owl, Pouched Frog, Glandular Frog, Sphagnum Frog, Eastern False Pipistrelle. There is also potential habitat for eastern tablelands species like the Rufous Scrub-bird and Olive Whistler. The area is also a regional core habitat area for the threatened Dorrigo Daisy Bush.

(20) Bindarri – Dorrigo

This is a somewhat remote but highly significant tract of rainforest and tall wet forest. It includes old-growth forest and contributes to a critical habitat corridor between Bindarri and Dorrigo national parks.

This wet forest area provides habitat for a vast suite of threatened species including Pouched Frog, Stuttering Frog, Wompoo Fruit-dove, Rose-crowned Fruit-dove, Sooty Owl, Spotted-tailed Quoll, Eastern Pygmy-possum, Parma Wallaby and Eastern Bentwing-bat. This area is also likely to be core habitat for many threatened plants including Slender Marsdenia, Milky Silkpod, Dorrigo Daisy Bush and Rusty Plum.

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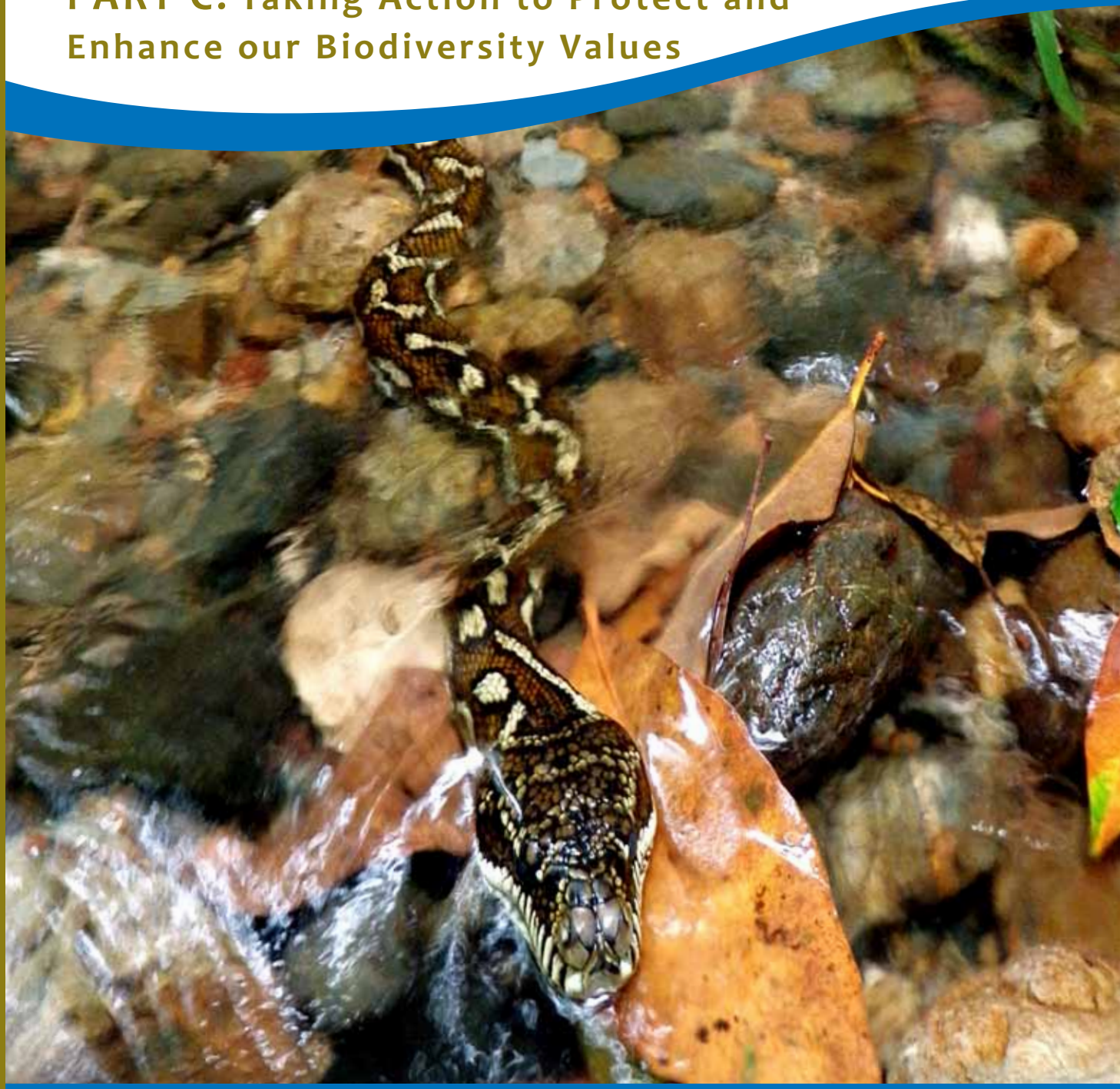
COFFS HARBOUR BIODIVERSITY ACTION STRATEGY

FROM THE OCEAN TO THE RANGES

PART C: Taking Action to Protect and Enhance our Biodiversity Values



November 2015

THIS IS A LOOKING AFTER OUR ENVIRONMENT PROJECT
Helping to achieve the 2030 Community Vision

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Front Cover Image
Coastal Carpet Python *Morelia spilota* subsp. *mcdowelli*
Supplied by Darren Moffatt.

VISION AND STRUCTURE

Adaptive management

Coffs Harbour City Council developed its original 'Biodiversity Action Strategy' in 2002 to address local biodiversity degradation, to integrate biodiversity considerations into all areas of management, and to provide clear guidelines for biodiversity conservation (CHCC 2002a,b). This 2012 Strategy builds on the original strategy and provides new information and direction in line with current principles and approaches to biodiversity conservation.

The 'Coffs Harbour Biodiversity Action Strategy 2012–2030' ('the/this Strategy') is based on the principles of 'adaptive management'. This is in the spirit of the original strategy and is an attempt to ensure that this Strategy remains relevant and achievable. Adaptive management is a dynamic approach to planning that is responsive and proactive. The outcomes of monitoring, evaluation and review processes, as well as new information and management systems, will be incorporated into Council's State of the Environment Reporting process and other ongoing assessment requirements.

The Coffs Harbour 2030 program revolved around community-based workshops set up to address key themes of public interest. One such theme was titled 'Looking after our Environment' and reflected the importance placed on conservation issues by the community during scoping workshops.

Three desired outcomes emerged from the theme of 'Looking after our Environment' in the Coffs Harbour 2030 Plan; they form the Vision for this Strategy:

- ***We understand and value our unique natural environment and its cultural connections.***
- ***We protect and restore our environment to conserve its unique biodiversity for future generations.***
- ***We manage our resources and develop sustainably.***

The 2030 Plan includes a number of key strategies for achieving the community's vision of environmental protection and conservation. These strategies include active programs to restore and improve our environment, to develop mechanisms for adaptation and mitigation of climate change, and to build ecosystem resilience through a system of local and regional habitat corridors. These strategies, and associated objectives of the 2030 Plan, are provided in Table A5.1 in Part A with a direct cross-reference to the relevant Biodiversity Action Strategy actions presented below. In turn, the actions developed for the Strategy to address biodiversity management issues (below) are also cross-referenced to the 2030 Plan strategies.

During development of the 2030 Plan the community expressed a real desire to see more recognition of Aboriginal culture, and specifically its links to biodiversity conservation. This updated Biodiversity Action Strategy strives to reflect that desire in the actions for biodiversity conservation.

White Booyong *Argyrodendron trifoliolatum*

Council's role in biodiversity management

Coffs Harbour City Council has a key role to play in biodiversity conservation in the LGA because it:

- manages significant areas of land and water where biodiversity conservation can be pursued
- undertakes civil project activities that can impact biodiversity
- is the determining authority for developments that can impact biodiversity
- influences community behaviour through public education, awareness campaigns and support
- supports, plans, implements and monitors on-ground works undertaken by volunteer organisations and private landholders
- identifies and assesses changes in the environment through local environmental monitoring and reporting
- is a key stakeholder on regional management boards
- plays a key role in strategic planning at the local scale.

Taking action on biodiversity management issues

This section directs how Council will implement strategies and actions for biodiversity conservation and management up until 2030. Actions have been formulated to address 9 general biodiversity management issues:

1. Building resilience against climate change
2. Community involvement and ownership
3. Supporting cultural connections
4. Conserving and restoring ecosystems
5. Protecting threatened and endangered species
6. Controlling invasive species
7. Ecological fire management
8. Maintaining healthy catchments
9. Improving our knowledge and understanding.

Actions are cross-referenced to relevant strategies concerning the environment in the Coffs Harbour 2030 Strategic Plan for the Coffs Harbour Community (CHCC 2009a).

The Biodiversity Action Strategy utilises the *Northern Rivers Regional Biodiversity Management Plan* (DECCW 2010a) as a fundamental resource plan. Where relevant, a number of actions are sourced directly from that plan.

Some actions feature in more than one biodiversity management issue, but are only costed once and cross-referenced to the other action.

Successful implementation of many of the actions is dependent on integration with other NSW Government agencies and community groups. The actions identify lead departments within Council as well as external partnerships. Cost estimates reflect the cost to Council of implementation. Some additional funding contributions from other organisations may be required to successfully implement an action.

The estimated costs of delivering the Biodiversity Action Strategy 2012–2030

Tables C1 and C2 below provide a summary of the financial commitment required to deliver the 176 actions over the first 15 years of the Biodiversity Action Strategy's implementation period.

Table C1 details the estimated funding requirements for each of the 9 categories. Table 2 presents the costs in regards to the priority commencement (short to long-term).

Table C1: Funding by category

Actions	Est. of Funds (Today's $)
C1- Building resilience against climate change	$455,000
C2- Community involvement and ownership	$377,500
C3- Supporting cultural connections	$330,000
C4- Conserving and restoring ecosystems	$361,000
C5- Protecting threatened and endangered species	$1,747,250
C6- Controlling invasive species	$513,000
C7- Ecological fire management	$111,000
C8- Maintaining healthy catchments	$921,000
C9- Improving our knowledge and understanding	$297,500
TOTAL	**$5,113,250**

Table C2: Funding - short to long term (today's $)

Priority	Est of Funds	Funding Source*
Short *(projects commenced within 5 years)*	$1,747,750	EL, G, PE, Core, CHCC, FUNDED
Medium *(projects commenced within 10 years)*	$1,942,500	EL, G, PE, Core, CHCC, FUNDED
Long *(projects commenced within 15 years)*	$1,423,000	EL, G, PE, Core, CHCC, FUNDED
Total	**$5,113,250**	

* See Table legend on page 108.

FUNDING THE STRATEGY

The *Northern Rivers Regional Biodiversity Management Plan* (DECCW 2010) outlines four mechanisms that can be used by local governments to raise money to address biodiversity conservation in their shires. The discussion is based on *Biodiversity Planning Guide for NSW Local Government* (Fallding et al. 2001).

Environment Trust (Proposer Coffs Harbour Ltd)

The trust's principle purpose is the protection and enhancement of the natural environment, and the provision of information, education and research about the natural environment. Where there has been a net environmental loss associated with illegal land clearing, habitat simplification or tree removal, any fines will fund restoration and rehabilitation of priority actions identified in this Strategy. The trust also provides the opportunity for landowners to bequeath land and money and receive tax advantages from the Australian Government.

Special rates

Rate income is usually the largest single category of revenue for local governments. Local governments have discretion to set the level of rates (within the limits of the rate cap), and to choose the structure of the rating system to be applied in their area.

There are two types of rates: ordinary and special. Ordinary rates raise revenue for general works, services and activities. Special rates may be levied to raise additional revenue for particular works, services or activities, including biodiversity conservation programs.

Special rates may be levied on any rateable land that has access to, or benefits from, or contributes to the need for particular works, services, facilities or activities. Any monies raised through a special rate must be spent on the activity for which the special rate was sought. Like ordinary rates, special rates are levied in relation to land value and if they come within the rate capping limit the Minister's approval for the special rate is not required.

Special variation

A local government wishing to increase rates above the rate set by the Minister must apply for a 'special variation'. In these cases the local government must either demonstrate that the project has regional significance or that the project is a major enhancement to community services or facilities. The provision of new or expanded environmental services is a sound reason for seeking a special variation, provided it can be justified. In June 2004, Byron Shire Council was successful in obtaining a 2% special variation to the general rate for use on biodiversity works over four years (Byron Shire Council 2004).

Section 94 developer contributions

Section 94 of the *Environmental Planning and Assessment Act 1979*, allows local governments to recover costs of providing infrastructure and facilities to meet the demands of future development, such as community facilities, open space, roads, drainage and conservation. Section 94 contributions can include the dedication of land free of cost, a payment of a monetary contribution, or a combination of both.

Developer contributions should be considered as a tool to offset losses to biodiversity as a consequence of development. Money collected for this purpose should be spent on restoring or reconstructing habitat in close proximity to the development site. Local government should also consider using developer contributions as in-kind contributions to apply for external environmental grant funds, thereby doubling the funds available for biodiversity projects (Byron Shire Council 2004).

Approved fees and charges

Approved fees are charges imposed by local governments on any service that it provides, including regulatory services. Fees may be imposed on any service other than those provided on an annual basis, such as water or sewerage.

External grant funding

Grant funding is sourced mainly from the Northern Rivers Catchment Management Authority; the NSW Environmental Trust; and Australian Government grant programs, but can also be acquired through other programs and private sponsorship arrangements.

Local governments could investigate the possibility of imposing a 'replacement fee' for tree removals that result in a loss of biodiversity, as a component of their relevant tree preservation order. The replacement fee should reflect true cost of the environmental benefit being lost (Bryon Shire Council 2004).

Table legend

PRIORITY

Essential	Priority 1
High	Priority 2
Moderate	Priority 3

BUDGET ESTIMATE

Estimated costs associated with a project are identified as either:

Project	one-off cost
Project (1, 2 or 3)	funding costs over 1–3 years of project operation (the project costs within the action table equal total costs over the project life)
Annual	annual cost for the life of the 2030 Community Strategic Plan

FUNDING SOURCE

EL	Environmental Levy
G	Grant funded
PEF	Coffs Harbour Protection of the Environment Fund
Core	Core Environmental Levy recurring (Biodiversity Officers)
CHCC	Internal CHCC staff resources
FUNDED	Currently funded projects
WONS	Weeds of National Significance

TIMEFRAME

Short	Short term—start project within 5 years of the Coffs Harbour BAS being adopted
Medium	Medium term—start project within 10 years of the Strategy being adopted
Long	Long term—start project within 15 years of the Strategy being adopted

PARTNERSHIP

OEH	NSW Office of Environment and Heritage
EDO	Environmental Defenders Office
NRCMA	Northern Rivers Catchment Management Authority
WIRES	Wildlife Information Rescue & Education Service
DPI	Department of Planning and Infrastructure
Fisheries	NSW Department of Trade and Investment – Fisheries
OW	NSW Office of Water
SIMP	Solitary Island Marine Park
CHRL	Coffs Harbour Regional Landcare
TRMS	Transport Roads & Maritime Services
NSWFB	NSW Fire Brigade
NSWRFS	NSW Rural Fire Servive
NCWAC	North Coast Weeds Advisory Committee

White Cheeked Honeyeater *Phylidonyris nigra*

C1 BUILDING RESILIENCE AGAINST CLIMATE CHANGE

Performance Criteria

- Identify climate change impacts on biodiversity and increase resilience of natural ecosystems and landscapes through implementation of:
  - climate change planning initiatives
  - adaptation of scientific knowledge to strategic and operational processes
  - mitigation strategies including targeted restoration projects.
- Ensure that climate change principles for biodiversity conservation are embedded in all of Council's strategic plans and programs.
- Provide the community with locally relevant climate change information.

C1.1 Ecosystem and landscape resilience

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
1.1.1	Finalise and adopt Coffs Harbour's new generation Class 5 Vegetation layers for the LGA.					
	Essential	$2,000 project	EL	Short	Gov: OEH, NRCMA	Obj. 1.1, 2.1 Strat. 2.1.1, 2.1.3, 2.1.5, 2.2.3
1.1.2	Derive and adopt the High Value Habitats Layer in accordance with the criteria set by this Strategy.					
	Essential	$30,000 project	EL	Short	Gov: OEH, NRCMA	Obj. 1.1, 2.1 Strat. 2.1.1, 2.1.3, 2.1.5, 2.2.3
1.1.3	Draft the Coffs Harbour Biodiversity Assets and Ecological Significance layers along with: (1) consultation plan, (2) communication targets, (3) information sheets, (4) reporting structure.					
	Essential	$50,000 project	EL, G & PEF	Short	Gov: OEH, NRCMA & OW	Obj. 1.1, 2.1 Strat. 2.1.1, 2.1.3, 2.1.5, 2.2.3
1.1.4	Adopt and implement the Biodiversity Assets and Ecological Significance layers for the Coffs Harbour LGA into the next phase of planning.					
	Essential	$150,000 Project	EL, G & PEF	Short	Gov: OEH, NRCMA & OW	Obj. 1.1, 2.1 Strat. 2.1.1, 2.1.3, 2.1.5, 2.2.3
1.1.5	Develop an Ecosystem Resilience Program based on: (1) identification of ecosystems under threat, (2) identification and prioritisation of threat level, (3) development of actions based on threat level, current status, representativeness, habitat restrictions & population size within the LGA.					
	High	$25,000 project	EL & PEF	Short	Gov: OEH, NRCMA	Obj. 1.1,2.1 Strat. 2.1.1, 2.1.3, 2.1.5, 2.2.3

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
1.1.6	Create an Ecosystem Resilience spatial layer that identifies: (1) vegetation communities at risk, (2) target restoration areas, (3) land acquisition targets, (4) priority management areas.					
	Essential	$15,000 project	EL	Medium	Gov: OEH	Obj. 1.1, 2.1 Strat. 2.1.1, 2.1.3, 2.1.5, 2.2.3
1.1.7	Identify the major barriers to dispersal through the Coffs Harbour landscape based on the SDE Corridors Footprint. Target the following barrier categories: (1) natural, (2) infrastructure, (3) cleared or degraded landscapes. Identify measures to address these barriers in the short & long term.					
	Essential	$25,000 project	EL & G	Medium	Gov: Fisheries, NRCMA, OEH, TRMS. Internal CHCC	Obj. 1.1, 2.1 Strat. 2.1.1, 2.1.3, 2.1.5, 2.2.3

C1.2 Council planning

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
1.2.1	Develop a Council policy based on the Ecosystem Resilience spatial layer.					
	High	$7,000 project	Core	Medium	Internal CHCC	Obj. 2.1, 2.2, 3.1 Strat. 2.1.1, 2.1.3, 2.1.5, 2.2.3
1.2.2	Investigate the capacity of Council's reserve systems to sustain biodiversity, ensuring a comprehensive and representative reserve system.					
	Essential	$15,000 project	Core & CHCC	Short	Gov: Fisheries, NRCMA, OEH	Obj. 2.1, 2.2, 3.1, Strat. 2.1.1, 2.1.3, 2.1.5, 2.2.3
1.2.3	Investigate Council's Natural Area Reserve System and develop strategies to improve their resilience.					
	High	$15,000 project	EL & G	Medium	Internal CHCC	Obj. 2.1, 2.2, 3.1 Strat. 2.1.1, 2.1.3, 2.1.5, 2.2.3
1.2.4	Develop a Council policy to deal with high conservation lands on private property that are retained during the development process.					
	High	$2,000 project	Core	Short	Internal CHCC	Obj. 2.1, 2.2, 3.1 Strat. 2.1.1, 2.1.3, 2.1.5, 2.2.3

C1.3 Climate change awareness

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
1.3.1	Develop web-based materials that detail the potential impacts of climate change on Coffs Harbour's biodiversity.					
	Moderate	$5,000 project	EL	Short	Gov: OEH	Obj. 2.1, 3.1 Strat. 2.2.2, 2.1.2, 2.1.5, 3.1.3
1.3.2	Host a series of public forums on climate change to create awareness and to better integrate the community's concerns into the management of Coffs Harbour's biodiversity.					
	High	$5,000 project	EL & G	Medium	Gov: OEH	Obj. 2.1, 3.1 Strat. 2.2.2, 2.1.2, 2.1.5, 3.1.3
1.3.3	Create an accreditation program in Coffs Harbour involving local businesses, commercial facilities, schools and community organisations to assist in the understanding and application of climate change resilience in the environment.					
	Essential	$10,000 project	G	Medium	EDO Gov: OEH	Obj. 2.1, 3.1 Strat. 2.2.2, 2.1.2, 2.1.5, 3.1.3
1.3.4	Create an emblem for the Climate Change Ecosystem Resilience program using Floyd's Grass & Black Grass-dart Butterfly.					
	Essential	$1,000 project	Core	Short	Gov: OEH & NRCMA	Obj. 2.1, 3.1 Strat. 2.2.2, 2.1.2, 2.1.5, 3.1.3

C1.4 Community support

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
1.4.1	Develop an assistance program for carbon neutral event planning.					
	High	$10,000 project	G	Long	Gov: OEH	Obj. 2.1, 2.2 Strat. 3.1.3, 3.2.2, 3.1.4
1.4.2	Create a media & web-based program 'Building Resilience' encouraging people to get involved in protecting biodiversity in their local community—a what and how to guide.					
	Essential	$3,000 project 3	G	Medium	Gov: OEH	Obj. 2.1, 2.2 Strat. 2.1.1, 2.1.3, 2.2.3, 2.2.1
1.4.3	Create a technical & financial support network for community groups wanting to develop climate change and biodiversity initiatives.					
	Essential	$10,000 project	G & EL	Long	Gov: OEH & NRCMA	Obj 2.1,2.2 Strat. 1.3.1, 2.1.1, 2.1.3, 2.2.3, 2.2.1, 3.1.3

C1.5 Research

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
1.5.1	Support TAFE & university research into ecological resilience to climate change through a sponsorship program of Honours, Masters and PhD students.					
	High	$55,000 project	G	Long	Gov: All education facilities	Obj. 2.1, 2.2, 3.1 Strat. 1.3.1, 2.1.1, 2.1.3, 2.2.3, 2.2.1, 3.1.3
1.5.2	Develop methods to manage, collect & present biodiversity information and data through a Biodiversity Monitoring Program.					
	Essential	$10,000 project	EL	Short	Internal CHCC	Obj. 2.1, 2.2, 3.1 Strat. 1.3.1, 2.1.1, 2.1.3, 2.2.3, 2.2.1, 3.1.3
1.5.3	Develop a program to address climate change and biodiversity information gaps & data deficiencies to improve land management systems into the future.					
	Moderate	$10,000 project	EL & G	Medium	Gov: OEH	Obj. 2.1, 2.2, 3.1 Strat. 1.3.1, 2.1.1, 2.1.3, 2.2.3, 2.2.1, 3.1.3

C2 COMMUNITY INVOLVEMENT AND OWNERSHIP

Performance Criteria

- Meet the objectives of the Coffs Harbour 2030 Community Strategic Plan Looking after our Environment theme that relate to community involvement and education.
- Strengthen actions to inform, motivate and achieve the support of the regional community in conserving biodiversity.
- Build the capacity of the community to protect, enhance and restore biodiversity.

C2.1 Foster community leadership and action

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
2.1.1	Review current community support networks and financial commitment from Council to ensure alignment with this Strategy.					
	Moderate	$2,000 project	Core CHCC	Short	Internal CHCC	Obj. 2.1, 2.2 Strat. 1.1.1, 1.1.2, 1.3.1, 2.2.1
2.1.2	Review the restoration and revegetation works conducted by community groups on Council land.					
	Essential	$3,000 project	Core CHCC	Short	Internal CHCC	Obj. 2.1 ,2.2 Strat. 1.1.1, 1.1.2, 1.3.1, 2.2.1
2.1.3	Improve representation and active support in community projects by developing a commitment program with: (1) educational institutions, (2) landowners, (3) other government organisations.					
	High	$4,000 project	EL	Medium	Gov: Education facilities in the CH LGA	Obj. 2.1 ,2.2 Strat. 1.1.1, 1.1.2, 1.3.1, 2.2.1
2.1.4	Create a series of media profiles on community Landcare groups that have achieved large-scale restoration within the public reservation system.					
	Essential	$4,000 project	Core	Medium	CHRL	Obj. 2.1 ,2.2 Strat. 1.1.1, 1.1.2, 1.3.1, 2.2.1

C2.2 Ecological accountability

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
2.2.1	Develop and present a series of workshops for industry to explain the function of Council's new Development Control Plans and Preservation of Vegetation Clause.					
	High	$2,000 project 2	Core	Short	Local Industry & Professional Services	Obj. 1.1, 2.1 Strat. 1.1.2, 2.1.1, 2.1.2, 2.1.2
2.2.2	Develop guidelines on biodiversity issues for the Coffs Harbour LGA-wide Development Control Plan. These guidelines will be put on public exhibition and adopted by Council to help streamline the environmental assessment process, and could include: (1) vegetation management planning, (2) arborist reporting, (3) ecological assessment standards, (4) Koala Plan of Management implementation, (5) compensatory planting advice, (6) riparian lands management, (7) wetlands, (8) hollow-bearing & old-growth trees, (9) aquatic habitat, (10) managing corridors, (11) threatened species & their habitats, (12) threatened ecological communities.					
	Essential	$5,000 project 2	Core	Short	Internal CHCC	Obj. 1.1, 2.1 Strat. 1.1.2, 2.1.1, 2.1.2, 2.1.2

C2.3 Awareness and learning

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
2.3.1	Prepare a media release on the 'Coffs Harbour Biodiversity Action Strategy 2012–2030' and its implementation to show what Council is doing to protect and enhance the natural environment in Coffs Harbour LGA.					
	Moderate	$500 project	Core & CHCC	Short	Internal CHCC	Strat. 1.1.1, 1.1.2, 2.2.1
2.3.2	Develop training for Council staff on the functions and relationships between the Standard Local Environment Plan (SLEP), development control plans and Biodiversity Guidelines (2.2.2 above). Training to focus on conservation planning outcomes for the development process and Council's internal operations, and ensuring that they remain consistent.					
	High	$15,000 project	EL & G	Short	Internal CHCC	Strat. 2.1.1, 2.2.2, 3.1.3
2.3.3	Facilitate investigations into the development of a regional education facility within the North Coast Regional Botanic Garden, Coffs Harbour. The facility would enhance our knowledge and understanding of the biodiversity values of the region.					
	Moderate	$25,000 project	EL & G	Medium	Gov: SIMP, NRCMA & OEH	LE1.1.2, LE2.2.1, LE1.2.2, LE1.2.3
2.3.4	Expand the biodiversity education curricula delivered by the Botanic Garden.					
	Essential	$15,000 annual	EL, G & PEF	Short	Gov: NRCMA & OEH	Strat. 1.1.2

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
2.3.5	Initiate an environmental education program scoping project to deliver and engage meaningful community-based education at the Botanic Garden.					
	High	$20,000 project	EL, G & PEF	Medium	Gov: NRCMA & OEH	Strat. 1.1.2
2.3.6	Design a walking track with educational interpretation through Council's major natural reserve areas including: (1) Solitary Island walk, (2) Coffs Creek walk, (3) Toormina/Boambee (main link), (4) Airport (state park), (5) Woolgoolga Lake, (6) Coramba.					
	High	$80,000 project 3	EL, G, PEF & Core	Long	Gov: NRCMA & OEH	Strat. 1.3.1, 1.3.2

C2.4 Addressing threats

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
2.4.1	Develop a web-based package and a two-stage media campaign on the impact that domestic animals have on native wildlife.					
	Essential	$2,000 project	EL	Medium	Internal CHCC	Obj. 2.2, 3.1 Strat.1.1.2, 2.1.1, 2.2.1, 2.2.2, 3.1.2, 3.1.4
2.4.2	Run three workshops about vegetation management, private native forestry and biodiversity management for the community.					
	High	$1,500 project 3	EL & PEF	Short	EDO Gov: NRCMA & OEH	Obj. 2.2, 3.1 Strat. 1.1.2, 2.1.1, 2.2.1, 2.2.2, 3.1.2, 3.1.4
2.4.3	Develop information packages in both web and printed versions for: (1) notifiable (noxious) weeds, (2) environmental weeds, (3) emerging weed threats.					
	Essential	$25,000 project	G	Medium	NCWAC	Obj. 2.2, 3.1 Strat. 1.1.2, 2.1.1, 2.2.1, 2.2.2, 3.1.2, 3.1.4
2.4.4	Run coastal and rural community workshops to explain legislation, its implementation and empower the community to get involved in the future of Coffs Harbour.					
	Essential	$1,000 project 3	EL & PEF	Short	EDO	Obj. 2.2, 3.1 Strat. 1.1.2, 2.1.1, 2.2.1, 2.2.2, 3.1.2, 3.1.4

C3 SUPPORTING CULTURAL CONNECTIONS

Performance Criteria

- We understand and value our unique natural environment and its cultural connections.
- Aboriginal people are engaged in local biodiversity conservation programs.

C3.1 Biodiversity and Aboriginal heritage

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
3.1.1	Support the Aboriginal community to record important landscapes and connections to Country.					
	Essential	$20,000 project	G & EL	Long	Land Council & Elders Groups Gov: NRCMA	Strat. 1.2.1, 1.2.2, 1.2.3, 2.1.4, 2.2.1
3.1.2	Support the development of school and community resources about cultural connections to biodiversity.					
	Moderate	$20,000 project	G & EL	Medium	Land Council & Elders Groups & Education Facilities Gov: OEH	Strat. 1.2.1, 1.2.2, 1.2.3, 2.1.4, 2.2.1
3.1.3	Support and initiate projects which enhance the conservation of significant cultural landscapes.					
	Essential	$15,000 project	EL & PEF	Long	Land Council & Elders Groups Gov: OEH	Strat. 1.2.1, 1.2.2, 1.2.3, 2.1.4, 2.2.1
3.1.4	Identify and integrate important cultural management practices into Natural Area Reserve Management plans to help maintain biological diversity.					
	High	$15,000 project	G & EL	Long	Land Council & Elders Groups	Strat. 1.2.1, 1.2.2, 1.2.3, 2.1.4, 2.2.1
3.1.5	Develop and implement a cultural stories program through the Botanic Garden that focuses on the cultural connections with biodiversity and the landscape.					
	Essential	$10,000 project	G & EL	Long	Land Council & Elders Groups	Strat. 1.2.1, 1.2.2, 1.2.3, 2.1.4, 2.2.1
3.1.6	Continue to support 'repair to Country' teams that involve Aboriginal people in landscape restoration.					
	High	$20,000 annual	EL	Short	Land Council & Elders Groups	Strat. 1.2.1, 1.2.2, 1.2.3, 2.1.4, 2.2.1

C4 CONSERVING AND RESTORING ECOSYSTEMS

Performance Criteria

- Reduce the loss of native vegetation to facilitate a net gain in vegetation.
- Conserve a comprehensive and representative range of regional ecosystems.
- Identify and protect high value environments.
- Establish a network of habitat corridors linking areas of native vegetation.
- Protect remaining habitat corridors and restore key parts of degraded corridors.
- Enforce legislation aimed at protecting biodiversity.
- Encourage landowners to retain and restore biodiversity through a range of incentive mechanisms.
- Encourage and promote community involvement and cooperation in the management of biodiversity.

C4.1 Implementation and policy

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
4.1.1	Review biodiversity-based policies to ensure they reflect community values, principles and goals under the Coffs Harbour 2030 Community Strategic Plan.					
	Essential	$2,000 project	Core & CHCC	Short	Internal CHCC	Obj. 1.1, 3.1 Strat. 1.1.1, 1.1.2, 2.1.1
4.1.2	Develop a program to identify new policies and associated procedures. Develop workflows to ensure that any changes or new policies are integrated into Council systems.					
	Essential	$5,000 project	Core & CHCC	Short	Internal CHCC	Obj. 1.1, 3.1 Strat. 1.1.1, 1.1.2, 2.1.1
4.1.3	Ensure all biodiversity guidelines are consistent with Australian Standards, relevant legislation and NSW Government guidelines.					
	Essential	$2,000 project	Core	Short	Internal CHCC	Obj. 3.1 Strat. 2.1.1
4.1.4	Ensure biodiversity guidelines provide for a consistent and equitable approach to managing biodiversity values during development activities and Council operations.					
	Essential	$1,000 project	Core	Medium	Internal CHCC	Obj. 3.1 Strat. 2.1.1

C4.2 Strategic biodiversity planning

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
4.2.1	Finalise the mapping of: a) High Valued Habitat b) Corridors footprint c) Biodiversity Assets d) Ecological Significance Criteria. In particular: (1) complete the mapping using new vegetation layers, (2) finalise spatial layers and documentation for all layers, (3) undertake further community and Council consultation, (4) integrate issues identified during consultation, (5) exhibit documentation, (6) provide Councillors with public submissions and documentation with changes integrated, (7) adopt the layers and associated documentation, (8) secure funds for implementing the plan(s).					
	Essential	$50,000 project	EL & G	Short	Gov: OEH, DPI & NRCMA	Obj. 2.1 Strat. 2.1.1, 2.1.3, 2.2.3
4.2.2	Draft, finalise and adopt the Biodiversity Assets Management Strategy.					
	Essential	$5,000 project	Core	Short	Gov: DPI	Obj. 2.1 Strat. 2.1.1, 2.1.3, 2.2.3
4.2.3	Integrate the Ecological Significance layer into the High Conservation Value Habitats (HCVH) Strategy.					
	Essential	$20,000 project	Core & CHCC	Short	Gov: OEH, DPI & NRCMA	Obj. 2.1 Strat. 2.1.1, 2.1.3, 2.2.3
4.2.4	Finalise the High Conservation Value Habitats (HCVH) Strategy and review the City Wide Local Environmental Plan environmental zoning through a Planning Proposal.					
	Essential	$5,000 project	Core	Short	Gov: OEH, DPI & NRCMA	Obj. 2.1 Strat. 2.1.1, 2.1.3, 2.2.3
4.2.5	Develop a specific plan which prioritises and verifies land for restoration under the Biodiversity Assets Management Strategy.					
	Essential	$15,000 project	EL & G	Short	Gov: OEH, DPI & NRCMA	Obj. 2.1 Strat. 2.1.1, 2.1.3, 2.2.3
4.2.6	Negotiate with all relevant government departments to integrate Council's Biodiversity Assets spatial layers into all Regional Conservation Plans and Strategies.					
	High	$2,000 project	Core	Short	Gov: OEH & DPI	Obj. 2.1 Strat. 2.1.1, 2.1.3, 2.2.3

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
4.2.7	Develop regional partnerships to address corridor connections across LGA boundaries.					
	Moderate	No cost	Core	Medium	Gov: OEH & DPI other LGA's	Obj. 2.1 Strat. 2.1.1, 2.1.3, 2.2.3
4.2.8	Integrate subcatchment restoration targets for regional vegetation communities into the Council's land acquisition policy (in prep.).					
	Essential	$1,000 project	Core & CHCC	Short	Internal CHCC	Obj. 2.1 Strat. 2.1.1, 2.1.2, 2.1.3, 2.1.5, 2.2.2, 2.2.3
4.2.9	Develop an offset policy for sustainable development in Coffs Harbour for properties that are unsuitable for the Biobanking process.					
	Essential	$3,000 project	Core	Medium	Internal CHCC	Obj. 2.1 Strat. 2.1.1, 2.1.2, 2.1.3, 2.1.5, 2.2.2, 2.2.3
4.2.10	Draft and finalise the Orara River Rehabilitation Strategy (in prep.) and commence priority actions.					
	Essential	$50,000 project	EL & G	Medium	Gov: OEH & NRCMA	Obj. 2.1 Strat. 2.1.1, 2.1.2, 2.1.3, 2.1.5, 2.2.2, 2.2.3
4.2.11	Implement the Orara River Restoration Project.					
	Essential	Subject to EL application annual	EL & G	Short	Gov: NRCMA	Obj. 2.1 Strat. 2.1.1, 2.1.2, 2.1.3, 2.1.5, 2.2.2, 2.2.3
4.2.12	Develop a detailed series of biodiversity 'standard conditions' for development applications. The conditions to cover all aspects of development application plan implementation, assessment, reporting and accountability.					
	High	$3,000 project	Core & CHCC	Short	Internal CHCC	Obj. 2.1 Strat. 2.1.1, 2.1.2, 2.1.3, 2.1.5, 2.2.2, 2.2.3
4.2.13	Develop a Natural Resources Ecotourism Strategy.					
	High	$40,000	Core & CHCC	Short	Internal CHCC	Obj. 2.1 Strat. 2.1.1, 2.1.2, 2.1.3, 2.1.5, 2.2.2, 2.2.3

C4.3 Native vegetation management

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
4.3.1	Develop a Council policy on how to deal with people engaging in pre-emptive clearing for the purposes of development. The policy to cover development applications for: (1) single dwellings, (2) subdivisions, (3) provision of auxiliary services.					
	Essential	$3,000 project	Core & CHCC	Short	Internal CHCC	Strat. 2.1.1, 2.1.3
4.3.2	Develop a community education program involving: (1) web-based material on the legal requirements to protect vegetation in the Coffs Harbour LGA, (2) two workshops on vegetation management, (3) a media campaign linked with changes to the Preservation of Vegetation Clause in the Development Control Plan.					
	High	$10,000 project	EL & G	Short	EDO Internal CHCC	Strat. 1.1.2, 2.1.1, 3.1.3
4.3.3	Undertake compliance training for Council officers dealing with unauthorised clearing of vegetation.					
	Essential	$10,000 project	Core	Short	Internal CHCC	Strat. 1.1.2, 2.1.1, 3.1.3
4.3.4	Commission an investigation to identify individual significant trees in the landscape that have either high ecological, aesthetic or cultural value.					
	Essential	$30,000 project	Core	Short	Internal CHCC	Strat. 1.1.2, 2.1.1, 3.1.3

C4.4 Managing biodiversity values on public land

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
4.4.1	Review the Coffs Coast Regional Park Strategic Plan: (1) define and implement stages, (2) identify potential additional lands, (3) integrate changes to Council conservation planning.					
	High	$15,000 project	EL & G	Short	Gov: OEH	Strat. 2.1.2, 2.1.3, 2.2.2, 3.1.3
4.4.2	Review Council's Open Space Strategy to include: (1) future acquisition, (2) handover, or (3) offset to improve the comprehensiveness of the conservation reserve system.					
	Essential	$15,000 project	Core & CHCC	Long	Internal CHCC	Strat. 2.1.2, 2.1.3, 2.2.2, 2.2.3
4.4.3	Advise and facilitate the purchase of high conservation lands in the coastal area as offsets to the Pacific Highway upgrade and larger coastal developments.					
	Essential	$5,000 project	Core	Short	Gov: OEH & DPI	Strat. 2.1.2, 2.1.3, 2.2.2, 2.2.3
4.4.4	Develop the operational framework for the Coffs Harbour Protection of the Environment Fund (PEF) including: (1) general administration, (2) appointment of a Board, (3) standard operational procedures, (4) sources of funding e.g. compliance actions, (5) offset procedures.					
	High	$5,000 project	Core & CHCC	Medium	Internal CHCC	Obj. 2.2, 3.1 Strat. 1.1.2, 2.1.1

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
4.4.5	Develop a Council operational guideline for works in conservation areas which details: (1) environmental assessment requirements, (2) removal of hollow-bearing trees, (3) offset policies in Council/reserve operations in line with Biodiversity Guidelines (2.2.2 above), (4) considerations for infrastructure development and maintenance.					
	High	$5,000 project	Core	Medium	Internal CHCC	Strat. 2.1.1, 2.2.2, 2.2.3, 3.1.3
4.4.6	Identify threatening processes acting on Council Natural Areas of high conservation significance.					
	High	$12,000 project	EL	Long	Internal CHCC Gov: OEH	Strat. 2.1.1, 2.2.2, 2.2.3, 3.1.3
4.4.7	Develop a plan to identify reserves which would benefit from: (1) remounted hollows or ground debris, (2) habitat boxes, (3) arborist works e.g. branch tear to encourage hollow development, (4) ecological burning regimes.					
	Essential	$2,000 project	Core	Short	Internal CHCC	Strat. 2.1.1, 2.2.2, 2.2.3, 3.1.3
4.4.8	Develop a 'bushcare' program which involves Council bush regeneration staff assisting Landcare groups.					
	Essential	$10,000 project	EL & G	Long	Com: CHRL	Obj. 1.1, 2.1, 2.2, 3.1 Strat. 1.1.1, 1.1.2, 2.1.1, 2.1.3, 2.2.2, 2.2.3

C4.5 Encouraging protection of biodiversity values on private land

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
4.5.1	Finalise and implement the Landowners Incentives Scheme for restoration of Coffs Harbour's Biodiversity Assets.					
	Essential	$15,000 project	EL & PEF	Short	Gov: OEH & NRCMA	Strat. 1.1.2, 1.2.1, 2.1.1, 2.1.3, 2.2.2, 2.2.3, 3.1.3
4.5.2	Encourage partnerships with the Northern Rivers CMA and Nature Conservation Trust to offer voluntary conservation agreements to private landholders. These would be offered through a range of mechanisms including OEH's Land for Wildlife and Conservation Partners Program.					
	High	No cost	Core & CHCC	Long	Gov: OEH & NRCMA	Strat. 1.1.2, 1.2.1, 2.1.1, 2.1.3, 2.2.2, 2.2.3, 3.1.3
4.5.3	Develop and implement an Incentives Plan to: (1) facilitate targeted application of conservation and biodiversity funds, (2) investigate the potential for biodiversity banking (Biobanking) and offsetting within the areas identified under the Biodiversity Assets spatial layer, (3) provide information on financial incentives to landowners.					
	Essential	$10,000 project	EL & PEF	Long	Gov: OEH & NRCMA	Strat. 1.1.2, 1.2.1, 2.1.1, 2.1.3, 2.2.2, 2.2.3, 3.1.3
4.5.4	Expand and implement the Jaliigirr Project.					
	Essential	$10,000 Project 2	EL, G & PEF	Short	Gov: OEH & NRCMA	Obj. 2.1, 2.2, 3.1, 3.2 Strat. 1.1.2, 2.1.1, 2.1.3, 2.1.5, 2.2.1, 2.2.2, 2.2.3, 3.1.2 3.1.3, 3.1.4

C5 PROTECTING THREATENED AND ENDANGERED SPECIES

Performance Criteria

- Protect threatened species, populations, communities and their habitats across the LGA.
- Improve knowledge of threatened species, their habitats and the issues that affect them.
- Support OEH threatened species recovery plans and programs.
- Develop appropriate management practices and policies to conserve threatened species and communities.

C5.1 Threatened species in general

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
5.1.1	Develop a field work program and undertake targeted threatened species surveys in priority Council Natural Areas.					
	Essential	$50,000 project	EL & G	Medium	Internal CHCC	Strat. 1.1.2, 1.2.1, 2.1.1, 2.1.3, 2.2.2, 2.2.3, 3.1.3
5.1.2	Use the new generation Class 5 vegetation spatial layers to refine Council's threatened ecological community mapping.					
	High	$20,000 project	EL & G	Short	Gov: OEH & NRCMA	Strat. 1.1.2, 1.2.1, 2.1.1, 2.1.3, 2.2.2, 2.2.3, 3.1.3
5.1.3	Integrate recovery planning priorities for all threatened species into Council's on-ground works programs.					
	High	$10,000 project	Core & CHCC	Medium	Internal CHCC	Strat. 1.1.2, 1.2.1, 2.1.1, 2.1.3, 2.2.2, 2.2.3, 3.1.3
5.1.4	Implement the Significant Roadside Vegetation Plan.					
	Essential	$15,000 annual	EL	Short	Internal CHCC	Strat 1.1.2, 1.2.1, 2.1.1, 2.1.3, 2.2.2, 2.2.3, 3.1.3
5.1.5	Develop a Council policy on in-situ management of threatened species and ecological communities.					
	Essential	$4,000 project	Core	Short	Internal CHCC Gov: OEH	Strat 1.1.2, 1.2.1, 2.1.1, 2.1.3, 2.2.2, 2.2.3, 3.1.3
5.1.6	Develop a standard condition and policy that requires submission of all threatened species records to the Atlas of NSW Wildlife identified under: (1) the development process, (2) Council internal operations.					
	Essential	$5,000 project	Core	Short	Internal CHCC Gov: OEH	Strat 1.1.2, 1.2.1, 2.1.1, 2.1.3, 2.2.2, 2.2.3, 3.1.3

C5.2 Mammals

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
5.2.1	Review the 1999 'Coffs Harbour City Comprehensive Koala Plan of Management' (CKPoM).					
	Essential	$200,000 project	EL	Short	Gov: OEH & DPI	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3
5.2.2	Endorse the reviewed CKPoM and ensure it is operational under SEPP 44.					
	Essential	$4,000 project	Core	Short	Gov: OEH & DPI	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3
5.2.3	Implement the revised Coffs Harbour CKPoM.					
	High	$50,000 annual	EL	Short	Internal CHCC	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3
5.2.4	Implement the Coffs Creek Flying-fox Camp Strategy and Vegetation Management Plan.					
	Essential	$50,000 project 2	EL & G	Short	Gov: OEH	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3
5.2.5	Implement the Woolgoolga Lake Flying-fox Camp Strategy and Vegetation Management Plan.					
	Essential	$65,000 project 2	EL & G	Short	Gov: OEH	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3
5.2.6	Develop a Council policy to manage temporary/seasonal flying-fox camps in Coffs Harbour.					
	Moderate	$2,000 project	Core	Medium	Gov: OEH	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3
5.2.7	Develop a regional strategy for the protection and restoration of flying-fox camps on the Mid North Coast.					
	Moderate	$10,000 project	FUNDED	Medium	Gov: OEH & Mid North Coast councils	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
5.2.8	Implement the 'Forests need flying-foxes' school programs in all primary schools in Coffs Harbour LGA.					
	High	$2,000 annual	EL	Short	Gov: OEH	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3
5.2.9	Develop a heat stress management plan for all the flying-fox maternity camps in Coffs Harbour LGA.					
	Essential	$5,000 project	EL & G	Short	Gov: OEH Com: WIRES	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3
5.2.10	Support research into the ecology of flying-fox camps and population dynamics in Coffs Harbour.					
	Moderate	$25,000 Project	EL & G	Medium	Education facilities	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3
5.2.11	Identify Coffs' 'Top 10' mammals for priority conservation and model their habitat requirements to improve decision making during the development application process.					
	High	$30,000 project	EL & G	Long	Gov: OEH	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3
5.2.12	Include the Top 10 within the Biodiversity Monitoring program.					
	High	$20,000 project	EL & G	Medium	Gov: OEH Com: WIRES	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3

C5.3 Birds

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
5.3.1	Identify Coffs' 'Top 10' birds for priority conservation and model their habitat requirements to improve decision making during the development application process.					
	High	$3,000 project	Core & CHCC	Long	Gov: OEH CH Community	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3
5.3.2	Include the Top 10 within the Biodiversity Monitoring program.					
	Moderate	$5,000 project	EL	Medium	Gov: OEH, DPI & NRCMA	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
5.3.3	Design and install interpretative and regulatory signage at Little Tern nesting sites.					
	Essential	$25,000 project	EL, G & PEF	Short	Gov: OEH	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3
5.3.4	Create a web-based information and guideline package for the Top 10 birds that includes: 1) school-based materials/activities, (2) information on conservation status and species information, (3) colony breeding reports, (4) Biodiversity Guidelines to increase consideration of conservation priority species.					
	High	$5,000 project	EL	Medium	Gov: OEH	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3
5.3.5	Develop a four-stage media program for the Little Terns each year: (1) prior to arrival, (2) in line with the installation of the fence, (3) mid-season update e.g. number of breeding pairs, (4) end of season report.					
	Essential	$500 annual	Core	Short	Gov: OEH	Obj. 2.1, 3.1 Strat. 1.1.2, 2.1.1, 2.1.3, 2.2.1, 2.2.3
5.3.6	Create a spatial layer/map of priority habitats for migratory seabirds.					
	High	$5,000 project	EL & G	Medium	Gov: OEH	Obj. 2.1, 3.1 Strat. 1.1.2, 2.1.1, 2.1.3, 2.2.1, 2.2.3
5.3.7	Develop an action plan for all migratory species which breed in Coffs Harbour LGA.					
	Moderate	$10,000 project	EL	Long	Gov: OEH & NRCMA	Obj. 2.1, 3.1 Strat. 1.1.2, 2.1.1, 2.1.3, 2.2.1, 2.2.3

C5.4 Frogs

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
5.4.1	Develop and implement a frog census program.					
	Essential	$25,000 project	EL	short	Gov: OEH & NRCMA	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3
5.4.2	Identify Coffs' 'Top 10' frog species for priority conservation and model their habitats requirements to improve decision making during the development application process.					
	High	$10,000 project	EL & G	Short	Gov: OEH & NRCMA	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
5.4.3	Include the Top 10 within the Biodiversity Monitoring program.					
	High	$5,000 project	EL, G & PEF	Medium	Gov: OEH	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3
5.4.4	Integrate performance standards for developments into the Development Control Plan that are based on threatened frogs and their habitat.					
	Essential	$4,000 project	Core	Short	Gov: OEH	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3
5.4.5	Develop a community education package including: (1) web-based material, (2) school program, (3) media program, (4) community survey, (5) census program.					
	High	$5,000 project	EL & G	Medium	Gov: OEH & NRCMA	Obj. 2.1, 3.1 Strat. 1.1.2, 2.1.1, 2.1.3, 2.2.1, 2.2.3

C5.5 Reptiles

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
5.5.1	Identify Coffs' 'Top 10' priority for conservation reptile species and model their habitats to improve consideration of them during the development process.					
	Essential	$10,000 project	EL & G	Short	Gov: OEH	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3
5.5.2	Include the Top 10 within the Biodiversity Monitoring program.					
	High	$5,000 project	EL, G & PEF	Medium	Gov: OEH	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3
5.5.3	Integrate performance standards for development into the Development Control Plan for threatened reptiles.					
	Essential	$4,000 project	Core	Short	Internal CHCC	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3
5.5.4	Develop a community education package including: (1) web-based material, (2) community survey (3) and reporting.					
	High	$5,000 project	EL	Medium	Gov: OEH & NRCMA	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3

C5.6 Plants

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
5.6.1	Identify Coffs' Top 10 threatened flora species and model their habitats to improve consideration during the development process.					
	Essential	$15,000 project	EL & G	Short	Gov: OEH	Obj. 2.1, 3.1 Strat. 1.1.2, 2.1.1, 2.1.3, 2.2.1, 2.2.3
5.6.2	Include the Top 10 within the Biodiversity Monitoring program.					
	High	$5,000 project	EL, G & PEF	Medium	Gov: OEH	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3
5.6.3	Create a predictive spatial layer of Top 10 flora habitats to improve Council operational considerations in environmentally sensitive areas.					
	High	$15,000 project	EL	Medium	Gov: OEH	Obj. 2.1, 3.1 Strat. 1.1.2, 2.1.1, 2.1.3, 2.2.1, 2.2.3
5.6.4	Develop a community education program including: (1) web-based material, (2) school programs to improve community knowledge on threatened flora in the Coffs Harbour LGA.					
	Moderate	$10,000 project	EL & G	Medium	Gov: OEH	Obj. 2.1, 3.1 Strat. 1.1.2, 2.1.1, 2.1.3, 2.2.1, 2.2.3
5.6.5	Develop a flora education/interpretation program with the North Coast Regional Botanic Garden, Coffs Harbour.					
	High	$5,000 annual	EL	Medium	Gov: OEH	Obj. 2.1, 3.1 Strat. 1.1.2, 2.1.1, 2.1.3, 2.2.1, 2.2.3
5.6.6	Integrate regional threatened flora/community restoration targets in the Coffs Harbour Bush Regeneration Strategy.					
	Essential	$500 project	Core & CHCC	Short	Internal CHCC	Obj. 2.1, 3.1 Strat. 1.1.2, 2.1.1, 2.1.3, 2.2.1, 2.2.3
5.6.7	Develop a seed collection/propagation project targeting selected threatened species to include in bush regeneration programs.					
	Essential	$5,000 annual	EL & G	Long	Internal CHCC	Obj. 2.1, 3.1 Strat. 1.1.2, 2.1.1, 2.1.3, 2.2.1, 2.2.3
5.6.8	Undertake threatened flora species propogation and re-introduction to public lands.					
	High	$5000 annual	EL & G	Medium	Internal CHCC	Obj. 2.1, 3.1 Strat. 1.1.2, 2.1.1, 2.1.3, 2.2.1, 2.2.3

C5.7 Threatened ecological communities (TECs)

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
5.7.1	Identify Coffs' Top 10 threatened ecological communities and model their habitats to improve consideration during the development process.					
	Essential	$15,000 project	EL & G	Short	Gov: OEH	Obj. 2.1, 3.1 Strat. 1.1.2, 2.1.1, 2.1.3, 2.2.1, 2.2.3
5.7.2	Include the Top 10 within the Biodiversity Monitoring program.					
	High	$5,000 project	EL, G & PEF	Medium	Gov: OEH	Obj. 2.1, 3.1 Strat. 2.1.1, 2.1.3, 2.2.3
5.7.3	Develop a photo reference monitoring program for Council reserves containing restored TECs.					
	Essential	$1,000 annual	Core & CHCC	Long	Internal CHCC	Obj. 2.1, 3.1 Strat. 1.1.2, 2.1.1, 2.1.3, 2.2.1, 2.2.3
5.7.4	Include increases in area of TECs as part of the Natural Area Bush Regeneration Strategy (CHCC in prep.) in the Biodiversity Monitoring program.					
	Essential	$5,000 project	Core & CHCC	Short	Internal CHCC	Obj. 2.1, 3.1 Strat. 1.1.2, 2.1.1, 2.1.3, 2.2.1, 2.2.3
5.7.5	Adopt a standard methodology of assessing and classifying wetlands in Coffs Harbour LGA.					
	High	$2,000 project	EL	Medium	Gov: NRCMA & Wetlandcare	Obj. 2.1, 3.1 Strat. 1.1.2, 2.1.1, 2.1.3, 2.2.1, 2.2.3
5.7.6	Prepare a submission to the Department of Planning and Infrastructure for the review of all SEPP 14 wetlands and SEPP 26 littoral rainforest areas.					
	High	$20,000 project	EL & G	Long	Gov: NRCMA, Wetlandcare, OEH & DPI	Obj. 2.1, 3.1 Strat. 1.1.2, 2.1.1, 2.1.3, 2.2.1, 2.2.3
5.7.7	Map the coastal floodplains in Coffs Harbour using terrain and soil data to improve the consideration of TECs during the development process.					
	Essential	$15,000 project	EL & G	Short	Gov: OEH	Obj .2.1, 3.1 Strat 1.1.2, 2.1.1, 2.1.3, 2.2.1, 2.2.3
5.7.8	Develop and implement restoration targets for EEC within the Bush Regeneration Strategy.					
	Essential	$30,000 annual	EL & G	Short	Gov: OEH	Obj .2.1, 3.1 Strat 1.1.2, 2.1.1, 2.1.3, 2.2.1, 2.2.3

C5.8 Research

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
5.8.1	Develop, implement and report on the biodiversity monitoring program, inclusive of all Top 10 species and communities, in accordance with the 2030 Key Environment Indicators.					
	Essential	$20,000 project	EL & G	Short	Gov: OEH	Obj. 2.1, 3.1 Strat. 1.1.2, 2.1.1, 2.1.3, 2.2.1, 2.2.3
5.8.2	Develop collaborative projects for the Top 10's to research ecology and species status in Coffs Harbour.					
	Moderate	$25,000 project 3	EL & G	Medium	Gov: OEH	Obj. 2.1, 3.1 Strat 1.1.2, 2.1.1, 2.1.3, 2.2.1, 2.2.3
5.8.3	Develop web-based reporting to integrate monitoring and species status reports – linking them clearly with threat mitigation and Council programs.					
	High	$5,000 project	Core	Long	Gov: OEH	Obj. 2.1, 3.1 Strat. 1.1.2, 2.1.1, 2.1.3, 2.2.1, 2.2.3

C6 CONTROLLING INVASIVE SPECIES

Performance Criteria

- Effectively manage and where possible eradicate pest species (both animal pests and weeds).
- Develop strategic weed control and management strategies for roadsides, parks and gardens, and other Council lands.
- Prevent and control the introduction of new pest animal and weed species to the region.
- Encourage community participation in reducing the impact of pest animal and weeds on biodiversity values.
- Maintain the genetic integrity of local native species.
- Effectively manage and where possible eradicate pest species.

C6.1 Weed management strategy

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
6.1.1	Implement Council's 'Roadside Weeds Strategy' identifying: (1) biodiversity values, (2) noxious, environmental and significant weed targets, (3) public education program.					
	High	$50,000 project	EL, G & WONS	Long	Com: NCWAC	Obj. 2.1, 2.2 Strat. 2.1.1, 2.1.3, 2.2.2, 2.2.3
6.1.2	Implement Council's Weeds Strategy and ensure it includes: (1) environmental weed targets, (2) urban and bushland targets, (3) private property education programs.					
	Essential	$10,000 project	Core & CHCC	Short	Internal CHCC	Obj. 2.1, 2.2 Strat. 2.1.1, 2.1.3, 2.2.2, 2.2.3
6.1.3	Develop and run three rural and rural-residential weed / land management workshops for landholders based on coastal catchment boundaries targeting upper catchment, ex-farmland and degraded lands.					
	High	$25,000 project	EL & G	Medium	Internal CHCC Gov: NRCMA, DPI & NCWAC	Obj. 2.1, 2.2 Strat. 2.1.1, 2.1.3, 2.2.2, 2.2.3
6.1.4	Develop and implement five operational plans targeting priority: (1) aquatic, (2) vine weeds, (3) new and emerging weeds, (4) woody weeds, (5) environmental weed priorities in the upper catchment systems.					
	Essential	$50,000 project 3	EL & G	Medium	Internal CHCC Gov: OEH & NRCMA	Obj. 2.1, 2.2 Strat. 2.1.1, 2.1.3, 2.2.2, 2.2.3

C6.2 Weeds

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
6.2.1	Integrate state and federal weed targets into operational planning including: (1) Bush Regeneration Strategy (in prep.), (2) reserve management plans, (3) National Weeds Week program, (4) Orara River Rehabilitation Strategy.					
	Essential	$5,000 project	Core & CHCC	Short	Internal CHCC Gov: NRCMA	Obj. 2.1, 2.2 Strat. 2.1.1, 2.1.3, 2.2.2, 2.2.3
6.2.2	Develop an education program which includes: (1) funding events over Weeds Week, (2) an urban weeds information booklet, (3) media including TV ads.					
	High	$5,000 annual	EL & G	Long	Internal CHCC Gov: NRCMA	Obj. 2.1, 2.2 Strat. 2.1.1, 2.1.3, 2.2.2, 2.2.3

C6.3 Vertebrate pest management strategy

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
6.3.1	Implement the Coffs Harbour 'Vertebrate Pest Management Strategy'.					
	Essential	$15,000 annual	EL	Short	Internal CHCC Gov: NRCMA	Obj. 2.1, 2.2 Strat. 2.1.1, 2.1.3, 2.2.2, 2.2.3
6.3.2	Implement biodiversity-linked programs in Council's 'Companion Animals Management Plan'.					
	High	$20,000 project	EL	Short	Internal CHCC Gov: NRCMA	Obj. 2.1, 2.2 Strat. 2.1.1, 2.1.3, 2.2.2, 2.2.3

C6.4 Council-managed lands

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
6.4.1	Develop a program to assess the vegetation condition, habitat values and connectivity of all Council-managed lands, including assessment of weed infestation levels, invasive species and resource availability.					
	Essential	$20,000 project	FUNDED	Short	Internal CHCC	Obj. 2.1, 2.2 Strat. 2.1.1, 2.1.3, 2.2.2, 2.2.3
6.4.2	Ensure the Natural Area Bush Regeneration Strategy (in prep.) incorporates: (1) a ranking system, (2) the level of community involvement in conservation works, (3) similar reservation systems under a common management unit, (4) naming of the reserve management units.					
	Essential	$20,000 project	FUNDED	Short	Internal CHCC	Obj. 2.1, 2.2 Strat. 2.1.1, 2.1.3, 2.2.2, 2.2.3

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
6.4.3	Develop a Council policy for ornamental (non-native) planting within the park land system.					
	High	$1,000 project	Core & CHCC	Short	Internal CHCC	Obj. 2.1, 2.2 Strat. 2.1.1, 2.1.3, 2.2.2, 2.2.3
6.4.4	Identify potential weed issues in Council's current street trees and plantings and develop/cost a program to systematically replace potential weed species.					
	High	$25,000 project	EL	Medium	Internal CHCC	Obj. 2.1, 2.2 Strat. 2.1.1, 2.1.3, 2.2.2, 2.2.3
6.4.5	Develop an enforcement policy and program for domestic animals in Council's Natural Area Reserve System.					
	Essential	$4,000 annual	Core & CHCC	Short	Internal CHCC	Obj. 2.1, 2.2 Strat. 2.1.1, 2.1.3, 2.2.2, 2.2.3

C6.5 Council staff training

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
6.5.1	Train operational staff in relevant aspects of weed identification (including potential new and emerging species), control and management, bush regeneration techniques and priorities species requiring mapping.					
	High	$5,000 project	Core & CHCC	Long	Internal CHCC	Obj. 2.1, 2.2, 3.1 Strat. 1.1.2, 2.1.1, 2.1.3, 2.2.1, 2.2.2, 2.2.3
6.5.2	Create and maintain a GIS database with up-to-date distribution and abundance mapping of all known and emerging weeds issues.					
	High	$20,000 project	EL	Long	Internal CHCC Gov: NRCMA	Obj. 2.1, 2.2, 3.1 Strat. 1.1.2, 2.1.1, 2.1.3, 2.2.1, 2.2.2, 2.2.3

C6.6 Community education

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
6.6.1	Develop biodiversity information sheets on the priority species in Coffs Harbour as identified by the weed and pest animals strategies					
	Essential	$10,000 project	EL & G	Medium	Internal CHCC Gov: NRCMA & DPI	Obj. 2.1, 2.2 Strat. 1.1.2, 2.1.1, 2.1.3, 2.2.2, 2.2.3
6.6.2	Develop a web-based reporting system for invasive species to allow community members to directly report species' location and impacts.					
	High	$2,000 project	Core	Long	Internal CHCC Gov: NRCMA & DPI	Obj. 2.1, 2.2 Strat. 2.1.1, 2.1.3, 2.2.2, 2.2.3

C7 ECOLOGICAL FIRE MANAGEMENT

Performance Criteria

- Ensure that fire management practices complement the conservation of biodiversity.
- Protect high value environments.

C7.1 Bushfire prone lands

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
7.1.1	Review bushfire prone lands maps using the new generation vegetation maps. This will update the notation system on properties.					
	Essential	$30,000 project	Core & CHCC	Short	Gov: NSWRFS	Strat. 2.1.1, 2.1.4
7.1.2	Develop a Biodiversity Information Sheet to deal with conflicts between Asset Protection Zone management and biodiversity issues.					
	High	$2,000 project	Core & CHCC	Short	Gov: NSWRFS	Strat. 2.1.1, 2.1.4

C7.2 Ecological burining

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
7.2.1	Create a spatial layer (database) to record fire history in Coffs Harbour's Natural Areas to better manage future fire risk.					
	High	$20,000 project	EL, G & PEF	Medium	Gov: NSWRFS, NSWFB Internal CHCC	Strat. 2.1.1, 2.1.4
7.2.2	Use the new vegetation maps to identify the location of ecological communities that have specific ecological burning requirements.					
	High	$10,000 project	Core & CHCC	Medium	Gov: NSWRFS, NSWFB & OEH Internal CHCC	Strat. 2.1.1, 2.1.4
7.2.3	Develop an ecological burn program for Council-managed lands incorporating fire history, vegetation information, hazard levels, and community consultation.					
	High	$30,000 project	EL	Medium	Gov: NSWRFS, NSWFB & OEH Internal CHCC	Strat. 2.1.1, 2.1.4

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
7.2.4	Improve the collection and management of data on fire incidents in Council-managed lands by specifying: (1) standards of data collection, (2) information storage processes, (3) communication between agencies.					
	Essential	$15,000 project	Core & CHCC	Short	Gov: NSWRFS, NSWFB & OEH Internal CHCC	Strat. 2.1.1, 2.1.4
7.2.5	Integrate an ecological burn program into the Bushfire Management Plan for the Coffs Harbour LGA.					
	Essential	$4,000 project	Core & CHCC	Long	Gov: NSWRFS & NSWFB Internal CHCC	Strat. 2.1.1, 2.1.4

C8 MAINTAINING HEALTHY CATCHMENTS

Performance Criteria

- Clean and healthy catchments and estuaries with enhanced habitat values.
- Contribute to:
  - the long-term ecological viability of freshwater, marine and estuarine systems including seagrasses, salt marshes and mangroves
  - the maintenance of marine and freshwater ecological processes and systems
  - the protection of marine and freshwater aquatic diversity
  - the reduction of water-based pollution.
- Maintain the integrity of ecosystem services provided by rivers, streams and wetlands.
- Reduce the area of land affected by land degradation.

C8.1 Catchment health

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
8.1.1	Develop biodiversity-based catchment health indicators that will allow changes to be effectively and quantitatively measured.					
	Essential	$10,000 project	EL & G	Medium	Gov: NRCMA & OEH	Obj. 2.2, 3.1 Strat. 2.1.1, 2.2.2, 3.1.2, 3.1.3
8.1.2	Develop a management program for degraded agricultural land which includes: (1) management through the development application process, (2) incentives program, (3) information, training and support for landowners.					
	High	$35,000 project	EL & PEF	Medium	Gov: NRCMA, DPI & OEH	Obj. 2.2, 3.1, Strat. 2.1.1, 2.2.2, 3.1.2, 3.1.3,
8.1.3	Complete an entire catchment assessment for 3 coastal plains, 2 midland hills, and 2 escarpment ranges landscape catchments to collect baseline data for monitoring programs.					
	Essential	$150,000 project 3	EL & G	Medium	Gov: NRCMA & OEH	Obj. 2.2, 3.1, Strat. 2.1.1, 2.2.2, 3.1.2, 3.1.3,
8.1.4	Develop 10 individual catchment target plans for high priority catchments to aid in strategic planning.					
	Essential	$10,000 annual	EL & G	Short	Gov: NRCMA & OEH	Obj. 2.2, 3.1, Strat. 2.1.1, 2.2.2, 3.1.2, 3.1.3,
8.1.5	Complete a river styles assessment for coastal river systems in the LGA.					
	High	$50,000 project	EL	Medium	Gov: NRCMA & OEH	Obj. 2.2, 3.1 Strat. 2.1.1, 2.2.2, 3.1.2, 3.1.3

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
8.1.6	Develop a catchment education program with North Coast Regional Botanic Garden.					
	Essential	$5,000 project	EL & G	Short	Gov: NRCMA & OEH	Obj. 2.2, 3.1 Strat. 2.1.1, 2.2.2, 3.1.2, 3.1.3

C8.2 Riparian lands

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
8.2.1	Review Council's management of the open drainage network using the revised stream order mapping layer.					
	Essential	$5,000 project	Core & CHCC	Medium	Gov: OW & Fisheries	Obj. 2.1, 2.2 Strat. 2.2.2, 3.1.1, 3.1.2, 3.1.3
8.2.2	Develop a system to implement and monitor Council operations in riparian lands.					
	High	$5,000 project	Core & CHCC	Short	Gov: OW & Fisheries	Obj. 2.1, 2.2 Strat. 2.2.2, 3.1.1, 3.1.2, 3.1.3
8.2.3	Develop river health monitoring targets for each landscape: coastal plains, midland hills and escarpment ranges.					
	Essential	$35,000 project	EL & G	Medium	Gov: NRCMA, OEH, OW & Fisheries	Obj. 2.2, 3.1 Strat. 2.1.1, 2.2.2, 3.1.2, 3.1.3,

C8.3 Estuary management

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
8.3.1	Support the implementation of all biodiversity actions in adopted estuary management plans.					
	Essential	$40,000 annual	EL & G	Short	Gov: NRCMA, OEH, OW, SIMP & Fisheries	Obj. 2.1, 2.2 Strat. 2.2.2, 3.1.1, 3.1.2, 3.1.3
8.3.2	Ensure all strategic planning requirements in individual estuary management plans inform development control planning and local environmental plans.					
	Moderate	$1,000 project	Core	Long	Gov: NRCMA, OEH, OW, SIMP & Fisheries	Obj. 2.1, 2.2 Strat. 2.2.2, 3.1.1, 3.1.2, 3.1.3

C9 IMPROVING OUR KNOWLEDGE AND UNDERSTANDING

Performance Criteria

- Compile information about the region's natural environment and ecological processes.
- Increase our understanding of the ecological systems and processes through scientific research, survey and monitoring.
- Improve identification and mapping of ecosystems, species distributions and high value environments.

C9.1 Planning

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
9.1.1	Finalise and adopt the new generation vegetation map for the LGA.					
	Essential	$50,000 project	EL	Medium	Gov: OEH	Strat. 1.1.1, 2.1.1, 2.2.2
9.1.2	Develop a data management system for all biodiversity-related datasets, including: (1) metadata, (2) tracking systems, (3) quarantine, (4) access, (5) storage, (6) process of review.					
	Essential	$10,000 project	Core & CHCC	Short	Internal CHCC	Strat. 1.1.1, 2.1.1, 2.2.2
9.1.3	Review Council's notification systems for high value environments to ensure the most current information is available for: (1) Section 149 Certificates, (2) public spatial data/mapping systems, (3) website information.					
	High	$5,000 project	Core	Medium	Internal CHCC	Strat. 1.1.1, 2.1.1, 2.2.2

C9.2 Conservation planning

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
9.2.1	Prepare a planning proposal to refine environmental zoning layers under the High Conservation Value Habitats (HCVH) Strategy adopted by Council.					
	Essential	$20,000 project	EL	Short	Gov: DPI & OEH	Strat. 1.1.1, 2.1.1, 2.2.2
9.2.2	Draft Biodiversity-related environmental components of the City Wide Development Control Plan in line with the changes implemented through the planning proposals.					
	Essential	$2,000 project	Core & CHCC	Short	Internal CHCC	Strat. 1.1.1, 2.1.1, 2.2.2

C9.3 Cooperative research, survey and monitoring

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
9.3.1	Pursue opportunities for collaborative research into the distribution and status of Coffs' Top 10's.					
	Essential	$15,000 annual	EL & G	Short	Gov: OEH, NRCMA & Wetlandcare	Obj. 3.1 Strat. 1.1.1, 2.1.1, 2.2.2
9.3.2	Update Council's biodiversity/conservation-based spatial information system quarterly: (1) assign responsible officers, (2) set clear policy and process for the review, (3) liaise with other agencies.					
	Essential	$1,000 project	Core & CHCC	Long	Internal CHCC	Obj. 3.1 Strat. 1.1.1, 2.1.1, 2.2.2

C9.4 Corporate biodiversity awareness

Action	Priority	Budget estimate	Funding source	Timeframe	Partnership	2030 Plan
9.4.1	Develop and implement an ongoing biodiversity awareness program focused on ensuring that Council staff are aware of the direction of the Biodiversity Action Strategy and the 2030 Environment targets.					
	High	$2,000 project	Core & CHCC	Short	Internal CHCC	Obj. 3.1 Strat. 1.1.1, 2.1.1, 2.2.2
9.4.2	Provide ongoing training in development assessment and compliance. Ensure all appropriate Council staff are trained in the use of Council's GIS data system and that this information is used during development assessment and Council operations.					
	High	$5,000 project	Core & CHCC	Medium	Internal CHCC	Obj. 3.1 Strat. 1.1.1, 2.1.1, 2.2.2
9.4.3	Develop a training package for new and existing staff (e.g. design engineers, plant operators etc.) to explain local policies and controls, and raise awareness of the LGA's unique biodiversity values.					
	High	$10,000 project	EL	Short	Internal CHCC	Obj. 3.1 Strat. 1.1.1, 2.1.1, 2.2.2
9.4.4	Audit, review and report on the implementation of the Biodiversity Action Strategy.					
	Essential	$3,000 project	EL & G	Short	Internal CHCC	Obj. 3.1
9.4.5	Undertake an audit of development approvals and Council civil works on at least an annual basis to ensure compliance with all biodiversity-based policy and assessment processes.					
	Essential	$2,000 project	Core	Medium	Internal CHCC	Strat. 1.1.1, 2.1.1, 2.2.2

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REFERENCES

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THIS IS A LOOKING AFTER OUR ENVIRONMENT PROJECT
Helping to achieve the 2030 Community Vision