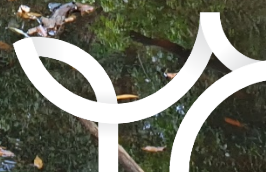


# Threatened Ecological Community and Ecological Assessment Report Raintree Bridge, Tinana Creek

## Forest Wind Project

*Report FWH-04  
Client: Forest Wind Holdings  
February 2020*



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DOCUMENT AUTHORISATION					
Revision		Rev. Date		Report Details	
-		23 January 2020		Draft report	
A		21 February 2020		Final	
Prepared By		Reviewed By		Authorised By	
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## 1 INTRODUCTION

Fox & Co Environmental Pty Ltd (Fox & Co) undertook an assessment of a potential *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed Threatened Ecological Community (TEC) occurring along Tinana Creek in the area of a proposed crossing at Raintree Bridge. The area immediately upstream and downstream of the existing Raintree Bridge was assessed and herein referred to as the Study Area.

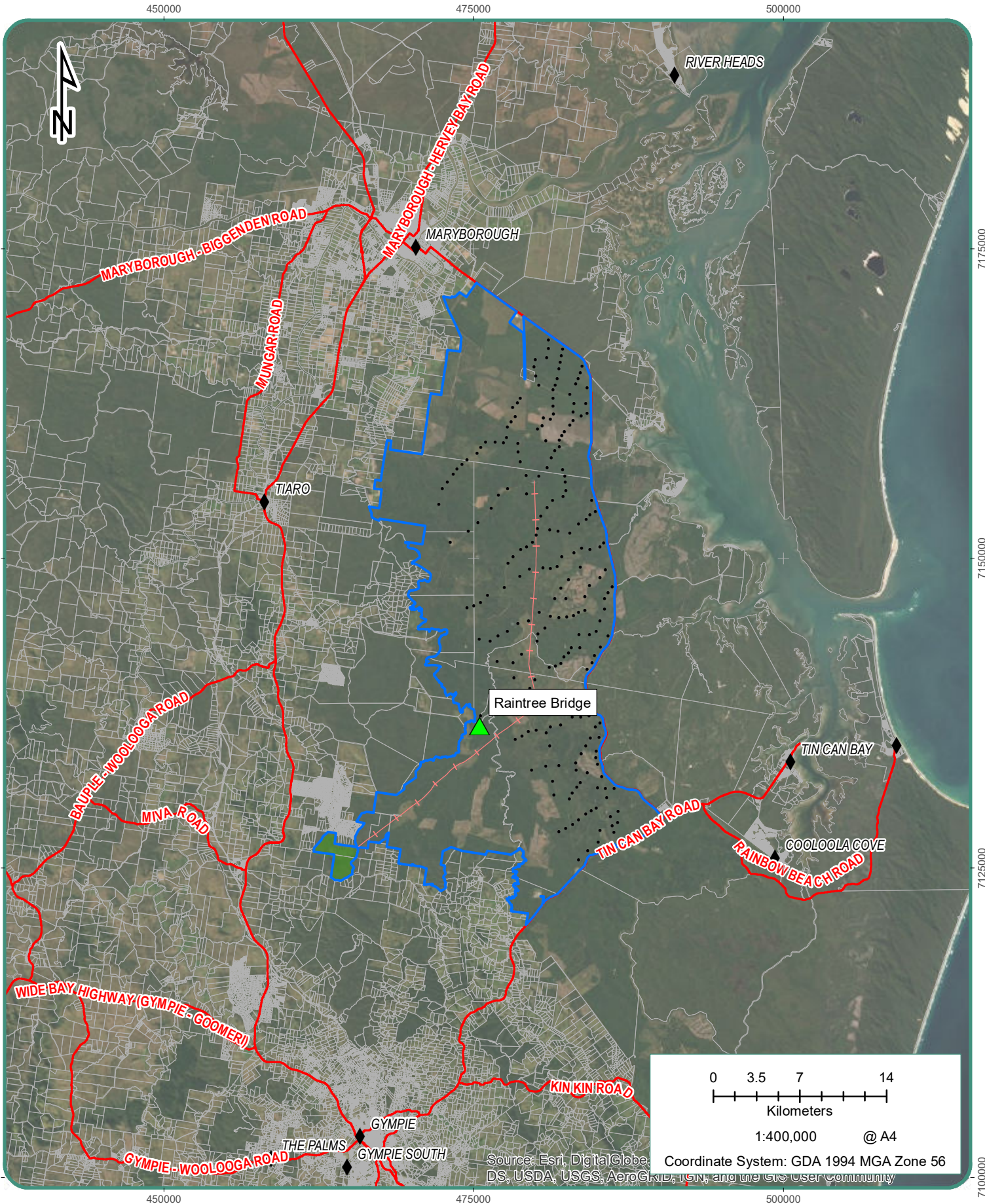
Tinana Creek runs through the south western portion of the Project Area (Plantation Licence Area (PLA)) and then runs north along the western boundary of the Project Area PLA. Scrubber Creek, Sandy Creek and Coondoo Creek run into Tinana Creek in the south western portion of the Project Area PLA.

The TEC is described as Lowland Rainforest of Subtropical Australia which is listed as Critically Endangered (CE) under the EPBC Act.

A concurrent aquatic assessment was undertaken to determine whether threatened species or habitat likely to support threatened species listed under the EPBC Act and/or *Nature Conservation Act 1994* (Qld) (NC Act) was present.

The existing Raintree Bridge is located on Tinana Creek. The location of the existing bridge is shown on **Figure 1**.

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**TITLE:**  
**Study Area and Regional Context**

**MAP NO:** Figure 1

**PROJECT:** Forest Wind Holdings Pty Ltd - Raintree Bridge Survey

**LEGEND**

- ▲ Raintree Bridge
- ◆ Populated places
- Nominated wind turbine
- High voltage transmission line
- Property boundaries
- Project Area (Plantation Licence Area (PLA))
- Native state forest

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Date: 23/02/2020

Data Source:  
 © State of Queensland (Department of Natural Resources, Mines and Energy) 2019.

## 2 METHOD

Vegetation surveys were undertaken on 9<sup>th</sup> January 2020 within approximately 50 m upstream and downstream of the existing bridge and also across the different vegetation communities. The mapped REs over the subject lot were verified in accordance with a Quaternary level CORVEG assessment (Neldner et al. 2019). Quaternary level assessments are plotless and record the dominant species in the Ecologically Dominant Layer (EDL) and other strata. Height and canopy cover are usually estimated rather than measured. Additional protected plants surveys were undertaken in accordance with the *Flora Survey Guidelines – Protected Plants V2.01* (DES, 2019). Refer to **Figure 2** for the survey area and survey track log which was approximately 120 m along Tinana Creek and 140 m wide from the non-remnant (pine plantation) through the vegetation units in the remnant area.

The EPBC Act listed TEC assessment was undertaken with reference to *Advice to the Minister for Sustainability, Environment, Water, Population and Communities from the Threatened Species Scientific Committee (the Committee) on an Amendment to the List of Threatened Ecological Communities under the EPBC Act* (EPBC Act listing advice).

Aquatic surveys were undertaken in accordance with *Survey Guidelines for Australia's Threatened Fish, 2011, Department of Sustainability, Environment, Water, Population and Communities* (DSEWPC, 2011).

### 2.1 TEC Field Survey

#### 2.1.1 TEC Classification Method

The field data collected was interpreted against the key diagnostic characteristics of the listed TEC which is provided in the EPBC Act listing advice, and include the following:

- Distribution of the ecological community is primarily in the New South Wales (NSW) North Coast and South Eastern Queensland bioregions, according to Interim Biogeographic Regionalisation for Australia (IBRA) version 7 (IBRA7).
- The ecological community occurs on: soils derived from basalt or alluvium; or enriched rhyolitic soils; or basaltically enriched metasediments.
- The ecological community generally occurs at an altitude less than 300 m above sea level.
- The ecological community typically occurs in areas with high annual rainfall (>1300 mm).
- The ecological community is typically more than 2 km inland from the coast.
- The structure of the ecological community is typically a tall (20 m–30 m) closed forest, often with multiple canopy layers.
- Patches of the ecological community typically have high species richness (at least 30 woody species from the EPBC Act listing advice).

The EPBC Act listed Lowland Rainforest of Subtropical Australia TEC comprises those patches that meet the key diagnostic characteristics (above) and the condition thresholds in Table 1 below. The area around the existing bridge was compared against both the key diagnostic characteristics and the condition thresholds.

**Table 1 Lowland Rainforest of Subtropical Australia Condition Thresholds**

<b>Patch Type</b>	<b>A</b>	<b>B</b>	<b>C</b>
(evidence of remnant vegetation & regeneration status)	Natural remnant evident by the persistence of mature residual trees from <u>Appendix B (of the EPBC Act listing advice)</u> .	Some residual trees from <u>Appendix B (of the EPBC Act listing advice)</u> are present plus evidence of either; natural regeneration <sup>*1</sup>  <b>AND/OR</b> regeneration with active management <sup>*2</sup>	A non-remnant patch that has recovered through a) natural regeneration <sup>*1</sup>  <b>AND/OR</b> b) supplementary planting that has stature and quality that is reflective of the “Description” <sup>*3</sup>  <b>AND</b>
<b>Patch Size</b> (excludes buffer zone)	≥ 0.1 ha <b>AND</b>	≥ 1 ha <b>AND</b>	≥ 2 ha <b>AND</b>
<b>Canopy Cover</b> (over entire patch) <sup>*4</sup>	Emergent/canopy/subcanopy <sup>*4</sup> cover is ≥70% <b>AND</b>		
<b>Species Richness</b> (over entire patch)	contains ≥40 native woody species <sup>*5</sup> from Appendix A ( <u>of the EPBC Act listing advice</u> ) <b>AND</b>	contains ≥30 native woody species <sup>*5</sup> from Appendix A ( <u>of the EPBC Act listing advice</u> ) <b>AND</b>	
<b>Percent of total vegetation cover that is native</b> <sup>*6</sup> (use sample plot)	≥70% of vegetation <sup>*6</sup> is native	≥50% of vegetation <sup>*6</sup> is native	
<b>Notes:</b> <sup>*1</sup> Evidence of natural regeneration is shown by the presence of seedlings of a range of native species that did not originate through deliberate plantings. <sup>*2</sup> A patch that is actively managed has regular (e.g. every 1–2 years) on the ground human regenerative activity such as weed control or supplementary plantings. <sup>*3</sup> Closed canopy, 20–30 m tall, of representative species (e.g. white booyong, hoop pine, figs, brush box, yellow carabeen, red cedar, rosewood, white beech) <sup>*4</sup> Canopy cover (projective foliage cover) is estimated over the entire patch. When assessing the ecological community, the canopy includes the emergents and subcanopy (everything above 10 m tall). Canopy/sub-canopy includes all trees and vines (native and non-native). <sup>*5</sup> Woody species are trees, shrubs or vines that contain wood or wood fibres that consist mainly of hard lignified tissues. Excluded from woody species are graminoids, other herbs and non-woody vines. <sup>*6</sup> Total vegetation cover includes emergents/canopy/subcanopy and understorey and ground layers.			

## **2.2 Aquatic Field Survey**

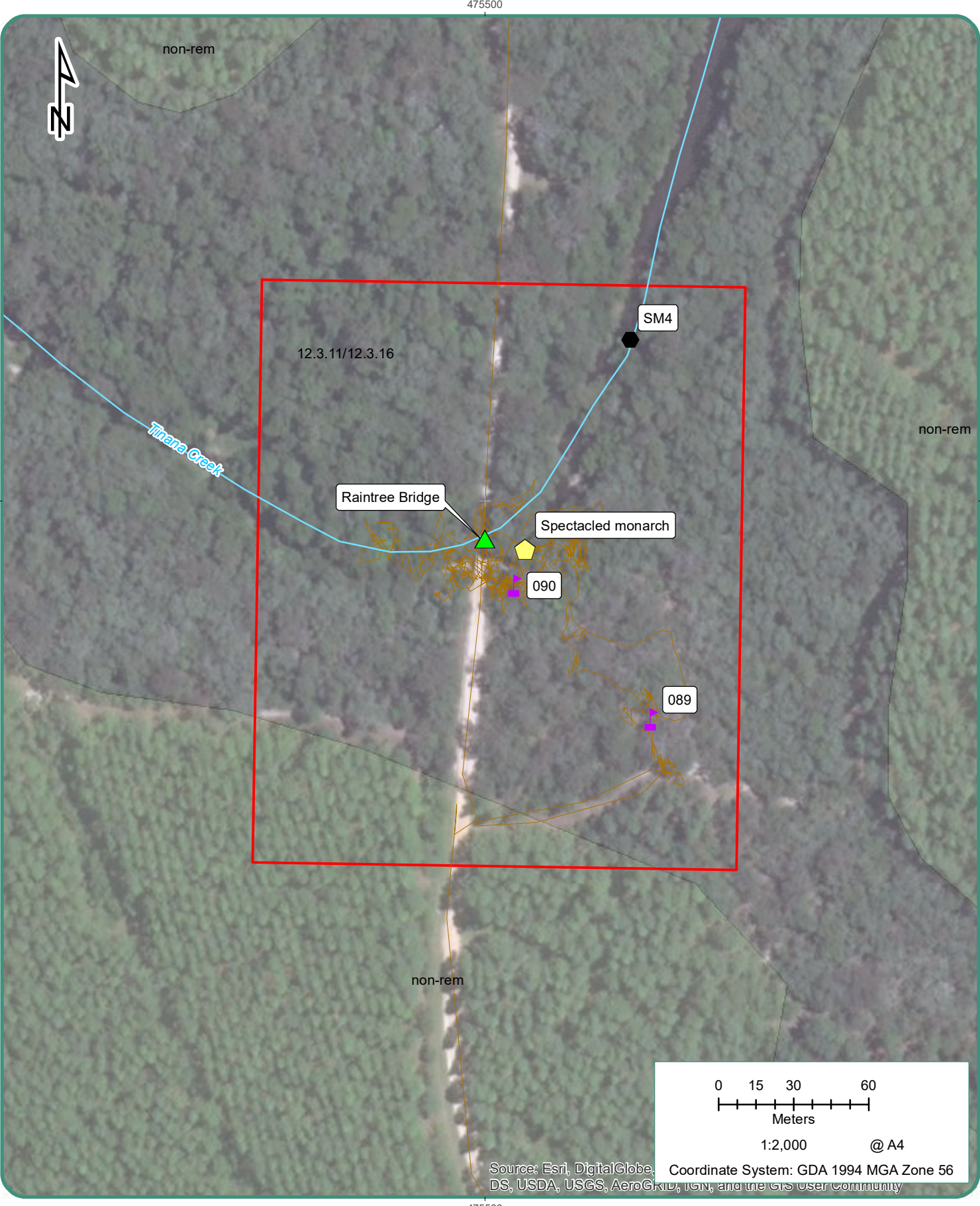
Dip netting was undertaken in the pools and riffles beneath Raintree Bridge and also the pools and riffles 50 m upstream and 50 m downstream of Raintree Bridge. Water quality measurements (pH, electrical conductivity and temperature) were taken, and observations were undertaken from the bank for signs of aquatic activity such as swirls or turtle / platypus movements.

Habitat assessments were undertaken to describe fauna habitats including their potential suitability for conservation significant species listed under the EPBC Act and NC Act. This involved collecting information such as structural complexity of instream and riparian habitat, sources of disturbance and any characteristics specific to the target conservation significant species identified by the desktop assessments.

A Songmeter (SM4) was deployed approximately 50 m upstream from Raintree Bridge on Tinana Creek during the ecological surveys over the Project Area PLA. The Songmeter was deployed for 5 nights during the period 27/02/2019 to 4/03/2019. The SM4 records acoustic sounds such as frogs, birds and flying-foxes.



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**TITLE:**

# Tinana Creek Survey Locations

**MAP NO:** Figure 2

**PROJECT:** Forest Wind Holdings Pty Ltd - Raintree Bridge Survey

**LEGEND**

	Acoustic recorder		Track log
	Survey locations		TEC survey area
	Spectacled monarch	<b>Regional ecosystems v11</b>	
	Raintree Bridge		Endangered - Sub-dominant
	Watercourse		Non-remnant, regrowth, disturbed



Date: 24/02/2020

Data Source:  
© State of Queensland (Department of Natural Resources, Mines and Energy) 2019.

### 3 RESULTS

#### 3.1 Desktop Results

##### 3.1.1 Lowland Rainforest of Subtropical Australia

All or part of the following equivalent state vegetation classifications and ecological communities are representative of the national Lowland Rainforest TEC where the requirements of the Regional Ecosystem (RE) description, key diagnostic characteristics and condition thresholds are met. Lowland Rainforest is not limited to these state equivalents.

*Qld Regional Ecosystems:*

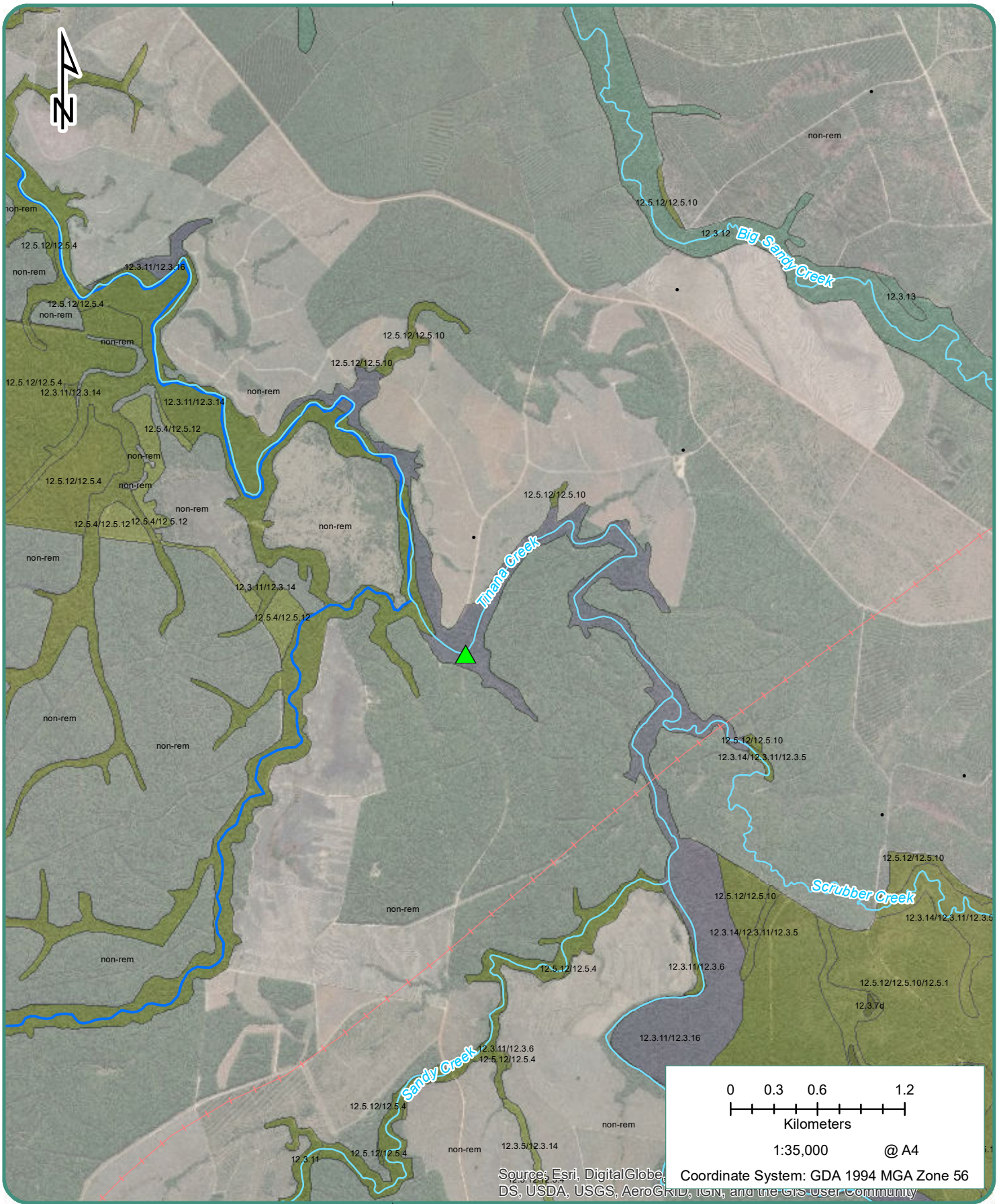
- 12.3.1 Complex to simple notophyll vine forest- Gallery rainforest (notophyll vine forest) on alluvial plains (VMA Class: endangered)
  - Note: RE 12.3.16 and RE 12.3.17 (which are mapped within the Project Area PLA) were both previously mapped as 12.3.1 prior to updated RE mapping.
- 12.5.13 Microphyll to notophyll vine forest +/- *Araucaria cunninghamii* (endangered)
- 12.8.3 Complex notophyll vine forest – complex notophyll vine forest on Cainozoic igneous rocks (no concern at present)
- 12.8.4 Complex notophyll vine forest with *Araucaria* spp. on Cainozoic igneous rocks (no concern at present)
- 12.8.13 Araucarian complex microphyll vine forest on Cainozoic igneous rocks (of concern)
- 12.11.1 Simple notophyll vine forest often with abundant *Archontophoenix cunninghamiana* (“gully vine forest”) on metamorphics +/- interbedded volcanics (no concern at present)
- 12.11.10 Notophyll vine forest +/- *Araucaria cunninghamii* on metamorphics +/- interbedded volcanics (no concern at present)
- 12.12.1 Simple notophyll vine forest usually with abundant *Archontophoenix cunninghamiana* (“gully vine forest”) on Mesozoic to Proterozoic igneous rocks (of concern)
- 12.12.16 Notophyll vine forest on Mesozoic to Proterozoic igneous rocks (no concern at present)

Surface geology in proximity of Raintree Bridge is mapped as Quaternary Alluvium (QA), which equates to land zone 3. RE mapping over portions of Tinana Creek within the Project Area PLA describe the RE as 12.3.11/12.3.16 or 12.3.5/12.3.17. The mapping in the portion of Raintree Bridge where it crosses Tinana Creek is mapped as 12.3.11/12.3.16.

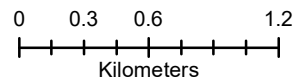
RE 12.3.16 is described as *Complex notophyll to microphyll vine forest on alluvial plains* and is endangered under the *Vegetation Management Act 1999* (VM Act). RE 12.3.17 is described as *Simple notophyll fringing forest usually dominated by Waterhousea floribunda* which is Of Concern under the VM Act, however has a Biodiversity Status (BD-Status) of endangered under the *Environmental Protection Act 1994* (EP Act).

Both RE 12.3.16 and 12.3.17 fit the RE description of a representative community of the EPBC Act listed TEC, Lowland Rainforest of Subtropical Australia (*12.3.1 Complex to simple notophyll vine forest- Gallery rainforest (notophyll vine forest) on alluvial plains* (endangered)). RE 12.3.16 and RE 12.3.17 were both previously mapped as 12.3.1 prior to RE mapping changes. According to the Regional Ecosystem Description Database (Queensland Herbarium, 2019) RE 12.3.1 has now been split into 12.3.1a, 12.3.16, 12.3.17 and 12.3.21

**Figure 3** shows the RE along Tinana Creek within the Project Area (PLA).



Source: Esri, DigitalGlobe, GeoEye, IGN, AerGRID, USDA, USGS, AeroGRID, IGN, and the GIS User Community  
 Coordinate System: GDA 1994 MGA Zone 56



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**TITLE:**

# Tinana Creek Regional Ecosystems

**MAP NO:** Figure 3

**PROJECT:** Forest Wind Holdings Pty Ltd - Raintree Bridge Survey

**LEGEND**

- Raintree Bridge
- Populated places
- Nominated wind turbine
- Watercourse
- High voltage transmission line
- Project Area (Plantation Licence Area (PLA))
- Native state forest

**Regional ecosystems v11**

- Endangered - Sub-dominant
- Of Concern - Dominant
- Of Concern - Sub-dominant
- No concern at present
- Non-remnant, regrowth, disturbed



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### 3.1.2 Terrestrial and Aquatic Flora and Fauna

The Mary River Catchment Coordinating Committee has been undertaking long-term baseline surface water quality monitoring and reporting across the region. The monitoring includes Tinana Creek and other tributaries of Tinana Creek within Toolara State Forest.

These creeks typically have low dissolved oxygen, slightly acidic tannin stained waters and high electrical conductivity (Gympie Region Waterwatch Report 2016 – 2018, Mary River Catchment Coordinating Committee, October 2018).

Previous reports have identified the likelihood of occurrence of the following threatened aquatic fauna and flora (Ecological Assessment Report, Fox & Co, 2019). Threatened flora and fauna that have the potential to occur in or along Tinana Creek within the Project Area PLA are provided in Table 2. Further assessment is provided in Section 4 regarding the likelihood of occurrence of these species associated with the water and riparian areas around Raintree Bridge.

**Table 2 Threatened Fauna and Flora Species Potentially Occurring in Proximity to Tinana Creek within the Project Area PLA**

Scientific Name	Common Name	EPBC Act <sup>1</sup>	NC Act <sup>2</sup>	GRC <sup>3</sup>
<b>Reptiles</b>				
<i>Elseya albagula</i>	Southern (white-throated) snapping turtle	CE	E	-
<i>Elusor macrurus</i>	Mary River Turtle	E	E	-
<b>Amphibians</b>				
<i>Adelotus brevis</i>	Tusked Frog	-	V	-
<i>Mixophyes iteratus</i>	Giant Barred Frog	E	E	-
<b>Mammals</b>				
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	-	-
<i>Phascolarctos cinereus</i>	Koala	V	V	LPS
<i>Ornithorhynchus anatinus</i>	Platypus	-	SLC	LPS
<b>Fish</b>				
<i>Maccullochella mariensis</i>	Mary River cod	E	-	LPS
<i>Nannoperca oxleyana</i>	Oxleyan Pygmy Perch	E	V	-
<i>Neoceratodus forsteri</i>	Australian lungfish	V	protected species under the <i>Qld Fish and Oyster Act 1914</i>	-
<i>Pseudomugil mellis</i>	Honey Blue Eye	V	V	-
<b>Crustaceans</b>				
<i>Tenuibranchiurus glypticus</i>	Swamp crayfish	-	E	
<b>Flora</b>				
<i>Boronia rivularis</i>	Wide Bay boronia	-	NT	
<i>Fontainea rostrata</i>	-	V	V	
<i>Macadamia</i>	Macadamia nut	V	V	

Scientific Name	Common Name	EPBC Act <sup>1</sup>	NC Act <sup>2</sup>	GRC <sup>3</sup>
<i>integrifolia</i>				
<i>Samadera bidwillii</i>	Quassia	V	V	
<i>Xanthostemon oppositifolius</i>	Southern Penda	V	V	

<sup>1</sup> – EPBC Act: CE – Critically endangered, E – Endangered, V – Vulnerable, (–) Not Listed

<sup>2</sup> – NC Act - E – Endangered, V – Vulnerable, SLC – Special Least Concern, NT – Near Threatened, (–) Least Concern

<sup>3</sup> – Gympie Regional Council Local Priority Species (LPS)

## 3.2 Field Survey Results

### 3.2.1 Vegetation and Flora

The vegetation community along Tinana Creek in proximity to Raintree Bridge was identified as a notophyll vine forest characterised by *Waterhousea floribunda*, *Syzygium austral* and *Castanospermum australe*. Based on the vegetation community, geology, land form and soils, this area equates to RE 12.3.17, which is described as *Simple notophyll fringing forest usually dominated by Waterhousea floribunda*. This RE is classed as Of Concern under the VM Act and Endangered under the EP Act.

RE 12.3.17 is analogous to the EPBC Act listed Lowland Rainforest of Subtropical Australia. The vegetation assessed does not meet all of the key diagnostic characteristics of the listed community (Table 3).

**Table 3 Key Diagnostic Characteristics of the listed TEC**

Key Diagnostic	Assessment
Distribution of the ecological community is primarily in the NSW North Coast and South Eastern Queensland bioregions, according to Interim Biogeographic Regionalisation for Australia (IBRA) version 6.1 (2004)	Yes. Study area occurs within the South Eastern Queensland bioregion and is within the known geographic distribution of this ecological community.
The ecological community occurs on: soils derived from basalt or alluvium; or enriched rhyolitic soils; or basaltically enriched metasediments.	Yes. Surface geology mapped as alluvium, which equates to land zone 3 in the RE framework.
The ecological community generally occurs at an altitude less than 300 m above sea level	Yes. Altitude less than 300 m
The ecological community typically occurs in areas with high annual rainfall (>1300mm)	Possible. Data received from Tuan State Forest weather station over a 2 year period indicate 1,180.4 mm of rainfall in 2016 and 1,230 mm of rainfall in 2017.
The ecological community is typically more than 2 km inland from the coast	Yes. The study area is more than 2 km from the coast
The structure of the ecological community is typically a tall (20 m–30 m) closed forest, often with multiple canopy layers	Marginal. The height of the canopy was a maximum of 20 m.
Patches of the ecological community typically have high species richness (at least 30 woody species from Appendix A).	No. 11 native woody species were identified.

The vegetation assessed at the existing Raintree Bridge crossing does not meet the key diagnostic species richness threshold (at least 30 woody species) with only 11 native woody species from Appendix A of the listing advice recorded during the survey.

**Table 4 Lowland Rainforest of Subtropical Australia Condition Thresholds and Evaluation**

Patch Type (evidence of remnant vegetation & regeneration status)	A	B	C	Assessment of TEC
		Natural remnant evident by the persistence of mature residual trees from <u>Appendix B (of the EPBC Act listing advice)</u> .	Some residual trees from <u>Appendix B (of the EPBC Act listing advice)</u> are present plus evidence of either; natural regeneration* <sup>1</sup> <b>AND/OR</b> regeneration with active management* <sup>2</sup>	A non-remnant patch that has recovered through c) natural regeneration* <sup>1</sup> <b>AND/ OR</b> d) supplementary planting that has stature and quality that is reflective of the „Description“ * <sup>3</sup>
<b>Patch Size</b> (excludes buffer zone)	≥ 0.1 ha <b>AND</b>	≥ 1 ha <b>AND</b>	≥ 2 ha <b>AND</b>	<b>Patch size is a long, narrow, fairly continuous patch along Tinana Creek. Study area assessed was &gt;0.1ha.</b>
<b>Canopy Cover</b> (over entire patch)* <sup>4</sup>	Emergent/canopy/subcanopy* <sup>4</sup> cover is ≥ 70% <b>AND</b>			<b>Canopy cover is over 70% (medium to dense)</b>
<b>Species Richness</b> (over entire patch)	contains ≥40 native woody species* <sup>5</sup> from Appendix A ( <u>of the EPBC Act listing advice</u> ) <b>AND</b>	contains ≥30 native woody species* <sup>5</sup> from Appendix A ( <u>of the EPBC Act listing advice</u> ) <b>AND</b>		<b>No.</b> <b>11 woody native species identified.</b>
<b>Percent of total vegetation cover that is native</b> * <sup>6</sup> (use sample plot)	≥70% of vegetation * <sup>6</sup> is native	≥50% of vegetation * <sup>6</sup> is native		<b>Yes. 83% of the vegetation is native</b>

<p><b>Notes:</b></p> <p>*<sup>1</sup> Evidence of natural regeneration is shown by the presence of seedlings of a range of native species that did not originate through deliberate plantings.</p> <p>*<sup>2</sup> A patch that is actively managed has regular (e.g. every 1–2 years) on the ground human regenerative activity such as weed control or supplementary plantings.</p> <p>*<sup>3</sup> Closed canopy, 20–30 m tall, of representative species (e.g. white booyong, hoop pine, figs, brush box, yellow carabeen, red cedar, rosewood, white beech)</p> <p>*<sup>4</sup> Canopy cover (projective foliage cover) is estimated over the entire patch. When assessing the ecological community, the canopy includes the emergents and subcanopy (everything above 10 m tall). Canopy/sub-canopy includes all trees and vines (native and non-native).</p> <p>*<sup>5</sup> Woody species are trees, shrubs or vines that contain wood or wood fibres that consist mainly of hard lignified tissues. Excluded from woody species are graminoids, other herbs and non-woody vines.</p> <p>*<sup>6</sup> Total vegetation cover includes emergents/canopy/subcanopy and understorey and ground layers.</p>	
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No threatened flora species were identified during the survey. Refer Appendix A for field survey results.

### 3.2.2 Fauna

No threatened fauna species were identified during the survey. Habitat exists along Tinana Creek for the threatened species below, however the areas immediately adjacent to and beneath Raintree Bridge are not considered core habitat or breeding habitat for any of the threatened species listed in Table 5.

A solitary Eastern Horseshoe Bat (*Rhinolophus megaphyllus*) was observed roosting under the bridge. A colony of microbats was also observed in the existing log sleepers, however positive identification could not be made as they were deep in the crevice. It is considered likely the colony is also Eastern Horseshoe Bats given the habitat, previous records within the Project Area (PLA) (from the microbat recordings) and identification of the solitary horseshoe bat. Eastern Horseshoe Bats are not a listed threatened species under the EPBC Act or NC Act.

A pair of spectacled monarchs (*Symposiarchus trivirgatus*) (EPBC Act – Listed Marine, Migratory Terrestrial) were observed in the understory along Tinana Creek within the vine forest. Spectacled monarchs are a vertebrate species that commonly occur in Lowland Rainforest of Subtropical Australia TEC (Table 1 from TEC Listing Advice). Brown cuckoo-doves (*Macropygia amboinensis*) and Lewin's honeyeater (*Meliphaga lewinii*) were also observed during the survey below canopy height. They are also associated with lowland rainforest (TEC Listing Advice). Brown cuckoo-doves and Lewin's honeyeaters are common Least Concern bird species and are also found in a variety of other habitats.



**Table 5 Threatened Fauna and Flora Species and Habitat Assessment in Relation to Raintree Bridge and Tinana Creek**

Species	Habitat Preference	Site Observations and Assessment	
		Study Area – Raintree Bridge	Tinana Creek
Southern (white-throated) snapping turtle <i>Elseya albagula</i> EPBC Act – CE NC Act - E	Found only in Queensland in the Fitzroy, Mary and Burnett Rivers and associated smaller drainages in south eastern Queensland. It prefers permanent flowing water habitats where there are suitable shelters and refuges (e.g. fallen trees). White throated snapping turtles do occur in non-flowing waters, but typically at much reduced densities (Conservation Advice, 2014)	There is a lack of suitable shelter and refuges (fallen trees) immediately beneath and adjacent to Raintree Bridge.  No suitable habitat immediately beneath and adjacent to Raintree Bridge.	Suitable habitat occurs in Tinana Creek.
Mary River Turtle <i>Elusor macrurus</i> EPBC Act – E NC Act - E	Restricted to permanent flowing streams and large pool habitats of the Mary River catchment.	There is a lack of suitable habitat (large pools) immediately beneath and adjacent to Raintree Bridge.	Suitable habitat occurs in Tinana Creek.
<b>Amphibians</b>			
Tusked Frog <i>Adelotus brevis</i> EPBC Act – not listed NC Act - V	Breeds in ponds and slow-moving sections of streams in rainforests, wet sclerophyll forests and, less commonly, dry open forest. Usually is found under logs, stones or leaf litter near puddles, creeks and ponds  The call is a slow "cluck" repeated several times a minute (Curtis & Dennis, 2012).	Lack of suitable habitat immediately beneath and adjacent to Raintree Bridge.	Suitable habitat occurs in Tinana Creek.
Giant Barred Frog <i>Mixophyes iteratus</i>	In south-eastern Queensland, the Giant Barred Frog is known from Doongul Creek in the Burrum River catchment, at scattered locations in the	Not recorded during the survey in the location of Raintree Bridge.  Not recorded on the SM4 Songmeter	Suitable habitat occurs in Tinana Creek.

Species	Habitat Preference	Site Observations and Assessment	
		Study Area – Raintree Bridge	Tinana Creek
EPBC Act – E NC Act - E	Mary River catchment downstream to Kenilworth, the Upper Stanley River, Caboolture River and Coomera River. Occurs along shallow rocky streams in rainforest, wet sclerophyll forest and farmland between 100 and 1000m or deep, slow moving streams with steep banks in lowland areas. Rainforests, Antarctic beech or wet sclerophyll forests with rainforest understorey.	deployed approximately 50m upstream between 27/2/2019 and 4/3/2019.	
<b>Mammals</b>			
Grey-headed Flying-fox <i>Pteropus poliocephalus</i> EPBC Act – V NC Act – not listed	A canopy-feeding frugivore and nectarivore, which utilises vegetation communities including rainforests, open forests, closed and open woodlands, <i>Melaleuca</i> swamps and <i>Banksia</i> woodlands (DoEE, 2019). Roost sites are typically located near water, such as lakes, rivers or the coast.	No calls recorded on the SM4 Songmeter deployed approximately 50m upstream between 27/2/2019 and 4/3/2019.	Suitable feeding habitat exists along Tinana Creek.  No known camps in the Project Area PLA. No camps or individuals observed along Tinana Creek.
Koala <i>Phascolarctos cinereus</i> EPBC Act – V NC Act – V	Scattered populations throughout Qld, including moist forests in coastal areas, subhumid woodlands in southern and central regions, and along watercourses in semiarid eucalypt forested landscapes in the west. May also be found along non-riverine communities in semi-arid areas. Preferred habitat includes a range of temperate, sub-tropical and tropical forest, woodlands and semiarid vegetation types dominated by eucalyptus species. Also known to be limited to altitudes <800 m ASL and may be affected by temperature and	May occur in remnant patches along waterway corridors where suitable habitat occurs (provided suitable connectivity). May utilise creek lines such as Tinana Creek for movement corridors within remnant vegetation.	May occur in remnant patches along waterway corridors where suitable habitat occurs (provided suitable connectivity). May utilise creek lines such as Tinana Creek for movement corridors within remnant vegetation.

Species	Habitat Preference	Site Observations and Assessment	
		Study Area – Raintree Bridge	Tinana Creek
	leaf moisture in the western and northern parts of its range (Department of the Environment, 2014d).		
Platypus <i>Ornithorhynchus anatinus</i>  EPBC Act – not listed NC Act – SLC GRC – LPS	Platypus occur in freshwater systems from tropical rainforest lowlands and plateaus of far northern Queensland to cold, high altitudes of Tasmania and the Australian Alps. They feed in both slow-moving and rapid (riffle) parts of streams, but show preference to coarser bottom substrates, particularly cobbles and gravel. The individuals use rocky crevices and stream debris as shelters, or they burrow under the roots of vegetation near the stream. Favoured habitat for the species includes a river or a stream with earth banks and native vegetation that provides shading of the stream and cover near the bank (Australian Museum, 2019).	None observed during survey. No suitable burrowing habitat immediately beneath or adjacent to Raintree Bridge due to rock fill or flat banks.	Suitable habitat occurs in Tinana Creek.
<b>Fish</b>			
Mary River cod <i>Maccullochella mariensis</i>  EPBC Act – E NC Act – not listed GRC - LPS	The Mary River Cod occurs in three natural subpopulations (Lake Macdonald, Tinana Creek and Coondoo Creek upstream of Tinana Barrage, and upper Obi Obi Creek) in different tributary systems of the Mary River which are isolated from one another by impoundments and the main river channel (Conservation Advice, 2016).  The Mary River Cod occurs mainly in pools within relatively undisturbed tributaries, preferring relatively large	No suitable habitat immediately adjacent to or beneath Raintree Bridge due to the shallow, open pools present.  Water temperature in the exposed shallow pools immediately adjacent to the bridge would be significantly warmer than the deeper pools in the more shaded areas of Tinana Creek.	Suitable habitat is present in Tinana Creek

Species	Habitat Preference	Site Observations and Assessment	
		Study Area – Raintree Bridge	Tinana Creek
	and deep (0.8 to 3.2 m) shaded pools with abundant, slowly flowing water. Submerged logs and branches (snags) are used as cover from which to ambush prey, as resting sites, and as nesting sites (Conservation Advice, 2016).		
Oxleyan Pygmy Perch <i>Nannoperca oxleyana</i> EPBC Act – E NC Act – V	Occurs in coastal <i>Banksia</i> -dominated heath or wallum habitats. Usually inhabit waters with a high proportion of aquatic plant cover, i.e. between 60-80% (Department of the Environment, 2015k).	No suitable habitat exists.	No suitable habitat exists.
Australian lungfish <i>Neoceratodus forsteri</i> EPBC Act – V NC Act – not listed although is protected species under the Qld Fish and Oyster Act 1914	The Australian Lungfish natural distribution is the Mary, Burnett and Brisbane River systems and (possibly) the Pine River system but translocated populations persist in the Coomera, Condamine, Albert and Logan Rivers (Department of the Environment, 2015m). The species is restricted to areas of permanent water and cannot live in saline waters or migrate through sea water. Still or slow-flowing, shallow, vegetated pools with clear or turbid water are required to spawn and feed. Emergent or submerged vegetation are essential for successful deposition of eggs and for providing refuges for juveniles (Department of the Environment, 2015m).	No emergent or submergent vegetation observed.  No suitable habitat beneath or immediately adjacent to Raintree Bridge.	Possible habitat in Tinana Creek
Honey Blue Eye	Inhabits slightly acidic (pH 4.4–6.8), clear and tannin-stained lakes, streams	pH of 6.6 is marginally within required pH range however no suitable habitat in	No suitable habitat within Tinana Creek.

Species	Habitat Preference	Site Observations and Assessment	
		Study Area – Raintree Bridge	Tinana Creek
<p><i>Pseudomugil mellis</i></p> <p>EPBC Act – V NC Act - V</p>	<p>and wetlands with sandy or muddy bottoms in coastal heath (wallum) ecosystem. The species usually occurs where there is little or no flow, and the fish can find shelter in dense, aquatic vegetation (Department of the Environment, 2015r).</p>	<p>proximity to Raintree Bridge due to the flows in Tinana Creek and riparian vegetation (gallery forest rather than coastal heath).</p>	
<b>Crustaceans</b>			
<p>Swamp crayfish</p> <p><i>Tenuibranchiurus glypticus</i></p> <p>EPBC Act – not listed NC Act - E</p>	<p>Reportedly world's smallest crayfish, being fully grown at 25 mm. Unlike other crayfish in south-east Queensland, fingers of claws open and close vertically rather than horizontally or obliquely. Body greyish-brown. Difficult to find due to small size, cryptic colouration and well-developed burrowing habits (Qld Museum, 2019). Paperbark swamps and shallow drainage channels. Prefers to burrow into damp clay but is occasionally found in peaty sand. Woodgate, Qld, south to at least southern Brisbane area (Qld Museum, 2019).</p>	<p>Suitable habitat exists in Tinana Creek. Not recorded during survey.</p>	<p>Suitable habitat exists in Tinana Creek. Not recorded during survey.</p>
<b>Flora</b>			
<p>Wide Bay boronia</p> <p><i>Boronia rivularis</i></p> <p>EPBC Act – not listed NC Act - NT</p>	<p>Known to occur only on Fraser Island and in the Cooloola area. Grows to 5m in height and found in damp gullies on the banks of creeks, usually in the shade of trees. May flower from Spring to late Summer.</p>	<p>Suitable habitat is present along Tinana Creek.</p> <p>Not recorded during survey in vegetation around Raintree Bridge.</p>	<p>Suitable habitat exists in Tinana Creek. Not recorded during survey.</p>
<p><i>Fontainea rostrata</i></p> <p>EPBC Act – V</p>	<p><i>Fontainea rostrata</i> is a tree or shrub growing 7–12 m tall and is known from ten sites in the Gympie district, Teddington Weir and Mt Theebine</p>	<p>Suitable habitat is present along Tinana Creek.</p> <p>Not recorded during survey in</p>	<p>Suitable habitat is present along Tinana Creek.</p>

Species	Habitat Preference	Site Observations and Assessment	
		Study Area – Raintree Bridge	Tinana Creek
NC Act - V	<p>near Glenwood, in Queensland, covering a distance of 100km (BRI collection records, n.d.). This species occurs in notophyll vine forest on soil derived from metamorphic rock (DoE, 2020).</p> <p>The main potential threats to <i>Fontainea rostrata</i> include clearing of vegetation, fire, invasion by weeds, and potential impacts of stochastic events due to restricted distribution.</p>	vegetation around Raintree Bridge.	
<p>Macadamia nut</p> <p><i>Macadamia integrifolia</i></p> <p>EPBC Act – V</p> <p>NC Act - V</p>	<p>The Macadamia Nut is a medium-sized tree which can grow to approximately 20 m tall with a similar crown width, giving the tree a rounded shape. The Macadamia Nut grows in remnant rainforest, preferring partially open areas such as rainforest edges (DoE, 2020).</p>	<p>Suitable habitat is present along Tinana Creek.</p> <p>Not recorded during survey in vegetation around Raintree Bridge.</p>	<p>Suitable habitat is present along Tinana Creek.</p>
<p>Quassia</p> <p><i>Samadera bidwillii</i></p> <p>EPBC Act – V</p> <p>NC Act - V</p>	<p>Endemic to Queensland and occurs in lowland rainforest most commonly but can also be found in other forest types. Commonly found in areas adjacent to watercourses. Found on a range of soil types including lithosols, skeletal soils, loam soils, sands, silts and sands with clay subsoils (DoE, 2019).</p> <p>Quassia is endemic to Queensland and is currently known to occur in several localities between Scawfell Island, near Mackay, and Goomboorian, north of Gympie. Quassia has been confirmed as occurring in at least 40 sites. Included within this range are a number of populations along the Mary</p>	<p>Suitable habitat is present along Tinana Creek.</p> <p>Not recorded during survey in vegetation around Raintree Bridge.</p>	<p>Suitable habitat is present along Tinana Creek.</p>



Species	Habitat Preference	Site Observations and Assessment	
		Study Area – Raintree Bridge	Tinana Creek
	River; Tinana Creek, Tallegalla Weir, Teddington Weir pondage, and from Teddington Weir to Tiana Barrage (DoEE, 2019).		
Southern Penda  <i>Xanthostemon oppositifolius</i>  EPBC Act – V NC Act - V	<p>It is known from Kin Kin-Boreen Point–Cooroy District, near Noosa; Teddington Weir, south of Maryborough; and Granite Creek and Broken Creek, south-west of Miriam Vale (DoE, 2019).</p> <p>In southern locations, southern penda occurs predominantly in riparian communities on slightly acid clayey sands to sandy clays derived from sedimentary and metasedimentary rocks. Associated vegetation includes notophyll vine forest, simple notophyll mixed tall closed forest with <i>Araucaria cunninghamii</i> var. <i>cunninghamii</i> (hoop pine) emergents or in transitional rainforest where the upper stratum is composed mostly of tall sclerophyll elements with rainforest species restricted to a developing understorey or mid-storey (DoE, 2019). At Granite Creek sites, it occurs on hillside on metasediments or old volcanic rocks in araucarian notophyll vine forest (DoE, 2019).</p>	<p>Suitable habitat is present along Tinana Creek.</p> <p>Not recorded during survey in vegetation around Raintree Bridge.</p>	<p>Suitable habitat is present along Tinana Creek.</p>

### 3.2.3 Habitat and Site Photos


Tinana Creek upstream and downstream of Raintree Bridge consists of a series of slow moving pools and riffles. The creek would experience high flows during and immediately following high-rainfall events, however, it generally experiences low-flow conditions. The creek immediately downstream of Raintree Bridge consists of a shallow pool approximately 15 m x 8 m and up to 0.3 m deep. It has a substrate of sandy gravel with no submergent or emergent vegetation. A small slightly deeper pool exists immediately upstream of the bridge which is approximately 8 m x 8 m and up to 1.0 m deep. The creek upstream and downstream of these pools is approximately 80% shaded however the two pools immediately adjacent to the bridge are exposed to direct sunlight due to the clearing for the existing bridge.




*Waterhousia floribunda* (weeping lilly pilly) is the dominant large riparian tree growing up to 20 m tall along the banks and overhanging the creek. Table 6 provides representative photos of the habitat and vegetation along Tinana Creek in the location of Raintree Bridge.

**Table 6 Representative Photos**

Habitat Description	Plate
Tinana Creek upstream of Raintree Bridge	
Tinana Creek downstream of Raintree Bridge	



Habitat Description	Plate
<p>Shallow pool (15m x 8m x 0.3m deep) with small rock weir immediately downstream of the existing Raintree Bridge.</p>	
<p>A solitary Eastern Horseshoe Bat (<i>Rhinolophus megaphyllus</i>) was observed roosting under the bridge. A colony of microbats was also observed in the existing log sleepers, however positive identification could not be made as they were deep in the crevice. It is considered likely the colony is also Eastern Horseshoe Bats given the habitat, previous records (27/2 – 4/3/2019) and identification of the solitary horseshoe bat.</p> <p>Eastern Horseshoe Bats are not a listed threatened species under the EPBC Act or NC Act.</p>	
<p>Aquatic fish were targeted using a fine mesh dip net.</p>	

Habitat Description	Plate
<p>A single concrete footing exists in the middle of the creek. Photo taken looking upstream, left and right side of the concrete footing.</p> <p>The creek is narrow, shallow and rocky under the existing bridge.</p>	
<p>Crimson spotted rainbow fish, empire gudgeon, mosquito fish (introduced), freshwater shrimp and freshwater crayfish were captured in the pools either side of the existing bridge.</p>	
<p>Large freshwater mussel shells were observed on the banks.</p>	

### 3.2.4 Water Quality

Water quality is consistent with the long-term monitoring data of representative creeks throughout the HQ Plantations pine forests in Toolara State Forest with the following parameters recorded during the survey.

**Table 7 Water Quality**

Parameter	Tinana Creek - Raintree Bridge (9 January 2020)	Tinana Creek upstream (TIN380) (60 samples)
pH	6.60	6.92
EC (uS)	403	382
Temperature °C	25.9	21.5

EC = Electrical conductivity

Tinana Creek in the vicinity of Raintree Bridge experiences high to low flows. The creek was under low-flow conditions during the survey on 9<sup>th</sup> January 2020.

The long-term monitoring data for Tinana Creek also demonstrates low dissolved oxygen (Gympie Region Waterwatch Report 2016 – 2018).

Refer to Appendix D for an extract of long-term water quality results from Tinana Creek (sample location upstream from Study Area) (Gympie Region Waterwatch Report 2016 – 2018).

## 4 CONCLUSION

The vegetation in the area immediately surrounding Raintree Bridge along Tinana Creek is currently mapped as RE 12.3.17 (Of Concern under the VM Act and endangered under the EP Act) and is described as *Simple notophyll fringing forest usually dominated by Waterhousea floribunda*.

Surveys undertaken in January 2020 confirmed that the area near Raintree Bridge on Tinana Creek is RE 12.3.17 (described as *Simple notophyll fringing forest usually dominated by Waterhousea floribunda*). The RE is analogous to the EPBC Act listed Lowland Rainforest of Subtropical Australia. The vegetation assessed at the existing Raintree Bridge crossing does not meet the species richness condition threshold for the listed community with only 11 native woody species from Appendix A of the listing advice recorded during the survey rather than the minimum 40 species required for remnant vegetation patches.

Habitat exists along Tinana Creek for a range of EPBC Act and NC Act listed threatened flora and fauna. Whilst there is potential for species to move up and down Tinana Creek beneath Raintree Bridge (as there are no existing barriers to movement presented by the present bridge), the area beneath and immediately adjacent to Raintree Bridge is not considered core habitat or breeding habitat for listed threatened species. No threatened flora was identified during the survey.

A pair of spectacled monarchs (*Symposiarchus trivirgatus*) (EPBC Act – Listed Marine, Migratory Terrestrial) were observed in the understory along Tinana Creek within the vine forest. Spectacled monarchs are a vertebrate species that commonly occur in Lowland Rainforest of Subtropical Australia TEC (Table 1 from Listing Advice). Brown cuckoo-doves (*Macropygia amboinensis*) and Lewin's honeyeater (*Meliphaga lewinii*) were also observed during the survey below canopy height. They are also associated with lowland rainforest (TEC Listing Advice). Brown cuckoo-doves and Lewin's honeyeaters are common Least Concern bird species. They are also found in a variety of other habitats.

A colony of microbats was identified living beneath the bridge between the log crevices. It is likely the bats are Eastern Horseshoe Bats (*Rhinolophus megaphyllus*) given one solitary individual was identified although it was separate to the actual colony. Whilst they are not a listed threatened species under the EPBC Act or NC Act, they are considered colonial breeders and therefore an approved Species Management Program under the *Nature Conservation (Wildlife) Regulation 2006* will be required prior to tampering with the breeding place.

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Threatened Species Scientific Committee (December 2016), Conservation Advice, *Maccullochella mariensis* (Mary River Cod)

## **APPENDIX A**

### Vegetation and Flora Field Data

## Raintree Bridge, Tinana Creek Flora Survey Data – 9 January 2020

Family	Taxon	Status	Declared	WONS	App A	App B
Blechnaceae	<i>Doodia caudata</i> (Cav.) R.Br.					
Pteridaceae	<i>Adiantum hispidulum</i> Sw. <i>var. hispidulum</i>					
Thelypteridaceae	<i>Christella dentata</i> (Forssk.) Brownsey & Jermy					
Acanthaceae	<i>Brunoniella australis</i> (Cav.) Bremek.					
Acanthaceae	<i>Pseuderanthemum variabile</i> (R.Br.) Radlk.					
Amaranthaceae	<i>Alternanthera denticulata</i> R.Br.					
Apocynaceae	<i>Tabernaemontana</i> <i>pandacaqui</i> Lam.					
Araceae	<i>Spirodela oligorrhiza</i> (Kurz) Hegelm.					
Asteraceae	<i>Ageratum houstonianum</i> Mill.	*				
Asteraceae	<i>Centipeda minima</i> (L.) A.Braun & Asch. subsp. <i>minima</i>					
Asteraceae	<i>Crassocephalum crepidioides</i> (Benth.) S.Moore	*				
Asteraceae	<i>Erechtites valerianifolius</i> (Link ex Spreng.) DC. forma <i>valerianifolius</i>	*				
Asteraceae	<i>Erigeron pusillus</i> Nutt.	*				
Asteraceae	<i>Sigesbeckia orientalis</i> L.					
Campanulaceae	<i>Wahlenbergia gracilis</i> (G.Forst.) A.DC.					
Casuarinaceae	<i>Casuarina cunninghamiana</i> Miq. subsp. <i>cunninghamiana</i>					
Commelinaceae	<i>Commelina diffusa</i> Burm.f.					
Commelinaceae	<i>Tradescantia fluminensis</i> Vell.	*				
Cyperaceae	<i>Cyperus trinervis</i> R.Br.					
Cyperaceae	<i>Isolepis cernua</i> (Vahl) Roem. & Schult.					
Euphorbiaceae	<i>Mallotus claoxyloides</i> (F.Muell.) Muell.Arg.					
Flagellariaceae	<i>Flagellaria indica</i> L.					
Hemerocallidaceae	<i>Geitonoplesium cymosum</i> (R.Br.) A.Cunn. ex Hook.					
Juncaceae	<i>Juncus usitatus</i> L.A.S.Johnson					
Lauraceae	<i>Cinnamomum oliveri</i> F.M.Bailey					
Lauraceae	<i>Cryptocarya triplinervis</i> R.Br. var. <i>triplinervis</i>					
Lauraceae	<i>Endiandra discolor</i> Benth.					
Lauraceae	<i>Neolitsea dealbata</i> (R.Br.) Merr.					
Laxmanniaceae	<i>Lomandra hystrix</i> (R.Br.) L.R.Fraser & Vickery					



Family	Taxon	Status	Declared	WONS	App A	App B
Laxmanniaceae	<i>Lomandra longifolia</i> Labill.					
Leguminosae (Fabaceae)	<i>Castanospermum australe</i> A.Cunn. ex Mudie					
Leguminosae (Mimosaceae)	<i>Acacia disparrima</i> M.W.McDonald & Maslin subsp. <i>disparrima</i>					
Menispermaceae	<i>Stephania japonica</i> var. <i>discolor</i> (Blume) Forman					
Moraceae	<i>Ficus coronata</i> Spin					
Moraceae	<i>Trophis scandens</i> (Lour.) Hook. & Arn. subsp. <i>scandens</i>					
Myrsinaceae	<i>Embelia australiana</i> (F.Muell.) F.M.Bailey					
Myrtaceae	<i>Angophora leiocarpa</i> (L.A.S.Johnson ex G.J.Leach) K.R.Thiele & Ladiges					
Myrtaceae	<i>Corymbia intermedia</i> (R.T.Baker) K.D.Hill & L.A.S.Johnson					
Myrtaceae	<i>Eucalyptus siderophloia</i> Benth.					
Myrtaceae	<i>Eucalyptus tereticornis</i> Sm.					
Myrtaceae	<i>Leptospermum brachyandrum</i> (F.Muell.) Druce					
Myrtaceae	<i>Lophostemon suaveolens</i> (Sol. ex Gaertn.) Peter G.Wilson & J.T.Waterh.					
Myrtaceae	<i>Melaleuca salicina</i> Craven					
Myrtaceae	<i>Syzygium australe</i> (H.L.Wendl. ex Link) B.Hyland					
Myrtaceae	<i>Waterhousea floribunda</i> (F.Muell.) B.Hyland					
Oxalidaceae	<i>Oxalis</i> sp.					
Passifloraceae	<i>Passiflora suberosa</i> subsp. <i>litoralis</i> (Kunth) Port.-Utl. ex M.A.M.Azevedo et al.	*				
Phyllanthaceae	<i>Glochidion ferdinandi</i> (Muell.Arg.) F.M.Bailey					
Phyllanthaceae	<i>Phyllanthus virgatus</i> G.Forst.					
Phyllanthaceae	<i>Synostemon albiflorus</i> (F.Muell. ex Muell.Arg.) Airy Shaw					
Poaceae	<i>Echinochloa colona</i> (L.) Link	*				
Poaceae	<i>Echinochloa telmatophila</i> P.W.Michael & Vickery					
Poaceae	<i>Oplismenus aemulus</i> (R.Br.) Roem. & Schult.					
Poaceae	<i>Ottochloa gracillima</i> C.E.Hubb.					
Poaceae	<i>Paspalidium distans</i> (Trin.) Hughes					
Poaceae	<i>Paspalum conjugatum</i> P.J.Bergius	*				

Family	Taxon	Status	Declared	WONS	App A	App B
Poaceae	<i>Pseudoraphis spinescens</i> (R.Br.) Vickery					
Polygalaceae	<i>Polygala paniculata</i> L.	*				
Polygonaceae	<i>Persicaria decipiens</i> (R.Br.) K.L.Wilson					
Polygonaceae	<i>Persicaria hydropiper</i> (L.) Spach					
Ranunculaceae	<i>Clematis glycinoides</i> DC.					
Rhamnaceae	<i>Alphitonia excelsa</i> (Fenzl) Benth.					
Ripogonaceae	<i>Ripogonum album</i> R.Br.					
Rubiaceae	<i>Gynochthodes jasminoides</i> (A.Cunn.) Razafim. & B.Bremer					
Rubiaceae	<i>Pavetta australiensis</i> Bremek.					
Sapindaceae	<i>Jagera pseudorhus</i> (A.Rich.) Radlk. var. <i>pseudorhus</i>					
Solanaceae	<i>Solanum chrysotrichum</i> Schltld.	*				
Solanaceae	<i>Solanum nodiflorum</i> Jacq.	*				
Verbenaceae	<i>Lantana camara</i> L.	*	3	w		
Verbenaceae	<i>Verbena litoralis</i> Kunth var. <i>litoralis</i>	*				
Violaceae	<i>Viola banksii</i> K.R.Thiele & Prober					
Vitaceae	<i>Cayratia clematidea</i> (F.Muell.) Domin					
Vitaceae	<i>Cissus antarctica</i> Vent.					

#### Declared *Qld Biosecurity Act 2014.*

- 1 must be reported to Biosecurity Queensland within 24 hours of the sighting, take all reasonable and practical steps to minimise the risk of it spreading
- 2 must be reported within 24 hours Biosecurity Queensland on 13 25 23  
must not be distributed either by sale or gift, or released into the environment
- 3 Invasive plant must not be distributed either by sale or gift, or released into the environment
- 4 must not be moved
- 5 must not be kept

#### TEC Thresholds

Woody Species from Appendix A of the TEC Listing Advice

Persistent Residual Trees from Appendix B of the TEC Listing Advice

#### WONS *Environmental Protection and Biodiversity Protection Act 1999. Australia 1999.*

- w listed as a weed of national significance under the Commonwealth's *Environmental Protection and Biodiversity Protection Act*.

All WONS have individual national strategic management plans. Management of lantana (WONS) should be in accordance with established national plan (*Australian Weeds Strategy 2017-2027*, Invasive Plants and Animals Committee, 2017).

Way point	Vegetation Layer	Estimated Canopy Cover	Estimated Canopy Height (metres)	Dominant or Codominant species	Subdominant species	Associated species	Structure	RE	TEC
89	T1	sparse	15-20	<i>Angophora leiocarpa, Corymbia intermedia</i>	<i>Eucalyptus siderophloia</i>	<i>Eucalyptus tereticornis</i>	open forest	12.3.11	N/A
90	E		26	<i>Eucalyptus tereticornis</i>					
	T1	medium to dense	15-20	<i>Waterhousia floribunda</i>	<i>Syzygium australe, Castanospermum australe</i>	<i>Endiandra discolor</i>	closed forest	12.3.16	No. Does not meet Condition Thresholds for Woody Species
	T2	medium to dense	8 to 15	<i>Waterhousia floribunda</i>	<i>Syzygium australe, Castanospermum australe, Endiandra discolor</i>	<i>Casuarina cunninghamiana, Neolitsea dealbata, Glochidion ferdinandi, Ficus coronata, Melaleuca salacina, Cryptocarya triplinervis</i>			
	T3	sparse to medium	3 to 8	T3 spp.					
	S	sparse	1 to 3	T spp.		<i>Pavetta australiensis, Sawopus albiflora, Leptospermum brachyandrum</i>			
	G	sparse to dense	0-1	<i>Lomandra hystrix</i>	<i>Cyperus trinervis, Isolepis cernua, Persicaria hydropiper</i>	<i>Juncus usitatus, Oplismenus aemulus, Paspalidium distans, Pseudoraphis spinescens</i>			

Structure terms derived from Neldner, V.J., Wilson, B.A., Dillewaard, H.A., Ryan, T.S. and Butler, D.W. (2017) Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland.

Version 4.0. Updated May 2017. Queensland Herbarium, Queensland Department of Science, Information Technology and Innovation, Brisbane.

Taxa derived from *Census of the Queensland Flora 2018*, Environment and Science, Queensland Government

## **APPENDIX B**

### Searches



# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 23/01/20 14:49:40

[Summary](#)

[Details](#)

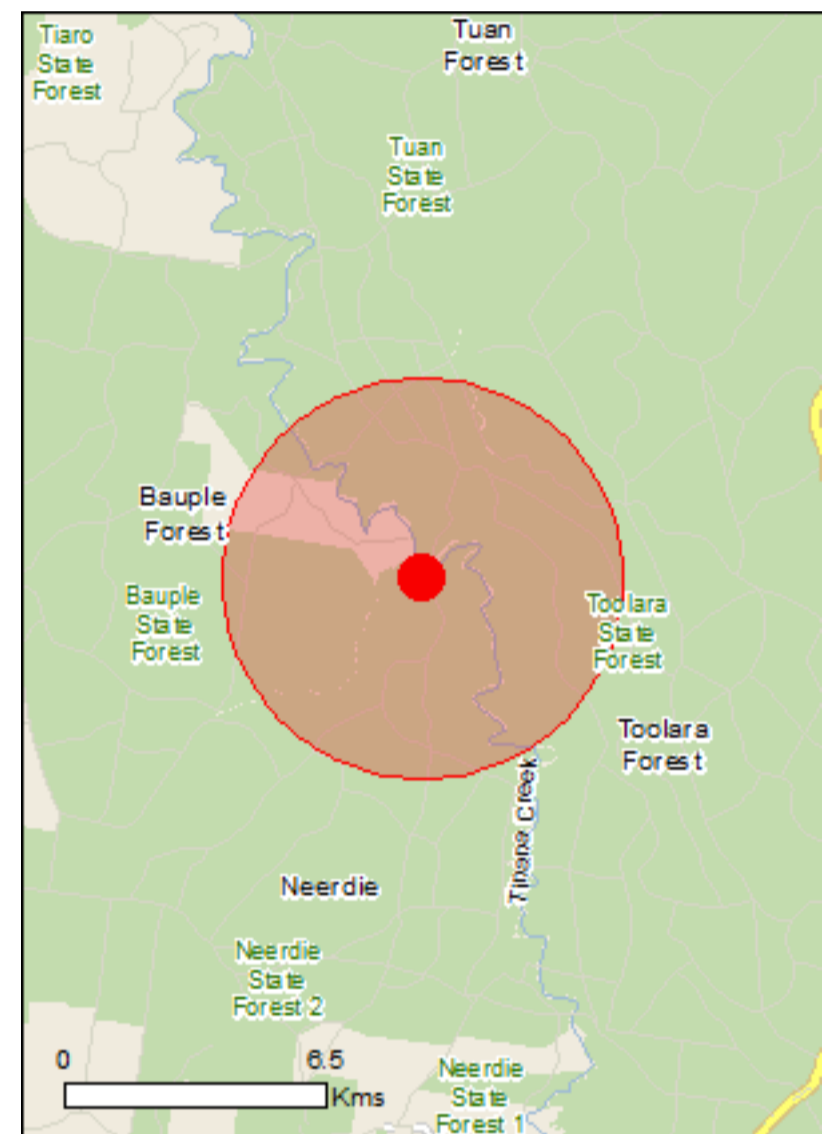
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

[Coordinates](#)

Buffer: 5.0Km



# Summary

## Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance:</a>	1
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Area:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	2
<a href="#">Listed Threatened Species:</a>	39
<a href="#">Listed Migratory Species:</a>	16

## Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

<a href="#">Commonwealth Land:</a>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	22
<a href="#">Whales and Other Cetaceans:</a>	None
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Australian Marine Parks:</a>	None

## Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

<a href="#">State and Territory Reserves:</a>	1
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	27
<a href="#">Nationally Important Wetlands:</a>	None
<a href="#">Key Ecological Features (Marine)</a>	None

# Details

## Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)	[ Resource Information ]
Name	Proximity
<a href="#">Great sandy strait (including great sandy strait, tin can bay and tin can</a>	Within 10km of Ramsar

## Listed Threatened Ecological Communities

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
<a href="#">Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community</a>	Endangered	Community may occur within area
<a href="#">Lowland Rainforest of Subtropical Australia</a>	Critically Endangered	Community may occur within area

## Listed Threatened Species

Name	Status	Type of Presence
<b>Birds</b>		
<a href="#">Anthochaera phrygia</a> Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour may occur within area
<a href="#">Botaurus poiciloptilus</a> Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Cyclopsitta diophthalma coxeni</a> Coxen's Fig-Parrot [59714]	Endangered	Species or species habitat may occur within area
<a href="#">Erythrotriorchis radiatus</a> Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Geophaps scripta scripta</a> Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat may occur within area
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Lathamus discolor</a> Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
<a href="#">Rostratula australis</a> Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
<a href="#">Turnix melanogaster</a> Black-breasted Button-quail [923]	Vulnerable	Species or species habitat likely to occur within area
<b>Fish</b>		
<a href="#">Maccullochella mariensis</a> Mary River Cod [83806]	Endangered	Species or species habitat known to occur within area
<a href="#">Nannoperca oxleyana</a> Oxleyan Pygmy Perch [64468]	Endangered	Species or species habitat likely to occur within area
<a href="#">Neoceratodus forsteri</a> Australian Lungfish, Queensland Lungfish [67620]	Vulnerable	Species or species habitat known to occur within area
<b>Frogs</b>		
<a href="#">Mixophyes iteratus</a> Giant Barred Frog, Southern Barred Frog [1944]	Endangered	Species or species habitat may occur within area
<b>Insects</b>		
<a href="#">Argynnis hyperbius inconstans</a> Australian Fritillary [88056]	Critically Endangered	Species or species habitat may occur within area
<b>Mammals</b>		
<a href="#">Chalinolobus dwyeri</a> Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may occur within area
<a href="#">Dasyurus hallucatus</a> Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat likely to occur within area
<a href="#">Dasyurus maculatus maculatus (SE mainland population)</a> Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat may occur within area
<a href="#">Petauroides volans</a> Greater Glider [254]	Vulnerable	Species or species habitat may occur within area
<a href="#">Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)</a> Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Potorous tridactylus tridactylus</a> Long-nosed Potoroo (SE Mainland) [66645]	Vulnerable	Species or species habitat may occur within area
<a href="#">Pteropus poliocephalus</a> Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<b>Plants</b>		
<a href="#">Acacia attenuata</a> [10690]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Bosistoa transversa</a> Three-leaved Bosistoa, Yellow Satinheart [16091]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Cossinia australiana</a> Cossinia [3066]	Endangered	Species or species habitat likely to occur within area



Name	Status	Type of Presence
<a href="#">Cryptocarya foetida</a> Stinking Cryptocarya, Stinking Laurel [11976]	Vulnerable	Species or species habitat may occur within area
<a href="#">Cupaniopsis shirleyana</a> Wedge-leaf Tuckerroo [3205]	Vulnerable	Species or species habitat may occur within area
<a href="#">Fontainea rostrata</a> [24039]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Fontainea venosa</a> [24040]	Vulnerable	Species or species habitat may occur within area
<a href="#">Macadamia integrifolia</a> Macadamia Nut, Queensland Nut Tree, Smooth-shelled Macadamia, Bush Nut, Nut Oak [7326]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Macrozamia pauli-guilielmi</a> Pineapple Zamia [5712]	Endangered	Species or species habitat likely to occur within area
<a href="#">Phaius australis</a> Lesser Swamp-orchid [5872]	Endangered	Species or species habitat may occur within area
<a href="#">Samadera bidwillii</a> Quassia [29708]	Vulnerable	Species or species habitat likely to occur within area
<b>Reptiles</b>		
<a href="#">Delma torquata</a> Adorned Delma, Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area
<a href="#">Egernia rugosa</a> Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area
<a href="#">Elseya albagula</a> Southern Snapping Turtle, White-throated Snapping Turtle [81648]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Elusor macrurus</a> Mary River Turtle, Mary River Tortoise [64389]	Endangered	Species or species habitat known to occur within area
<a href="#">Furina dunmalli</a> Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area
<b>Listed Migratory Species</b>		<b>[ Resource Information ]</b>
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
<b>Migratory Marine Birds</b>		
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<b>Migratory Marine Species</b>		
<a href="#">Crocodylus porosus</a> Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
<b>Migratory Terrestrial Species</b>		
<a href="#">Cuculus optatus</a> Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat known to occur within area
<a href="#">Monarcha trivirgatus</a> Spectacled Monarch [610]		Species or species habitat known to occur within area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat known to occur within area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat known to occur within area

#### Migratory Wetlands Species

<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat may occur within area
<a href="#">Tringa nebularia</a> Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

#### Other Matters Protected by the EPBC Act

##### Listed Marine Species [\[ Resource Information \]](#)

\* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
<b>Birds</b>		
<a href="#">Actitis hypoleucos</a> Common Sandpiper [59309]		Species or species habitat may occur within area
<a href="#">Anseranas semipalmata</a> Magpie Goose [978]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat may occur within area
<a href="#">Calidris acuminata</a> Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
<a href="#">Calidris ferruginea</a> Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Calidris melanotos</a> Pectoral Sandpiper [858]		Species or species habitat may occur within area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Lathamus discolor</a> Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat known to occur within area
<a href="#">Monarcha trivirgatus</a> Spectacled Monarch [610]		Species or species habitat known to occur within area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat known to occur within area
<a href="#">Numenius madagascariensis</a> Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat may occur within area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat known to occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
<a href="#">Tringa nebularia</a> Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

## Reptiles

<a href="#">Crocodylus porosus</a> Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
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## Extra Information

### State and Territory Reserves [\[ Resource Information \]](#)

Name	State
Tinana Creek	QLD

### Invasive Species [\[ Resource Information \]](#)

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
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## Birds

Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
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Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
--	--	--

Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
--	--	--

Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
--	--	--

Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
---	--	--

Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
---	--	--

## Frogs

Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
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## Mammals

Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
------------------------------------	--	--

Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
--	--	--

Name	Status	Type of Presence
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
<b>Plants</b>		
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Cryptostegia grandiflora Rubber Vine, Rubbervine, India Rubber Vine, India Rubbervine, Palay Rubbervine, Purple Allamanda [18913]		Species or species habitat likely to occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Parthenium hysterophorus Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
<b>Reptiles</b>		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area
Ramphotyphlops braminus Flowerpot Blind Snake, Brahminy Blind Snake,		Species or species

Name	Status	Type of Presence
Cacing Besi [1258]		habitat may occur within area

# Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

# Coordinates

-25.88948 152.75371

# Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-Other groups and individuals](#)

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.













# Queensland Government

## Wildlife Online Extract

Search Criteria: Species List for a Specified Point

Species: All

Type: All

Status: All

Records: Confirmed

Date: Since 1980

Latitude: -25.8899

Longitude: 152.7553

Distance: 5

Email: [info@ecofoxco.com.au](mailto:info@ecofoxco.com.au)

Date submitted: Thursday 23 Jan 2020 11:56:00

Date extracted: Thursday 23 Jan 2020 12:00:08

The number of records retrieved = 52

### **Disclaimer**

As the DSITIA is still in a process of collating and vetting data, it is possible the information given is not complete. The information provided should only be used for the project for which it was requested and it should be appropriately acknowledged as being derived from Wildlife Online when it is used.

The State of Queensland does not invite reliance upon, nor accept responsibility for this information. Persons should satisfy themselves through independent means as to the accuracy and completeness of this information.

No statements, representations or warranties are made about the accuracy or completeness of this information. The State of Queensland disclaims all responsibility for this information and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs you may incur as a result of the information being inaccurate or incomplete in any way for any reason.

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Hylidae	<i>Litoria latopalmata</i>	broad palmed rocketfrog		C		2
animals	amphibians	Hylidae	<i>Litoria gracilentata</i>	graceful treefrog		C		1
animals	amphibians	Hylidae	<i>Litoria fallax</i>	eastern sedgefrog		C		3
animals	amphibians	Myobatrachidae	<i>Uperoleia fusca</i>	dusky gungan		C		2
animals	birds	Cacatuidae	<i>Calyptorhynchus funereus</i>	yellow-tailed black-cockatoo		C		1
animals	birds	Campephagidae	<i>Coracina novaehollandiae</i>	black-faced cuckoo-shrike		C		1
animals	birds	Campephagidae	<i>Coracina papuensis</i>	white-bellied cuckoo-shrike		C		1
animals	birds	Climacteridae	<i>Cormobates leucophaea metastasis</i>	white-throated treecreeper (southern)		C		1
animals	birds	Columbidae	<i>Geopelia striata</i>	peaceful dove		C		1
animals	birds	Coraciidae	<i>Eurystomus orientalis</i>	dollarbird		C		1
animals	birds	Cuculidae	<i>Cacomantis flabelliformis</i>	fan-tailed cuckoo		C		1
animals	birds	Dicruridae	<i>Dicrurus bracteatus</i>	spangled drongo		C		1
animals	birds	Eurostopodidae	<i>Eurostopodus mystacalis</i>	white-throated nightjar		C		1
animals	birds	Halcyonidae	<i>Dacelo novaeguineae</i>	laughing kookaburra		C		1
animals	birds	Meliphagidae	<i>Manorina melanocephala</i>	noisy miner		C		1
animals	birds	Meliphagidae	<i>Meliphaga lewinii</i>	Lewin's honeyeater		C		1
animals	birds	Meropidae	<i>Merops ornatus</i>	rainbow bee-eater		C		1
animals	birds	Motacillidae	<i>Anthus novaeseelandiae</i>	Australasian pipit		C		1
animals	birds	Pachycephalidae	<i>Pachycephala pectoralis</i>	golden whistler		C		1
animals	birds	Pachycephalidae	<i>Colluricincla harmonica</i>	grey shrike-thrush		C		1
animals	birds	Pachycephalidae	<i>Pachycephala rufiventris</i>	rufous whistler		C		1
animals	birds	Petroicidae	<i>Microeca fascinans</i>	jacky winter		C		1
animals	birds	Pomatostomidae	<i>Pomatostomus temporalis</i>	grey-crowned babbler		C		1
animals	insects	Nymphalidae	<i>Hypocysta adiante adiante</i>	orange ringlet				1
animals	insects	Nymphalidae	<i>Acraea andromacha andromacha</i>	glasswing				1
animals	insects	Pieridae	<i>Belenois java teutonia</i>	caper white				1
animals	mammals	Petauridae	<i>Petaurus norfolcensis</i>	squirrel glider		C		1
animals	ray-finned fishes	Percichthyidae	<i>Maccullochella mariensis</i>	Mary River cod			E	1/1
plants	land plants	Acanthaceae	<i>Pseuderanthemum variabile</i>	pastel flower		C		1/1
plants	land plants	Asteraceae	<i>Rutidosia murchisonii</i>			C		1/1
plants	land plants	Commelinaceae	<i>Commelina diffusa</i>	wandering jew		C		1/1
plants	land plants	Cyperaceae	<i>Chorizandra sphaerocephala</i>			C		1/1
plants	land plants	Cyperaceae	<i>Cyperus trinervis</i>			C		1/1
plants	land plants	Cyperaceae	<i>Isolepis cernua</i>	nodding club rush		C		1/1
plants	land plants	Cyperaceae	<i>Lepidosperma longitudinale</i>	pithy swordedge		C		1/1
plants	land plants	Cyperaceae	<i>Cyperus polystachyos var. polystachyos</i>			C		1/1
plants	land plants	Cyperaceae	<i>Lepidosperma laterale var. laterale</i>			C		2/2
plants	land plants	Cyperaceae	<i>Schoenus apogon var. apogon</i>			C		1/1
plants	land plants	Cyperaceae	<i>Lepironia articulata</i>			C		1/1
plants	land plants	Cyperaceae	<i>Baumea teretifolia</i>			C		1/1
plants	land plants	Cyperaceae	<i>Rhynchospora rubra</i>			C		1/1
plants	land plants	Cyperaceae	<i>Cyperus laevis</i>			C		1/1
plants	land plants	Dilleniaceae	<i>Hibbertia vestita</i>			C		2/2
plants	land plants	Elaeocarpaceae	<i>Elaeocarpus reticulatus</i>	ash quandong		C		1/1
plants	land plants	Lauraceae	<i>Cryptocarya macdonaldii</i>	McDonald's laurel		C		1/1
plants	land plants	Lauraceae	<i>Cassytha filiformis</i>	dodder laurel		C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	land plants	Lauraceae	<i>Endiandra discolor</i>	domatia tree		C		1/1
plants	land plants	Myrtaceae	<i>Leptospermum brachyandrum</i>	weeping tea-tree		C		1/1
plants	land plants	Orchidaceae	<i>Eriochilus cucullatus</i>			C		1/1
plants	land plants	Restionaceae	<i>Sporadanthus caudatus</i>			C		1/1
plants	land plants	Rubiaceae	<i>Opercularia diphylla</i>			C		1/1
plants	land plants	Zamiaceae	<i>Macrozamia pauli-guilielmi</i>			E	E	2/2

#### CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992*. The codes are Extinct in the Wild (PE), Endangered (E), Vulnerable (V), Near Threatened (NT), Least Concern (C) or Not Protected ( ).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999*. The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).

This number is output as 99999 if it equals or exceeds this value. The second number located after the / indicates the number of specimen records for the taxon.

This number is output as 999 if it equals or exceeds this value.

## **APPENDIX C**

### Lowland Rainforest of Subtropical Australia Listing Advice



**Advice to the Minister for Sustainability, Environment, Water, Population and Communities from the Threatened Species Scientific Committee (the Committee) on an Amendment to the List of Threatened Ecological Communities under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)**

**1 Name of the ecological community**

**Lowland Rainforest of Subtropical Australia**

The ecological community was nominated as Lowland Subtropical Rainforest on Basalt and Alluvium in North East NSW and South East Queensland. The Committee has determined the name of the ecological community to be **Lowland Rainforest of Subtropical Australia**. In the new name ‘Subtropical’ has been used to describe the climatic zone where the ecological community generally occurs within eastern Australia, rather than the specific type of rainforest that comprises the ecological community.

Throughout this document the Lowland Rainforest of Subtropical Australia is often abbreviated to the ‘Lowland Rainforest’ or ‘the ecological community’.

Much of the **Lowland Rainforest of Subtropical Australia** ecological community is listed as endangered in New South Wales as ‘Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions’ and ‘Lowland Rainforest on floodplain in the NSW North Coast Bioregion’ (DECC, 1999, 2006); and as ‘of concern’ or ‘endangered’ under a number of Regional Ecosystems in Queensland (for more detail, see Section 6. National Context – *Relationships to State-listed ecological communities and state vegetation classifications*, below).

**2. Public Consultation**

A technical workshop with experts on the ecological community was held in June 2010. The nomination and a technical report, based on the workshop outcomes, were made available for public exhibition and comment for a minimum 30 business days. The Committee has had regard to all public and expert comment that was relevant to the consideration of the ecological community.

**3. Summary of conservation assessment by the Committee**

The Committee provides the following assessment of the appropriateness of the ecological community’s inclusion in the EPBC Act list of threatened ecological communities.

The Committee judges that the ecological community has been demonstrated to have met sufficient elements of:

Criterion 1 to make it **eligible** for listing as **endangered**,

Criterion 2 to make it **eligible** for listing as **critically endangered**,

Criterion 3 to make it **eligible** for listing as **endangered**; and

Criterion 4 to make it **eligible** for listing as **endangered**.

The highest category for which the ecological community is **eligible** to be listed is **critically endangered**.

## 4. Description

### *Location*

The ecological community primarily occurs from Maryborough in Queensland to the Clarence River (near Grafton) in New South Wales (NSW). The ecological community also includes isolated areas between the Clarence River and Hunter River such as the Bellinger and Hastings valleys. The ecological community occurs in the following Interim Biogeographic Regionalisation for Australia Version 6.1 (IBRA) Bioregions: South Eastern Queensland Bioregion and NSW North Coast Bioregion.

### *Physical environment*

The ecological community occurs on basalt and alluvial soils, including sand and old or elevated alluvial soils as well as floodplain alluvia. It also occurs occasionally on enriched rhyolitic soils and basaltically enriched metasediments. Lowland Rainforest mostly occurs in areas <300 m above sea level. Aspect can result in the ecological community being found at >300 m altitude on north-facing slopes, but typically 300 m defines the extent of the lowlands. In addition, Lowland Rainforest typically occurs in areas with high annual rainfall (>1300 mm).

The physical environment where the ecological community occurs is differentiated from the EPBC listed Littoral Rainforest and Coastal Vine Thickets of Eastern Australia ecological community (hereafter referred to as Littoral Rainforest) by the level of coastal or estuarine influence (such as windshear). Lowland Rainforest typically occurs more than 2 km from the coast, however, it can (and does) intergrade with Littoral Rainforest in some coastal areas.

### *Vegetation structure*

The ecological community is generally a moderately tall ( $\geq 20$  m) to tall ( $\geq 30$  m) closed forest (canopy cover  $\geq 70\%$ ). Tree species with compound leaves are common and leaves are relatively large (notophyll to mesophyll). Typically there is a relatively low abundance of species from the genera *Eucalyptus*, *Melaleuca* and *Casuarina*. Buttresses are common as is an abundance and diversity of vines.

Lowland Rainforest has the most diverse tree flora of any vegetation type in NSW (Floyd, 1990a) and the species composition of the canopy varies between local stands and between regions (Keith, 2004). The ecological community typically has high species richness ( $\geq 30$  woody species from [Appendix A](#)). The canopy comprises a range of tree species but in some areas a particular species may dominate e.g. palm forest, usually dominated by *Archontophoenix cunninghamiana* (bangalow palm) or *Livistona australis* (cabbage palm); and riparian areas dominated by *Syzygium floribundum* (syn. *Waterhousea floribunda*) (weeping satinash/weeping lilly pilly).

The canopy is often multilayered consisting of an upper, discontinuous layer of emergents, over the main canopy and subcanopy. Below the canopy is an understorey of sparse shrubs and seedlings.

The upper, discontinuous layer includes **canopy emergents** that may be 40–50 m tall and have large spreading crowns. This layer is composed of species such as *Araucaria cunninghamii* (hoop pine), *Ficus* spp. (figs), *Lophostemon confertus* (brushbox), and in some sites, *Eucalyptus* spp.. Typically non-rainforest species such as eucalypts and brushbox comprise <30% of canopy emergents.

The **canopy/subcanopy layer** contains a diverse range of species. Representative species include: hoop pine, figs, *Argyrodendron trifoliolatum/Heritiera trifoliolata* (white booyong), *Castanospermum australe* (black bean), *Cryptocarya obovata* (white walnut, pepperberry),

*Dendrocnide excelsa* (giant stinging tree), *Diploglottis australis* (native tamarind), *Dysoxylum fraserianum* (rosewood), *Dysoxylum mollissimum* (red bean), *Elatostachys nervosa* (green tamarind), *Endiandra pubens* (hairy walnut), *Flindersia schottiana* (bumpy ash, cudgerie, silver ash), *Gmelina leichhardtii* (white beech), *Neolitsea australiensis* (bolly gum), *Neolitsea dealbata* (white bolly gum), *Sloanea australis* (maiden's blush), *Sloanea woollsii* (yellow carabeen), *Toona ciliata* (red cedar), and epiphytes such as *Platyserium* spp. and *Asplenium australasicum* (bird's nest fern).

In areas where the canopy is lower (<25 m) due to coastal or estuarine influences the Littoral Rainforest ecological community typically replaces the Lowland Rainforest ecological community.

The **understorey** contains a sparse layer of species such as *Cordyline stricta* (narrow-leaved palm lily), *Linospadix monostachya* (walking stick palm), *Neolitsea dealbata* (white bolly gum), *Notelaea johnsonii* (veinless mock olive), *Pittosporum multiflorum* (orange thorn), *Triunia youngiana* (native honey-suckle bush), *Wilkiea austroqueenslandica* (smooth wilkiea) and *Wilkiea huegeliana* (veiny wilkiea) as well as seedlings of a variety of canopy species. A variety of vines may be present such as *Calamus muelleri* (lawyer vine), *Cissus antarctica* (native grape vine, water vine), *Cissus hypoglauca* (giant water vine), *Dioscorea transversa* (native yam), *Flagellaria indica* (whip vine), *Morinda jasminoides* (sweet morinda), *Pandorea floribunda* (wonga wonga vine) and *Smilax australis* (sarsaparilla). Ferns such as *Adiantum hispidulum* (rough maidenhair fern), *Doodia aspera* (rasp fern), *Lastreopsis decomposita* (trim shield fern) and *Lastreopsis marginans* (bordered shield fern, glossy shield fern) may also be present.

### ***Fauna***

The diversity of rainforest plants and the high nutritional content of their fruits and leaves provide the foundation for the high diversity of animals in the ecological community. This is a direct reflection of the high nutrient soils and moist environment occupied by this rainforest type. Remnants and regenerating patches of Lowland Rainforest provide important habitat and food resources for a range of fauna. In turn the Lowland Rainforest flora also relies on the native fauna for pollination and seed dispersal.

Lowland Rainforest is characterised by a high proportion of frugivorous birds, epiphyte and litter foraging vertebrates, micro- and mega-chiropteran bats, and a broad range of invertebrate groups associated with the decomposition cycle (such as insects and snails).

Vertebrate species that commonly occur in Lowland Rainforest are listed in Table 1.

Table 1. Vertebrate species that commonly occur in Lowland Rainforest of Subtropical Australia ecological community.

<b>Frogs</b>	
<i>Lechriodus fletcheri</i> *	Fletcher's frog
<i>Litoria chloris</i>	red-eyed tree frog
<i>Mixophyes iteratus</i> *	giant barred frog
<b>Reptiles</b>	
<i>Bellatorias major</i>	land mullet
<i>Cacophis krefftii</i>	dwarf crowned snake
<i>Hypsilurus spinipes</i>	southern forest dragon
<i>Ophioscincus truncatus</i>	yellow-bellied legless-skink
<i>Saltuarius swaini</i>	southern leaf-tailed gecko
<i>Saproscincus challengeri</i> *	orange-tailed shadeskink
<b>Birds</b>	
<i>Carterornis leucotis</i>	white-eared monarch
<i>Colluricincla megarhyncha</i>	little shrike-thrush
<i>Coracina lineata</i> *	barred cuckoo-shrike
<i>Orthonyx temminckii</i>	Australian logrunner
<i>Pitta versicolor</i>	noisy pitta
<i>Podargus ocellatus</i> *	marbled frogmouth
<i>Ptilinopus magnificus</i> *	wompoo fruit-dove
<i>Ptilinopus regina</i> *	rose-crowned fruit-dove
<i>Sericulus chrysocephalus</i>	regent bowerbird
<i>Sphecotheres vieilloti</i>	Australasian figbird
<i>Symposiachrus trivirgatus</i>	spectacled monarch
<i>Tregellasia capito</i>	pale-yellow robin
<i>Turnix melanogaster</i> *	black-breasted button-quail
<b>Mammals</b>	
<i>Antechinus subtropicus</i>	subtropical antechinus
<i>Melomys cervinipes</i>	fawn-footed melomys
<i>Nyctimene robinsoni</i> *	eastern tube-nosed bat
<i>Nyctophilus bifax</i> *	eastern long-eared bat
<i>Pteropus alecto</i>	black flying-fox
<i>Thylogale stigmatica</i> *	red-legged pademelon

Lowland Rainforest has an influx of birds in the cooler months (mainly April to September) from higher altitudes (Holmes, 1987; Osborne, 1991). These species include the regent bowerbird, *Acanthorhynchus tenuirostris* (eastern spinebill), *Columba leucomela* (white-

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\* Threatened species (see: Appendix D)

headed pigeon), *Dicrurus bracteatus* (spangled drongo), *Gerygone mouki* (brown gerygone), *Lopholaimus antarcticus* (topknot pigeon), *Petroica rosea* (rose robin), *Pachycephala pectoralis* (golden whistler), *Ptilonorhynchus violaceus* (satin bowerbird), *Rhipidura albiscapa* (grey fantail), and *Zoothera lunulata* (Bassian thrush). Frugivorous species present throughout the year include the Australasian figbird, wompoo fruit-dove, *Ailuroedus crassirostris* (green catbird), *Alisterus scapularis* (Australian king-parrot), *Lalage leucomela* (varied triller), *Macropygia amboinensis* (brown cuckoo-dove), *Meliphaga lewinii* (Lewin's honeyeater) and *Strepera graculina* (pied currawong) (Holmes, 1987).

The relationships between the Lowland Rainforest ecological community and associated fauna is emphasised by the distributional limits of some vertebrate species aligning with the distributional limit of the ecological community. The rose-crowned fruit-dove (Vulnerable in NSW), although widely distributed in subtropical rainforest, reaches its southern breeding limit in the lower Clarence Valley and does not occur regularly south of the Hunter River (NSW Scientific Committee, 2008). The southern limit of the marbled frogmouth, white-eared monarch and eastern tube-nosed bat also align with the southern limit of the ecological community (Milledge pers. comm. 2010).

The northern limits of distribution of some other rainforest vertebrates align with the northern limit of the ecological community. These include the green catbird, southern forest dragon, *Hoplocephalus stephensii* (Stephen's banded snake), *Ptiloris paradiseus* (paradise riflebird), *Saproscincus rosei* (Rose's shadescink) and *Thylogale thetis* (red-necked pademelon) (Milledge pers. comm. 2010).

Several other rainforest vertebrates are also endemic to the latitudinal extent of the ecological community but also extend to higher elevations. These include the subtropical antechinus, *Menura alberti* (Albert's lyrebird) and *Philoria loveridgei* (Loveridge's frog) (Milledge pers. comm. 2010).

## **5. Key Diagnostic Characteristics and Condition Thresholds**

It is recognised that many examples of the ecological community now occur in a degraded or disturbed state. In some cases, the degradation is irreversible, or the potential for rehabilitation is limited or impractical. For example, areas previously dominated by Lowland Rainforest that are now permanently converted to cropland or development are unlikely to be rehabilitated back to a condition that reaches the 'Description' requirements.

National listing focuses legal protection on patches of the ecological community that are most functional, relatively natural (as defined by the 'Description') and in relatively good condition. Condition thresholds help identify both the ecological community and ecological function using a set of criteria that assist in indicating when the EPBC Act is likely to apply to an ecological community. They provide guidance for when a patch of a threatened ecological community retains sufficient conservation values to be considered as a Matter of National Environmental Significance\*, as defined under the EPBC Act. This means that the referral, assessment and compliance provisions of the EPBC Act are focussed on the most valuable elements of Australia's natural environment, while heavily degraded or modified patches will be largely excluded.

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\* For more information on Matters of National Environmental Significance see: [www.environment.gov.au/epbc/protect/index.html](http://www.environment.gov.au/epbc/protect/index.html)

Although very degraded or modified patches are not protected as the ecological community listed under the EPBC Act, it is recognised that patches that do not meet the condition thresholds may still retain important natural values and may have the potential to be rehabilitated to a point where they meet the condition thresholds. Therefore, these patches should not be excluded from recovery and other management actions.

Condition thresholds are determined in consultation with experts on the particular ecological community. They include a range of criteria such as: diversity of native species present; vegetation structure and cover attributes; level of weed invasion; patch size; and proximity to other native vegetation remnants.

***The key diagnostic characteristics of the listed ecological community are:***

- Distribution of the ecological community is primarily in the NSW North Coast and South Eastern Queensland bioregions, according to Interim Biogeographic Regionalisation for Australia (IBRA) version 6.1 (2004).
- The ecological community occurs on: soils derived from basalt or alluvium; or enriched rhyolitic soils; or basaltically enriched metasediments.
- The ecological community generally occurs at an altitude less than 300 m above sea level.
- The ecological community typically occurs in areas with high annual rainfall (>1300mm).
- The ecological community is typically more than 2 km inland from the coast.
- The structure of the ecological community is typically a tall (20 m–30 m) closed forest, often with multiple canopy layers.
- Patches of the ecological community typically have high species richness (at least 30 woody species from Appendix A).

### Condition thresholds:

The listed **Lowland Rainforest of Subtropical Australia** ecological community comprises those patches that meet the key diagnostic characteristics (above) and the **condition thresholds** (below).

Patch Type	A	B	C
(evidence of remnant vegetation & regeneration status)	Natural remnant evident by the persistence of mature residual trees from <u>Appendix B</u> .	Some residual trees from <u>Appendix B</u> are present plus evidence of either; natural regeneration <sup>*1</sup>  <b>AND/OR</b> regeneration with active management <sup>*2</sup>	A non-remnant patch that has recovered through a) natural regeneration <sup>*1</sup>  <b>AND/OR</b> b) supplementary planting that has stature and quality that is reflective of the 'Description' <sup>*3</sup>
	<b>AND</b>	<b>AND</b>	<b>AND</b>
<b>Patch Size</b> (excludes buffer zone)	≥ 0.1 ha <b>AND</b>	≥ 1 ha <b>AND</b>	≥ 2 ha <b>AND</b>
<b>Canopy Cover</b> (over entire patch) <sup>*4</sup>	Emergent/canopy/subcanopy <sup>*4</sup> cover is ≥ 70% <b>AND</b>		
<b>Species Richness</b> (over entire patch)	contains ≥ 40 native woody species <sup>*5</sup> from Appendix A <b>AND</b>	contains ≥ 30 native woody species <sup>*5</sup> from Appendix A <b>AND</b>	
<b>Percent of total vegetation cover that is native</b> <sup>*6</sup> (use sample plot)	≥70% of vegetation <sup>*6</sup> is native	≥50% of vegetation <sup>*6</sup> is native	
<b>Notes:</b>			
<sup>*1</sup> Evidence of natural regeneration is shown by the presence of seedlings of a range of native species that did not originate through deliberate plantings. <sup>*2</sup> A patch that is <b>actively managed</b> has regular (e.g. every 1–2 years) on the ground human regenerative activity such as weed control or supplementary plantings. <sup>*3</sup> Closed canopy, 20–30 m tall, of representative species (e.g. white booyong, hoop pine, figs, brush box, yellow carabeen, red cedar, rosewood, white beech) <sup>*4</sup> Canopy cover (projective foliage cover) is estimated over the entire patch. When assessing the ecological community, the canopy includes the emergents and subcanopy (everything above 10 m tall). Canopy/sub-canopy includes all trees and vines (native and non-native). <sup>*5</sup> Woody species are trees, shrubs or vines that contain wood or wood fibres that consist mainly of hard lignified tissues. Excluded from woody species are graminoids, other herbs and non-woody vines. <sup>*6</sup> Total vegetation cover includes emergents/canopy/subcanopy and understorey and ground layers.			

A **patch** is defined as a discrete and continuous area of the ecological community. However, a patch may include small-scale disturbances, such as tracks or breaks, watercourses or small-scale variations in vegetation that do not significantly alter its overall functionality (functionality here refers to processes such as the movement of wildlife and pollinators, the dispersal of plant propagules, activities of seed and plant predators and many others).

Patches of Lowland Rainforest that remain today and meet the condition thresholds (above) are typically in varying states of condition as a result of landuse history in the area. A **natural remnant** is a patch of native vegetation that remains after the surrounding area has been cleared or modified (patch type **A**). It contains **persistent residual**/mature trees of which many, but not all, pre-date clearing. A natural remnant is a largely undisturbed patch of native vegetation that has a high species richness with relatively little weed infestation. The second patch type (**B**) recognised in the condition thresholds has some residual/mature trees (not necessarily original/pre-clearing) and there is evidence **of natural regeneration and/or active management**. The third patch type (**C**) reflects the ability of this ecological community to regenerate in some circumstances, either naturally or through human intervention. There may not be any mature/large trees but it must be 2 ha or more in size and regeneration is evident. **Regeneration (natural or through supplementary planting)** must be of stature and quality that reflects the 'Description' of the ecological community (i.e. tall, closed forest with representative species composition and species diversity, as well as a relatively low weed component in all layers). It is likely that a patch may be comprised of a combination of these patch types such as a small natural remnant surrounded by regeneration.

The **sampling protocol** involves developing a quick/simple map of the vegetation condition, diversity, landscape qualities and management history (where possible) of the site. For sites  $\leq 2$  ha evaluate the entire site for canopy cover and species richness. For sites  $>2$  ha use **sample plots** of 50 × 20 m to obtain a representative sample of the site including any different patch types. An appropriate sampling strategy should be used that captures the diversity of the site and recognises any variation e.g. due to topography.

The Lowland Rainforest ecological community has a relatively high potential for rehabilitation and natural **regeneration**. Rainforests are dynamic communities that can regenerate naturally following disturbance and structural damage. Some rainforest species store viable seed in the soil (although viability varies between species) but more commonly rainforest species rely on rapid germination and seedlings in the understorey<sup>1</sup> (Big Scrub Rainforest Landcare Group, 2005). As canopy gaps appear, the availability of light removes any suppression to seedling growth. The inclusion of patches of natural and managed regeneration (with  $\geq 30$  species from Appendix A) as part of the ecological community is due to the particular ability of this ecological community to regenerate. Degraded patches that are actively managed (i.e. weeds removed and/or supplementary planting) are capable of re-establishing an area and supporting a basic ecologically functional state.

In addition to the patch a minimum **buffer zone** that extends 50 m beyond the trunks of the outermost trees in the patch is defined to assist in the preservation of the patch. Fifty metres is the maximum likely height of a tree in the ecological community. The 50 m buffer zone will encompass an area large enough to protect the root zone of edge trees. The buffer zone will also help protect the ecological community from spraydrift (fertiliser, pesticide or herbicide sprayed in adjacent land) and other threats.

The purpose of the buffer zone is to protect and manage the patch and to help avoid potential significant impacts\* to the ecological community. Its purpose is not specifically to extend the patch through regeneration, although this would be beneficial.

If the use of an area (e.g. grazing land) that adjoins a patch of the ecological community is going to be intensified (e.g. intensified grazing or changed to cropping) then approval under

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<sup>1</sup> It is not uncommon for seedlings within this ecological community to be suppressed in the understorey.

\* For more information on Matters of National Environmental Significance see: [www.environment.gov.au/epbc/protect/index.html](http://www.environment.gov.au/epbc/protect/index.html)



the EPBC Act may be required. Changes in land-use to the land that falls within the buffer zone must not have a significant impact on the ecological community, but there are exemptions for continuing use\*.

### ***Surrounding environmental and landscape context***

The condition thresholds outlined above are the minimum level at which patches are to be considered under the EPBC Act for actions that may require referral to the Australian Government. These thresholds do not represent the ideal state of the ecological community. Patches that are larger, more species rich and less disturbed are likely to provide greater biodiversity value. Additionally, patches that are spatially linked, whether ecologically or by proximity, are particularly important as wildlife habitat and to the viability of those patches of the ecological community into the future.

Therefore, in the context of actions that may have ‘significant impacts’ and require approval under the EPBC Act, it is important to consider the environment surrounding patches that meet the condition thresholds. Some patches that meet the condition thresholds occur in isolation and require protection, as well as priority actions, to link them with other patches. Other patches that are interconnected to similar native vegetation associations that may not, in their current state, meet the condition thresholds have additional conservation value. In these instances, the following indicators should be considered when assessing the impacts of actions or proposed actions under the EPBC Act, or when considering recovery, management and funding priorities for a particular patch:

- Large size and/or a large area to boundary ratio – larger area/boundary ratios are less exposed and more resilient to edge effect disturbances such as weed invasion and other human impacts;
- Evidence of recruitment of key native plant species or the presence of a range of age cohorts (including through successful assisted regeneration);
- Good faunal habitat as indicated by patches containing mature (persistent residual) trees, logs, watercourses, diversity of landscape, contribution to movement corridors;
- High species richness, as shown by the variety of native species;
- Presence of listed threatened species;
- Areas of minimal weeds and feral animals, or where these can be managed;
- Connectivity to other native vegetation remnants or restoration works. In particular, a patch in an important position between (or linking) other patches in the landscape; and/or,
- Patches that occur in areas where the ecological community has been most heavily cleared and degraded, or that are at the natural edge of its range.

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\* For more information on Matters of National Environmental Significance see: [www.environment.gov.au/epbc/protect/index.html](http://www.environment.gov.au/epbc/protect/index.html)

## 6. National Context

The area where Lowland Rainforest occurs has significant biodiversity values. It is located in the McPherson Macleay Overlap, contains the Big Scrub rainforest, supports World Heritage Rainforest and includes the Border Ranges which is one of Australia's National Biodiversity Hotspots.

The core of the Lowland Rainforest ecological community is in the Big Scrub region near Lismore. This lowland area has been heavily cleared due to its highly fertile basalt soils. The ecological community also extends to the north and the south and includes lowland areas mainly on fertile basalt soils but also some areas on enriched sand, rhyolite and basalt enriched metasediments. Floristically, the ecological community also centres around the core area of the Big Scrub. Rainforests of this region are characterised by the following species; white booyong, black bean, native tamarind, white bolly gum, pepperberry, figs, red cedar and bangalow palm. However, the outlying patches of the ecological community (in areas such as the Bellinger and Hunter valleys) intergrade with drier rainforests and include the following species: hoop pine; whalebone tree; silky oak; and, small-leaved tuckeroo. The ecological community is generally not described as dry rainforest but may include intergrades with dry rainforest and other rainforest types that meet the key diagnostic characteristics and condition thresholds.

### *Distribution*

The ecological community primarily occurs from Maryborough in Queensland to the Clarence River (near Grafton) in NSW. The ecological community also includes isolated areas between the Clarence River and Hunter River such as the Bellinger and Hastings valleys. The ecological community occurs in the following IBRA Bioregions (V. 6.1): SE Qld Bioregion and NSW North Coast Bioregion.

The ecological community is known to occur in the following Natural Resource Management (NRM) and Catchment Management Authority (CMA) regions: SE Queensland Catchments, Burnett Mary Regional Group, Northern Rivers and Hunter-Central Rivers.

The latitudinal distribution of the ecological community is confined by recognised dry corridors in both the north and the south. A low rainfall corridor associated with the absence of subcoastal highlands, which in the humid areas ensure orographic rainfall eastwards, occurs north of Gladstone to Rockhampton (Webb and Tracey, 1981; Adam, 1992). The Hunter Valley also acts as a dry corridor south to the Hawkesbury sandstone around Sydney. These corridors separate the Lowland Rainforest ecological community from more tropical rainforest in the north and the transitional rainforests in the south.

The ecological community does not include the rainforest on Queensland's sand islands such as Fraser Island as the rainforests on these islands have a closer affinity to Littoral Rainforest. However, it does occur on alluvial sands accumulated from terrestrial sources elsewhere.

The ecological community does not include rainforest found further south, such as in the Illawarra region. Rainforests in the Illawarra region generally occur at higher altitudes (Mills, 1987) and are characterised by different species. With increasing altitude rainforest also become less diverse and structurally simpler (Adam, 1992). The Illawarra is beyond the southern limits of Floyd's (1990a) *Argyrodendron trifoliolatum* alliance which is typical in the Lowland Rainforest ecological community. The Illawarra region is the northern limit to many southern cool temperate rainforest species. Many of the species common in the Lowland Rainforest ecological community are not found in the Illawarra as they do not survive the lower temperatures (Mills, 1987).

The Macpherson Macleay Overlap spans the Queensland NSW border, from the Macpherson Ranges in the north to the Macleay River in the south (Webb and Tracey, 1981). Much of the rainforest in the Overlap is part of the Mount Warning shield which extends between Beenleigh on the northern edge of the shield and the Richmond River on the southern edge. The Overlap region has a high diversity and a large area of Lowland Rainforest, including the Big Scrub (Webb and Tracey, 1981). The rainforests of the Mount Warning shield are particularly important for conservation of both rare plants and species of ecological significance. Twenty-three rainforest plant species are endemic to the Border lowlands and adjacent low ranges and approximately 200 rainforest species are either at their northern or southern limits on the Mount Warning shield (Lott and Duggin, 1993).

### ***Similar ecological communities***

***Littoral Rainforest*** and Lowland Rainforest have some overlap in species composition. Littoral Rainforest typically has lower stature than Lowland Rainforest due to maritime influences including windshear. Species diversity and the abundance of vines, buttresses, ground ferns and epiphytes are lower in Littoral Rainforest. In some circumstances there are also more sclerophyllous species such as *Eucalyptus*, *Corymbia* and *Banksia* as well as salt tolerant species.

The major canopy species in Littoral Rainforest are: *Podocarpus elatus* (plum pine, brown pine), *Ficus obliqua* (small-leaved fig), *F. macrophylla* (Moreton Bay fig), *Drypetes deplanchei* (yellow tulip, grey boxwood), *Cryptocarya triplinervis* var. *triplinervis* (brown laurel, three-veined cryptocarya), *Cupaniopsis anacardioides* (tuckeroo), *Acmena hemilampra* (*Syzygium hemilamprum* – broad-leaved lilly pilly, blunt satinash), *Acmena smithii* (*Syzygium smithii* – lilly pilly, lillipilly satinash), *Lophostemon confertus* (brushbox) and *Syzygium luehmannii* (riberry, cherry satinash) (Floyd, 1990a). These areas will usually also have salt tolerant species such as *Acronychia imperforata* (logan apple), *Alectryon coriaceus* (beach alectryon), *Cupaniopsis anacardioides* (coastal tuckeroo) and *Macaranga tanarius* (macaranga) present. The Listing Advice for Littoral Rainforest and Vine Thickets of Eastern Australia contains a more complete list of flora and fauna (TSSC, 2008).

***Wet sclerophyll forests*** that occur adjacent to Lowland Rainforest are characterised by a tall, open, sclerophyllous tree canopy of *Eucalyptus grandis* (flooded gum), *E. microcorys* (tallowwood) and *E. pilularis* (blackbutt) and an understorey of soft-leaved, shrubs, ferns and herbs. Many understorey plants are rainforest species or have close rainforest relatives. This type of forest is often found at the margin of the Lowland Rainforest, usually on the more exposed and drier areas. Emergents such as *Eucalyptus saligna* (Sydney blue gum), *Lophostemon confertus* (brush box), *Syncarpia glomulifera* (turpentine) and *E. acmenoides* (white mahogany) occur more frequently than in Lowland Rainforest. Wet sclerophyll forest may have an understorey of rainforest species but the emergent, non-rainforest species of >30% (DECC, 2007) is greater than that found in Lowland Rainforest.

Wet sclerophyll forest relies on fire for regeneration of some species. The understorey of wet sclerophyll forest typically consists of palms in the poorly drained valley floors or small trees and shrubs such as *Elaeocarpus reticulatus* (blueberry ash), *Brachychiton acerifolius* (flame tree) and *Backhousia myrtifolia* (grey myrtle) in the better drained areas (DECCW, 2005).

**Dry rainforests** that occur adjacent to Lowland Rainforest tend to have no palms and fewer fern and herbs species than Lowland Rainforest, but more shrubs and vines in the understorey (Keith, 2004). Dry rainforests occur where the soil moisture and nutrients are less than areas that support Lowland Rainforest. Typically these rainforests occur in rough terrain and rocky substrates (Keith, 2004) and at higher altitudes than Lowland Rainforest. Dry rainforest is characterised by canopy species such as *Alectryon subcinereus* (wild quince), *Backhousia sciadophora* (shatterwood) and *Brachychiton discolor* (lacebark tree) (Keith, 2004).

***Relationships to State-listed ecological communities and state vegetation classifications***

All or part of the following equivalent state vegetation classifications and ecological communities are representative of the national Lowland Rainforest ecological community where the requirements of the Description, Key diagnostic characteristics and Condition thresholds are met. Lowland Rainforest is not limited to these state equivalents.

***Qld Regional Ecosystems:***

- 12.3.1 Complex to simple notophyll vine forest- Gallery rainforest (notophyll vine forest) on alluvial plains (endangered)
- 12.5.13 Microphyll to notophyll vine forest +/- *Araucaria cunninghamii* (endangered)
- 12.8.3 Complex notophyll vine forest – complex notophyll vine forest on Cainozoic igneous rocks (no concern)
- 12.8.4 Complex notophyll vine forest with *Araucaria* spp. on Cainozoic igneous rocks (no concern)
- 12.8.13 Araucarian complex microphyll vine forest on Cainozoic igneous rocks (of concern)
- 12.11.1 Simple notophyll vine forest often with abundant *Archontophoenix cunninghamiana* (“gully vine forest”) on metamorphics +/- interbedded volcanics (no concern)
- 12.11.10 Notophyll vine forest +/- *Araucaria cunninghamii* on metamorphics +/- interbedded volcanics (no concern)
- 12.12.1 Simple notophyll vine forest usually with abundant *Archontophoenix cunninghamiana* (“gully vine forest”) on Mesozoic to Proterozoic igneous rocks (of concern)
- 12.12.16 Notophyll vine forest on Mesozoic to Proterozoic igneous rocks (no concern)

***New South Wales***

Ecological Communities listed under the NSW *Threatened Species Conservation Act 1995*:

- Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions (Endangered)
- Lowland Rainforest on floodplain in the NSW North Coast Bioregion (Endangered)

### ***Relationships to other vegetation classifications***

The ecological community corresponds, entirely or in part, to the following vegetation classifications:

*National Vegetation Information System (NVIS) (v. 3.1):*

- Major Vegetation Group (MVG) 1: Rainforest and vine thickets
- Major Vegetation Subgroup (MVS) 2: Tropical or subtropical rainforest

*Webb (1968):*

- Rainforest of Provinces A1 and A2 – Southern Queensland and New South Wales
- Rainforest of Provinces C1 – coastal lowlands and adjacent ranges of southern Queensland for just north of Brisbane to Mackay (with extensions north and south)

*Keith (2004):*

- Subtropical Rainforests
- Northern Warm Temperate Rainforests

*Floyd (1990b):*

- *Argyrodendron trifoliolatum* Alliance  
Suballiance 1: *Argyrodendron trifoliolatum*  
Suballiance 2: *Toona – Flindersia*  
Suballiance 3: *Cryptocarya obovata – Dendrocnide excelsa – Ficus spp – Araucaria.*  
Suballiance 4: *Elaeocarpus grandis,*  
Suballiance 5: *Castanospermum australe – Dysoxylum muelleri*  
Suballiance 6: *Archontophoenix – Livistona*
- *Dendrocnide excelsa – Ficus spp.* Alliance  
Suballiance 15: *Ficus spp. – Dysoxylum fraserianum – Toona – Dendrocnide*  
*Drypetes australasica – Araucaria cunninghamii* Alliance  
Suballiance 21: *Araucaria cunninghamii*  
Suballiance 22: *Flindersia spp. – Araucaria*  
Suballiance 23: *Ficus – Streblus – Dendrocnide – Cassine,*
- *Castanospermum – Waterhousea floribunda* Alliance  
Suballiance 24: *Castanospermum – Grevillea robusta*  
Suballiance 25: *Streblus – Austromyrtus*  
Suballiance 26: *Waterhousea floribunda – Tristaniopsis laurina*
- *Ceratopetalum apetalum* Alliance  
Suballiance 33: *Ceratopetalum/Schizomeria Argyrodendron/Sloanea*

## *Heritage*

In 1986 a number of rainforest reserves located on the Great Escarpment of eastern NSW, known as the Australian East Coast Sub-tropical and Temperate Rainforest Parks were inscribed on the World Heritage list for their outstanding natural universal values:

- as an outstanding example representing major stages of the earth's evolutionary history;
- as an outstanding example representing significant ongoing geological processes and biological evolution; and
- containing important and significant habitats for the *in situ* conservation of biological diversity.

Large extensions, including reserves in south-east Queensland, were listed in 1994. In 2007 the World Heritage Committee agreed to the new title of the ***Gondwana Rainforests of Australia*** (DEWHA, 2010a). The listing of Gondwana Rainforests includes 42 separate reserves located between Newcastle and Brisbane with only areas of reserved Crown land included (DEWHA, 2010a).

There is some overlap of the World Heritage listing of Gondwana Rainforests of Australia and the Lowland Rainforest of Subtropical Australia ecological community listing. Areas in reserves such as Main Range National Park, Border Ranges National Park, Lamington National Park and Nightcap National Park are included in the World Heritage listing and also contain significant patches of the ecological community. However, there are also numerous smaller patches of the ecological community which lie outside reserves, and therefore the World Heritage listing. These smaller areas make up a significant number of the remaining patches of the ecological community. They are also valuable stepping-stones and corridors between the larger rainforest reserves, yet they have continued to be susceptible to a number of threats as they have had little or no protection.

## **7. Relevant Biology and Ecology**

The protection of ecological communities or species alone will not be effective unless the ecological processes that sustain them are maintained (Bennett et al., 2009). Many types of ecological processes sustain biodiversity. These include climate processes, primary productivity, hydrological processes, formation of biophysical habitats, interactions between species, movement of organisms and natural disturbance regimes (Bennett et al., 2009).

Movement of organisms within and between ecological communities occur at different spatial and temporal scales depending on size, behaviour and ecology of the species concerned (Bennett et al., 2009). Movements of animals may occur: i) on a daily basis for activities such as foraging, avoiding predators, or for social interactions; ii) to allow individuals to track resources that vary irregularly in space and time; iii) to undertake large-scale seasonal migrations; iv) to access resources at different life-cycle stages, such as moving to or from breeding sites; and v) for newly independent individuals to disperse and establish in a new location. Movements fulfil a variety of roles that contribute to the survival and successful reproduction of individuals and persistence of populations. Movements by organisms also are critical to interspecific interactions such as mutualisms (pollination, seed dispersal), predation, parasitism and competition, which influence the composition of communities (Bennett et al., 2009).

For the Lowland Rainforest ecological community, the movement of some vertebrate fauna is affected by the distance between remnants and consequently the dispersal of some plant

species is affected by the mobility of their animal dispersers. For example, plant species dispersed by native rats are likely to be limited by distances between remnants greater than 0.5 km, whereas plants that rely on flying mammal dispersers such as *Pteropus poliocephalus* (grey-headed flying-fox) that have been shown to disperse seeds of rainforest plants up to 40 km from foraging sites to their daytime camps (Eby, 1989, 1991, 1995) can cope with greater distances between patches of Lowland Rainforest.

Bird species that may have the greatest potential to disperse a large volume and wide variety of plants, including large-seeded plants, tend to be less abundant outside of extensive forests (Moran et al., 2004b). This also suggests that the extent to which dispersal of certain plant species is limited in fragmented Lowland Rainforest (Moran et al., 2004b) is affected by the plant's dispersal mechanism. In some cases these birds are being replaced by smaller bird species that do not disperse the same suite of large seeded plant species (such as species from Lauraceae, Elaeocarpaceae and Sapotaceae families). This means that fewer seedlings of such plant species will be recruited to many rainforest regrowth or remnant patches (Moran et al., 2004a). The smaller bird species that have been observed to be increasing such as the silvereye (Moran et al., 2004b) are also associated with the dispersal of weed species that are common in the fragmented landscape.

The fruits of most rainforest plants are dispersed by animals, particularly birds and bats, but also possums, small mammals, lizards and ants. Somewhat paradoxically, seed predation by insects and rodents, and the browsing of seedlings by herbivores from caterpillars to wallabies, are together thought to play a major role in maintaining the diversity of rainforest plants, by limiting the competitive dominance of species (Big Scrub Rainforest Landcare Group, 2005). On the forest floor worms, mites and a myriad of invertebrates, aided by the raking of lyre-birds, brush turkeys, logrunners and other animals, help to decompose the leaf litter, fallen logs and other refuse of the forest, and promote the recycling of nutrients (Big Scrub Rainforest Landcare Group, 2005). While fleshy fruits sustain a wide range of vertebrate species, the foliage of rainforest trees supports a vast diversity of invertebrate species (Keith, 2004).

Natural regenerative capacity relies not only on seed sources and dispersal but also on pollination. Although some species utilise vertebrate pollinators (e.g. black bean), insects are the dominant pollinators in lowland rainforest (Williams and Adams, 1998). Effective pollination by generalist insect pollinators is most likely to occur within 50 m and unlikely beyond 100 m (Big Scrub Rainforest Landcare Group, 2005). While canopy trees can benefit from a wide range of different pollinators, there is growing awareness that understorey species such as small trees, shrubs, herbs and epiphytes rely on specialist pollinators (Williams and Adams, 1998). Clearing the understorey and increasing fragmentation are therefore more likely to impact acutely on regenerative processes. However, the indirect impacts of loss of pollinators are unlikely to be immediately noticed, and without close monitoring of recruitment may remain masked by current species assemblages. It may take decades to realise the lack of recruitment of key species that support specialist pollinators (Big Scrub Rainforest Landcare Group, 2005). Where individual species are part of a sequential flowering season for local pollinators, their loss may affect the dynamics of the entire remnant patch and possibly further afield (Big Scrub Rainforest Landcare Group, 2005).

The fragmentation of the Lowland Rainforest ecological community, and consequently the habitat for local flora and fauna, has impacted on the ecological processes and the species composition of flora and fauna in the fragmented landscape.

### ***Listed threatened species***

A total of 63 plant species and 42 animal species are listed as threatened under national or state legislation at 31 January 2011. This includes:

- 34 flora species listed under the Commonwealth *EPBC Act 1999*
- 12 fauna species listed under the Commonwealth *EPBC Act 1999*
- 52 flora species listed under the NSW *Threatened Species Conservation Act 1995*
- 34 fauna species listed under the NSW *Threatened Species Conservation Act 1995*
- 37 flora species listed under the Queensland *Nature Conservation Act 1992*
- 24 fauna species listed under the Queensland *Nature Conservation Act 1992*

A list of all threatened species associated with Lowland Rainforest is at [Appendix D](#).

### **8. Description of Threats**

The main ongoing threats to the Lowland Rainforest ecological community are:

- land clearing;
- impacts associated with fragmentation of remnants;
- weeds; and,
- private native forestry.

### ***Land Use History***

Prior to European settlement, virtually the whole of the north coast of NSW was forested. It formed part of a continuum of forest stretching along most of the coast of NSW and southern Queensland. In areas of high rainfall and better soils, the predominant forest type was subtropical rainforest (Big Scrub Rainforest Landcare Group, 2005). Lowland Rainforest of the Big Scrub area near Lismore originally covered 750 square kilometres, and was the most extensive Lowland Rainforest in south-eastern Australia.

In the pre-European landscape, rainforest patches were set within a matrix of more open forest and woodland (dominated by *Eucalyptus* and *Acacia* spp.) from which they differ both structurally and floristically (Webb, 1968; Floyd, 1990a; Neilan et al., 2006). It is likely that the Lowland Rainforest ecological community would have lined the major rivers on the floodplains above the reaches of tidal influence (Keith and Scott, 2005). It would also have spread across elevated flats where moisture and soil nutrients were in abundance, particularly on the Tweed, which receives more rainfall than any of the other major floodplains (Keith and Scott, 2005).

It is thought that the Indigenous people of NSW used Lowland Rainforest seasonally for food and raw materials such as macadamia nuts, figs, wild grapes, yams, cunjevoi roots, the heart of bangalow and cabbage palms, black bean seeds, brush turkeys, bandicoots, pademelons and small wallabies (Keith, 2004; Big Scrub Rainforest Landcare Group, 2005). The fibre from the bark of *Dendrocnide excelsa* (giant stinging tree) was used to make nets for fishing and hunting (Keith, 2004).

Lowland Rainforest provided one of the world's most prized cabinet timbers to early European settlers. *Toona ciliata* (red cedar) was in huge demand as a cabinet timber within Australia and overseas. When the red cedar resource was exhausted, the loggers turned their



attention to *Gmelina leichhardtii* (white beech) and *Araucaria cunninghamii* (hoop pine) (Keith, 2004).

Farming on the newly cleared land took over as the major land use in the 1880s (Keith, 2004). By the twentieth century, most Lowland Rainforest had been cleared for agriculture (Keith, 2004). Today Lowland Rainforest is reduced to scattered remnants, many only a few hectares in size, such as Davis Scrub and Booyong Flora Reserve. Larger stands survive on the Border and Nightcap ranges and in World Heritage areas (Keith, 2004).

In addition to timber, early settlers used Lowland Rainforest for hunting. Pigeons and turkeys were hunted as one of the few sources of fresh meat, and pademelons, possums and water rats were a source of hides (Frith, 1977).

Since much of Lowland Rainforest has been cleared, regrowth dominated by camphor laurel (*Cinnamomum camphora*) has become common on former agricultural land (Frith, 1977; Neilan et al., 2006).

### ***Land Clearing***

Land clearing continues to threaten floodplain vegetation, as rural enterprises and hobby farms expand into the upper reaches of the floodplains (Keith and Scott, 2005). The density of isolated trees continues to decline through senescence without replacement and with the conversion of grazing properties to cropping (Keith and Scott, 2005).

Ongoing incremental clearing of vegetation for agricultural activities (in particular macadamias and fruit crops), horticultural industry (and the subsequent introduction of new potential weeds), hobby farming, peri-urban and rural residential development (including vegetation removal for bush fire protection), and private native forestry are further adding to isolation and fragmentation of Lowland Rainforest remnants.

### ***Weeds and feral animals***

Weeds compete with native species in the ecological community for space, light, water and nutrients. They also suppress and out-compete mid-storey and canopy trees. Weeds are a major threat to the long-term viability and survival of the majority of Big Scrub remnants and many Lowland Rainforest remnants elsewhere.

Key Threatening Processes (KTPs) listed under the NSW *Threatened Species Conservation Act 1995* and the EPBC Act impact the fauna of Lowland Rainforest. For instance, the *Invasion and establishment of Cane Toad (Bufo marinus)* and *Predation by European Red Fox (Vulpes vulpes)* both have widespread impacts throughout the distribution of Lowland Rainforest. The most serious impact of these KTPs is in small remnants and the edges of larger remnants. All vertebrates are impacted with small frogs, reptiles and mammals preyed upon by the cane toad and larger predatory species poisoned when cane toads are ingested. Cane toads shelter and forage in small remnants and edges, particularly if there is suitable adjacent breeding habitat such as farm dams. The red fox also has dens in small remnants of Lowland Rainforest and forages through these and along the edges of large patches taking a range of reptiles, birds and small mammals.

Introduced mammals found in remnants of Lowland Rainforest include: black rat (*Rattus rattus*), house mouse (*Mus musculus*), hare (*Lepus capensis*), rabbit (*Oryctolagus cuniculus*), wild dog (*Canis familiaris*), European red fox (*Vulpes vulpes*) and cat (*Felis catus*). Small remnants are particularly vulnerable to feral animals (Lott and Duggin, 1993).

The significance of the threat posed by weeds is reflected by the listing of *The invasion and establishment of exotic vines and scramblers* as a Key Threatening Process under the NSW *Threatened Species Conservation Act 1995* and the *Loss and degradation of native plant and*

*animal habitat by invasion of escaped garden plants, including aquatic plants as a Key Threatening Process under the EPBC Act.*

Numerous weeds affect remnants of the Lowland Rainforest ecological community. They compete with native species for space, light and other resources but they also provide resources to other plants and animals in the ecological community. Woody weeds such as camphor laurel and tobacco bush (*Solanum mauritianum*) shade and inhibit the growth of other plants including detrimental weeds such as cat's claw creeper (*Macfadyena unguis-cati*), madeira vine (*Anredera cordifolia*), morning glory (*Ipomoea* spp.), wandering jew (*Tradescantia fluminensis*), climbing asparagus (*Asparagus plumosus*), ochna (*Ochna serrulata*) and small-leaved privet (*Ligustrum sinense*). Woody weeds can also provide an improved microclimate for rainforest seedlings to grow (Big Scrub Rainforest Landcare Group, 2008). Birds and other animals use the weeds for food and shelter, e.g. *Psophodes olivaceus* (eastern whipbird) uses lantana (*Lantana camara*) for nesting from winter to spring and numerous butterflies feed on its flowers (Big Scrub Rainforest Landcare Group, 2008).

#### Camphor laurel (*Cinnamomum camphora*)

Camphor laurel is a fast-growing woody weed that can colonise and reforest cleared ex-rainforest land. Camphor laurel dominates many abandoned pastures and edges and dominates the canopy of many regrowth patches where it shades out and competes with other vegetation. The species is known to exclude native rainforest species from establishing (by competing for space and resources) and to retard the growth of some rainforest species in its vicinity (Big Scrub Rainforest Landcare Group, 2008).

Camphor laurel is considered to be an undesirable invasive plant in productive agricultural lands and some types of native forest, but it also provides food resources and other habitat (including stepping-stones) for rainforest wildlife, and hence may contribute to regional conservation (Date et al., 1996; Neilan et al., 2006). Neilan et al. (2006) also suggest that camphor laurel facilitates the recruitment of native rainforest plants into abandoned farmland. Camphor laurel can successfully recruit in pasture and, if grazing pressure is reduced, grow rapidly amongst grasses to form a regrowth patch. Once established, camphor laurel regrowth develops a relatively complex forest structure. The moderately dense canopy cover and litter layer create shade and other physical conditions which suppress the growth of pasture grasses and herbaceous weeds, but are suitable for the germination and growth of native rainforest plants (Neilan et al., 2006). There is potential for camphor laurel stands to develop into transitional communities between abandoned pasture and regrowth rainforest (Big Scrub Rainforest Landcare Group, 2005).

It is therefore important to consider the role camphor laurel plays as a transitional ecological community when planning weed management strategies in Lowland Rainforest patches. In some areas where it dominates, camphor laurel is regarded as a rainforest type (DECCW, 2010) as it provides an important seasonal resource (Neilan et al., 2006; DECCW, 2010). However, in areas where it is not dominant and is still actively taking over areas of native vegetation such as patches of the Lowland Rainforest ecological community, it should be considered an invasive species and prevented from establishing (DECCW, 2010).

#### ***Private Native Forestry***

Private native forestry is intended to be the sustainable use of native vegetation on privately-owned land in NSW for obtaining forest products including sawlogs, veneer logs, poles, girders, piles and pulp logs. Although it is excluded from vegetation patches that meet certain rainforest definitional criteria, the implementation of this management practice is threatening remnants of the Lowland Rainforest ecological community in NSW, particularly smaller remnants.

Private native forestry is excluded from areas of old growth forest and rainforest where rainforest is defined as tree-dominated vegetation where the tree stratum (over 3 m in height) has rainforest species making up 50% or more of the crown cover, except where non rainforest emergent species (including brushbox and turpentine) occur and exceed 30% or more of the upper stratum crown cover (DECC, 2007). Rainforest includes all areas of rainforest mappable at a 1:25 000 scale. Rainforest also includes areas exceeding 0.5 hectares occurring as isolated clumps or lineal strips of rainforest trees (DECC, 2007).

Private native forestry may also occur in endangered ecological communities listed under the NSW *Threatened Species Conservation Act 1995*, as part of an approved Ecological Harvesting Plan approved by the Director General of the NSW Department of Environment (DECC, 2007).

### ***Native Forest and Horticulture Plantations***

The proposal to replace stands of camphor laurel with short rotation eucalypt plantations reduces the food and habitat resources for rainforest fauna (Neilan et al., 2006). Eucalypt plantations near Lowland Rainforest remnants also increase fire risks in the ecological community (Neilan et al., 2006).

The increase in herbicide, pesticide and fertiliser use near remnants as a result of the shift from, for example, dairy farming to more intensive tropical fruit cultivation (such as avocados and macadamia plantations) potentially poses a threat to the Lowland Rainforest ecological community (Gilmour and Helman, 1991; Lott and Duggin, 1993). The impact of invading edge and weed species is also likely to be increased with this change in landuse (Gilmour and Helman, 1991). The proximity of remnants to macadamia plantations has resulted in introduced black rats becoming a pest. The impact of this species on native rodents is not known within the ecological community (Lott and Duggin, 1993) but it is likely to be negative.

### ***Grazing***

Some remnants of Lowland Rainforest are grazed by domestic stock. Cattle often damage or destroy the understorey and native ground covers and remove naturally regenerating seedlings. In doing so, they alter the species composition of Lowland Rainforest, damage the vegetation and degrade land by causing soil compaction and erosion problems.

### ***Pathogens***

Myrtle rust (*Uredo rangelii*) is part of the group of fungi that includes guava rust and eucalyptus rust (Carnegie et al., 2010). It originated in South America but was first identified in Australia in a nursery on the Central Coast of NSW in April 2010. Myrtle rust affects plants in the Myrtaceae family, including native species found in the Lowland Rainforest ecological community such as *Syzygium floribundum* (weeping lilly pilly). Plants affected by myrtle rust often suffer dieback. The rust can compromise the plants ability to thrive and reproduce and can cause the plant to eventually die. The fungus thrives in humid conditions so Lowland Rainforest is particularly susceptible to myrtle rust. Myrtle rust has spread throughout the range of Lowland Rainforest.

### ***Fragmentation***

Many patches of the ecological community now exist in very small remnants in areas where Lowland Rainforest was once widespread. Remnants are scattered through an open landscape that is largely agricultural (grazing) land. As the fragmentation of Lowland Rainforest continues, the viability of remnants as habitat for native plants and animals is threatened.

The effects of fragmentation on vertebrate fauna are better understood than effects on other groups. There is often a rapid loss of some fauna species and an increase in other species, particularly generalist species, following isolation. These ecological imbalances are likely to drive the loss of additional species in isolated patches. Thus, a Lowland Rainforest remnant may pass quickly through a series of unstable transient states until it reaches a biologically simplified equilibrium (Hunter, 1998). Fragmentation can affect invertebrate species dramatically as they are short-lived and sensitive to fine-scale environmental variation (Hunter, 1998).

Fragmentation increases the competition for resources such as food and shelter as these become more and more limiting as remnants get smaller in size (Hunter, 1998). Bird species that facilitate dispersal of a large volume and variety of plants, tend to be less abundant in fragmented forests (Moran et al., 2004b). This suggests that dispersal of certain plant species is limited in fragmented Lowland Rainforest (Moran et al., 2004b; Neilan et al., 2006).

The fragmentation of the Lowland Rainforest in the Big Scrub area has resulted in the loss of birds such as the *Atrichornis rufescens* (rufous scrub-bird) and *Dasyornis brachypterus* (eastern bristlebird) (Hunter, 1998; DECC, 2005). It has also been suggested to have caused the local extinction of *Maccullochella ikei* (Clarence River cod) due to major changes in watercourses (Hunter, 1998). The fragmentation of Lowland Rainforests has also been a major factor in the decline and near extinction of Coxen's fig parrot (Hunter, 1998).

Rainforest trees are often long-lived and may respond slowly to fragmentation. Some species may be functionally extinct in remnants before they have actually disappeared. Co-evolved pollinators or seed dispersers may have disappeared. However, for many species there may be gene flow between remnants because of movement of pollinators and seed dispersers. Remnants may therefore contribute to the genetic connectivity of a larger metapopulation and act as stepping-stones (Hunter, 1998).

### ***Edge effects***

Fragmentation and the creation of patches with long edges results in physical and biotic changes which have major impacts on the ecology of the remnant. The edges of a remnant are subject to physical effects which include elevated wind turbulence and incursion, temperature variability, lateral light penetration and reduced humidity (Hunter, 1998). These changes in the physical environment of Lowland Rainforest have consequences for the plants and animals which inhabit the remnant. The species diversity of some generalist species increases near edges and some specialist rainforest species are generally uncommon near edges (Hunter, 1998). Predation on nesting birds and seeds may increase near edges and in fragments due to an influx of generalist predators from the surrounding matrix which influence the success of regeneration within remnants. Increased windshear forces may cause an increase in the frequency of treefall gaps (Hunter, 1998).

### ***Climate Change***

The effects of climate change, increased human population numbers and associated human disturbances will impact on Lowland Rainforest. Climate change predictions for northern NSW and south-east Queensland indicate a shift to warmer minimum and maximum temperatures, more extreme fire event days, fewer but more intense extreme weather events such as storms with destructive winds and sea level rise (DECC, 2009). Many faunal species are expected to migrate to cooler, higher elevations. Adequate corridors of suitable vegetation will be needed to facilitate this movement. Less mobile species will be more significantly impacted by climate change (Blyth, 1991; Westoby and Burgman, 2006).

Habitat loss and fragmentation present increasingly serious problems in the context of global climate change, as smaller patches of ecological communities will be less resilient and

isolated ecological communities will have difficulty shifting their ranges to track changing environments. A potential solution is to provide *structural connectivity* i.e. elements of the landscape (typically some form of native vegetation) that physically link isolated patches of habitat. These linkages will allow individuals and/or their genes to disperse between multiple small patches, allowing these subpopulations to collectively function as larger, more resilient metapopulations (Doerr et al., 2010).

The effect of changing climate on Australian landscapes is likely to be significant because extensive land clearing and post European settlement have left fragmented remnants of native vegetation within a matrix dominated by agricultural production (Doerr et al., 2010).

### ***Fire***

Unlike most other vegetation types in Australia, rainforest is not adapted to fire (Floyd, 1990a). Fire is an important factor in limiting rainforest boundaries (Bowman, 2000). Rainforest species are capable of colonising eucalypt forests and grasslands but are only likely to survive to maturity if fire is excluded until the rainforest species have formed a closed community (Bowman, 2000). However, most rainforest species can regenerate after a single fire (Bowman, 2000). It is therefore, the frequency of fires that is critical.

Weeds can substantially change fuel characteristics at rainforest boundaries (Bowman, 2000). Therefore, Lowland Rainforest remnants with a high woody weed component, or surrounded by land with a high woody weed component, are more susceptible to the impacts of fire.

## **9. How judged by the Committee in relation to the EPBC Act criteria.**

### ***Criterion 1 - Decline in geographic distribution***

#### **New South Wales**

The area of all rainforest in NSW has been reduced by about 90% since European settlement (Floyd, 1990a; Gilmour and Helman, 1991). The core area of Lowland Rainforest in the Big Scrub has been reduced from 75 000 ha to <750 ha (<1% remaining) (Floyd, 1990a; Gilmour and Helman, 1991; Big Scrub Rainforest Landcare Group, 2005). This trend has been shown to apply to the entire geographic extent of the ecological community. Detailed analysis of the NSW mapping undertaken by Flint and Cerese (unpublished) has determined that the Lowland Rainforest ecological community in NSW has been reduced from 187 280 ha to 11 170 ha. Over 94% of the ecological community has been cleared.

The current extent of Lowland Rainforest within protected areas is 1 988 ha (Flint and Cerese, unpublished). This is across 41 different national parks or reserves, however the majority is within Nightcap National Park (525 ha), Border Ranges National Park (283 ha), Mooball National Park (203 ha), Mt Jerusalem National Park (143 ha) and Inner Pocket Nature Reserve (104 ha).

#### **Queensland**

There are eight Queensland Regional Ecosystems (REs) that are considered to contain Lowland Rainforest. These are: 12.3.1, 12.5.13, 12.8.3, 12.8.4, 12.11.1, 12.11.10, 12.12.1 and 12.12.16. The remaining extent of these REs (at an altitude <300 m above sea level) ranges from 5% to >70% of that likely to exist prior to European settlement (McDonald pers. comm. 2010). However, these regional ecosystems are substantially broader than the Lowland Rainforest ecological community. Not all areas mapped as the REs will match the 'description', 'key diagnostic characteristics' and 'condition thresholds' that define the national Lowland Rainforest ecological community.

Flint and Cerese (unpublished) assessed the extent of the Lowland Rainforest ecological community in Queensland prior to European settlement to be 8 840 ha. The extent remaining today is estimated at 2 910 ha.

The extent within protected areas is 643 ha. The largest occurrences in protected areas are in Springbrook National Park (approx. 260 ha), Lamington National Park (approx. 100 ha), Kondalilla National Park (approx. 95 ha) and the Glass House Mountains National Park (approx. 70 ha).

### **Total**

The pre-European extent of the Lowland Rainforest ecological community is estimated to be 196 110 ha. The current extent is estimated to be 14 080 ha. These results indicate that there is only 7.2 % of the ecological community remaining across its range and that more than 92% of the community has been cleared since European occupation of Australia.

The estimates of decline do not take into consideration the condition of remnants. It is likely that the extent of Lowland Rainforest that remain in good condition, and meet the condition thresholds, is lower than indicated above. The Committee considers that the ecological community has undergone a **severe** decline in geographic distribution. Therefore, the ecological community has been demonstrated to have met the relevant elements of Criterion 1 to make it **eligible** for listing as **endangered**.

### ***Criterion 2 - Small geographic distribution coupled with demonstrable threat***

As detailed in Section 8 – ‘Description of Threats’, the Lowland Rainforest ecological community is subject to several ongoing demonstrable threats. Key threats include ongoing vegetation clearance, impacts associated with fragmentation of remnants and weed invasion.

The purpose of this criterion is to recognise that an ecological community with a distribution that is currently small has an inherently higher risk of extinction if it is subject to a threatening process. Thresholds to identify terrestrial vegetation communities with small distributions are typically based on three indicative measures. These are the area of occupancy, total extent of occurrence and patch size (indicative of fragmentation). If any of the three measures is demonstrated to apply to the ecological community it is considered to have a small geographic distribution.

The distribution of Lowland Rainforest occurs over a large area of eastern Australia from Maryborough in Queensland to the Hunter River in NSW. Neither the total area of occupancy or the total extent of occurrence of this ecological community are restricted. However, within its distribution it occurs in a range of patch sizes. Of the 2 683 mapped patches, 88.7% were less than 10 ha in size and only 16 patches exceed 100 ha. The average patch size for Lowland Rainforest is 5.4 ha. The fragmentation of this ecological community makes it very vulnerable to the ongoing threats such as the impacts of edge effects, limitations to dispersal mechanisms and increased vulnerability to the potential impacts of climate change.

The Committee considers that the ecological community has a **very restricted** distribution, as evidenced by highly fragmented remnants with the majority (>88%) of patches being a very small size, typically less than 10 ha. There is also clear evidence that the ecological community is subject to a range of ongoing threats that could cause it to be lost in the immediate future. Therefore, the ecological community has been demonstrated to have met the relevant elements of Criterion 2 to make it **eligible** for listing as **critically endangered**.

### ***Criterion 3 - Loss or decline of functionally important species***

The relationship between species is important for maintaining ecosystem function in the Lowland Rainforest ecological community. Frugivorous birds and mammals are important for seed dispersal of key plant species such as fig trees, quandongs, pepperberry and walnuts.

Frugivorous birds such as Coxen's fig-parrot are among other functionally important animals such as the grey-headed flying-fox that are threatened. A decline in numbers is evident in the list of over 40 animal species, which can be found in the ecological community, that are listed as threatened under national or state threatened species legislation.

The grey-headed flying-fox (Vulnerable – EPBC & NSW), is an important seed disperser for a number of Lowland Rainforest plants. Seed dispersal within and between Lowland Rainforest remnants is needed to maintain forest dynamics (Moran et al., 2004b). The grey-headed flying-fox is a key disperser likely to disperse seeds large distances. In the increasingly fragmented landscape, the functional role of this vulnerable species is increasingly important for the survival of the Lowland Rainforest ecological community.

Research has shown that the abundance of frugivorous birds (wompoo, superb and rose-crowned fruit-doves) has significantly reduced in remnants compared to extensive forest (Moran et al., 2004a,b; Neilan et al., 2006). This suggests that the birds have a minimum habitat requirement and that suitable food resources and habitat are absent or in very low abundance in pioneer vegetation and some smaller patches (Moran et al., 2004a).

It seems likely that the reduced numbers of functionally important frugivorous birds in fragmented and disturbed habitats would change the composition and rate of seed dispersal in these habitats. In addition, there is an increase in smaller birds (varied triller and the silvereve) that are likely to feed on small-seeded sugary fruits in regrowth compared to remnants and extensive forest (Moran et al., 2004b). These birds are often associated with the consumption of the seeds and fruits of introduced weeds which are typically found in abundance in fragmented parts of the landscape (Moran et al., 2004b). Although subsequent seedling germination and plant establishment, growth and reproduction are affected by a number of biotic and abiotic factors, initial seed input to a site is essential, especially in a cleared landscape.

It has been demonstrated that there is a severe change in the composition of the functionally important bird species found in the fragmented Lowland Rainforest ecological community (Moran et al., 2004a,b; Neilan et al., 2006) and, in turn, a change in the composition of plant species with a likely decrease in native species and increase in introduced species (Moran et al., 2004b). The ability of the ecological community to restore relatively quickly (with human intervention) does allow the community to re-establish a rainforest-like state and provide habitat for some rainforest dependant biota but it does not enable the ecological community to regenerate to its original state, including the restoration of all functionally important bird populations. Complete regeneration of Lowland Rainforest may take more than 44 years (Kariuki and Kooyman, 2005) and possibly as long as 800 years (Hopkins, 1990) and is unlikely in the **near future** (Summerbell, 1991; Kanowski et al., 2009). Therefore, the ecological community has been demonstrated to have met the relevant elements of Criterion 3 to make it **eligible** for listing under this criterion as **endangered**.

#### ***Criterion 4 - Reduction in community integrity***

##### Reduction in integrity through the loss of key vegetative components

In many remaining areas the species composition of the ecological community has changed. Introduced species such as camphor laurel can dominate many patches of Lowland Rainforest, out-competing native vegetation and in some cases, reducing the integrity of a patch so much that it is no longer considered part of the ecological community. The grazing of domestic animals such as cattle in patches of Lowland Rainforest also reduces the ability of native plant species to regenerate.

The size of individual remnants has been shown to affect species diversity in the Big Scrub area (Lott and Duggin, 1993). Smaller remnants (<10 ha) characteristically have a lower species diversity. Small remnants are also prone to chance removal of diagnostic tree species through clearing and its subsequent effects and invasion by other species (Lott and Duggin, 1993).

Lowland Rainforest also supports a number of rare and/or threatened plants species such as *Davidsonia jerseyana* (Davidson's plum) (Endangered-EPBC, Endangered-NSW). Many Lowland Rainforest remnants (>80%) are not protected in national parks (Flint and Cerese, unpublished) despite their importance in the conservation of these rare and/or threatened flora and their role in the maintenance of community integrity.

##### Reduction in integrity through loss of key faunal components

The number of frugivorous birds in subtropical Australia has decreased following extensive clearing of rainforests especially in lowland areas (Date et al., 1991; Moran et al., 2004a). Frugivorous birds play an important role in the ecological community as they are highly mobile and are among the most likely to carry plant seeds across cleared land. Seed dispersal within and between Lowland Rainforest remnants is needed to maintain forest dynamics.

Big Scrub data (Lott and Duggin, 1993) indicates that the size of a remnant affects its ability to support mammals. Remnants less than 20 ha in size did not contain *Rattus fuscipes* (bush rat). Similarly, *Antechinus stuartii* (brown antechinus, Stuart's antechinus) is only found in one remnant outside the Nightcap National Park/Whian Whian area (Lott and Duggin, 1993). Predation by cats and dogs may have eliminated these species from the smaller remnants, however, the presence of a dense groundcover has also been found to be important for these native mammal species (Lott and Duggin, 1993). *Thylogale thetis* (red-necked pademelon) is also absent in smaller Big Scrub remnants. The known small size of the home range of these mammal species suggests that they should be able to survive in many of the smaller remnants. The fact that they are absent indicates that other factors such as the availability of food and shelter, and predation reduce the integrity of the ecological community to a level that prevents pademelons and rodents from inhabiting the smaller remnants.

The Lowland Rainforest ecological community is habitat for over 40 animal species listed as threatened at the national or state level. It can be inferred that the decline in the abundance of these species indicates a decline in the quality of habitat the ecological community is providing as well as indicating a reduction in ecological processes reliant on the interaction of plant and animal species within the ecological community.



### Reduction in integrity through weed invasion

The ecological community is threatened by more than 130 weed species (Big Scrub Rainforest Landcare Group, 2005). These weeds compete with native species for space, light and resources. Lantana is also known to smother native species and the toxicity of camphor laurel is thought to inhibit the growth of some native species (Big Scrub Rainforest Landcare Group, 2005). Although the regeneration of the ecological community is possible if weeds are removed, it has been shown that complete regeneration may take more than 44 years (Kariuki and Kooyman, 2005) and possibly as long as 800 years (Hopkins, 1990).

### Reduction in integrity through fragmentation and degradation of habitat

Extensive fragmentation of the ecological community into isolated and disconnected remnants has ecological implications. Fragments with a high edge to area ratio are more susceptible to disturbances and adverse influences from the surrounding agricultural landscape, such as weeds and spray drift. Disconnected remnants can also affect the dispersal and movement of wildlife and plant propagules. Small remnants may also prove to be less suitable habitat for some native species e.g. bush rat, Stuart's antechinus and red-necked pademelon.

Despite the negative impacts of the fragmentation of the ecological community, it is important to highlight the significance of small and/or isolated patches. Some isolated remnants are too small to support all rainforest dependant species together but the occurrence of rainforest dependant species in scattered locations throughout the Big Scrub (despite the long periods of isolation) indicates that they are important stepping-stones between larger remnants providing supplementary food and allowing bird movement and therefore seed dispersal within and between remnants (Lott and Duggin, 1993; Moran et al., 2004a,b).

### Summary

The Committee considers that the Lowland Rainforest ecological community has undergone a **severe** reduction in its ecological integrity across most of its distribution, demonstrated by several indicators of severe degradation and disruption of important ecological processes. There is a high incidence of weeds in the ecological community and key floral and faunal components have declined. The ecological community currently exists in a highly fragmented state which has the capacity to exacerbate the impacts from ongoing threats and disturbance. It is unlikely that the ecological community will recover its full ecological integrity in the **near future**, even with positive human intervention. Therefore the ecological community is **eligible** for listing as **endangered** under this criterion.

### ***Criterion 5 - Rate of continuing detrimental change***

The Lowland Rainforest ecological community has undergone a severe decline in geographic distribution that has resulted in the remaining Lowland Rainforest being highly fragmented and vulnerable to disturbance. Exposure to an altered physical environment (light, temperature and wind) particularly on edges has continued detrimental effects on the ecological community. Disturbance of the canopy in Lowland Rainforest often promotes the growth of alien vines (that smother native trees and further disrupt the canopy) and alien groundcovers (that suppress the regeneration of other rainforest plants) (Kanowski et al., 2009). The impact of exotic weeds in this community is increased with increasing fragmentation and smaller patch sizes. The ability of the fragmented ecological community to support native flora and fauna and important ecological processes such as seed dispersal and pollination has also been reduced (Moran et al., 2004b; Big Scrub Rainforest Landcare Group, 2005).

The detrimental change occurring in this ecological community has been demonstrated by the number of threatened species associated with the ecological community, the severe decline in its geographic distribution and the disruption of ecological processes that has occurred. There is an indication that decline in the condition of Lowland Rainforest remnants is continuing and that a significant investment in ongoing maintenance, in the form of weed control and in some cases supplementary planting, is required to avoid a further increase in the rate of continuing detrimental change. However, data on the rate of change are not available to support this, therefore the ecological community is **not eligible** for listing under Criterion 5.

***Criterion 6 - Quantitative analysis showing probability of extinction***

There are no quantitative data available to assess the ecological community under this criterion. Therefore, it is **not eligible** for listing under this criterion.

## 10. Conclusion

### *Conservation status*

This advice follows the assessment of information to include the Lowland Rainforest of Subtropical Australia ecological community in the list of threatened ecological communities referred to in Section 181 of the EPBC Act. The Lowland Rainforest of Subtropical Australia ecological community meets:

- Criterion 1 as **endangered** because its decline in geographic distribution is severe; and
- Criterion 2 as **critically endangered** because its geographic distribution is very restricted and the nature of its distribution makes it likely that the action of a threatening process could cause it to be lost in the immediate future;
- Criterion 3 as **endangered** because the decline of functionally important species is severe and restoration is unlikely to be possible in the near future;
- Criterion 4 as **endangered** because the ecological community has undergone a severe reduction in community integrity such that regeneration is unlikely within the near future.

The highest category for which the ecological community is **eligible** to be listed is **critically endangered**.

### *Recovery Plan*

Due to a number of existing management plans relevant to the ecological community, the Committee considers that a recovery plan specific to the Lowland Rainforest of Subtropical Australia ecological community is a low priority. In particular, management actions relevant to the ecological community can be found in the Northern Rivers Regional Biodiversity Management Plan (DEWHA, 2010b).

## 11. Recommendations

The Committee recommends that:

- i. The list referred to in section 181 of the EPBC Act be amended by **including** in the list in the **critically endangered** category:

### **Lowland Rainforest of Subtropical Australia;**

- ii. The Minister decides not to have a recovery plan for this ecological community.
- iii. The Minister provides the following reasons for his decision not to have a recovery plan:

A recovery plan is not required at this time. The planning, implementation and coordination of recovery actions does not involve complexity beyond that which can be managed through existing management plans and processes. A conservation advice is also available that details the priority recovery actions required for this ecological community.

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<b>Appendix A Characteristic Flora Species</b>	<b>common name</b>	<b>synonym</b>
<i>Acacia bakeri</i>	marblewood	
<i>Acacia chrysotricha</i>	Newry golden wattle	
<i>Acalypha eremorum</i>	acalypha	
<i>Ackama paniculata</i>	soft corkwood, rose-leaved marara	<i>Caldcluvia paniculosa</i>
<i>Acmena ingens</i>	red apple; southern satinash	<i>Syzygium ingens</i>
<i>Acmena smithii</i>	lilly pilly, lillipilli satinash	<i>Syzygium smithii</i>
<i>Acradenia euodiiformis</i>	bonewood	
<i>Acronychia baeuerlenii</i>	Byron Bay acronychia	
<i>Actephila lindleyi</i>	actephila	
<i>Alphitonia excelsa</i>	red ash soapbush	
<i>Amyema plicatula</i>		<i>Amyema scandens</i>
<i>Angiopteris evecta</i>	giant fern	
<i>Anopterus macleayanus</i>	Macleay laurel	
<i>Anthocarapa nitidula</i>	incense tree, bog onion	
<i>Aphananthe philippinensis</i>	rough leaved elm, grey handlewood	
<i>Araucaria cunninghamii</i>	hoop pine	
<i>Archidendron hendersonii</i>	white laceflower	
<i>Archidendron muellerianum</i>	veiny laceflower	
<i>Archontophoenix cunninghamiana</i>	bangalow palm	
<i>Ardisia bakeri</i>	ardisia bakeri	
<i>Argyrodendron actinophyllum</i>	black booyong	
<i>Argyrodendron trifoliolatum</i>	white booyong	<i>Heritiera trifoliata</i>
<i>Arthraxon hispidus</i>	hairy jointgrass	
<i>Arthropteris palisotii</i>	lesser creeping fern	
<i>Arytera distylis</i>	twin-leaved coogera	
<i>Asperula asthenes</i>	trailing woodruff	
<i>Asplenium australasicum</i>	bird's nest fern	
<i>Atractocarpus chartaceus</i>		
<i>Baloghia inophylla</i>	brush bloodwood, scrub bloodwood	<i>Baloghia lucida</i>
<i>Baloghia marmorata</i>	jointed baloghia	
<i>Beilschmiedia elliptica</i>		
<i>Belvisia mucronata</i>	needle-leaf fern	
<i>Bosistoa transversa</i>	yellow satinheart, heart-leaved bonewood	<i>Bosistoa selwynii</i>
<i>Brachychiton acerifolius</i>	flame tree	
<i>Breynia oblongifolia</i>	coffee bush	
<i>Bridelia exaltata</i>	brush ironbark	
<i>Bulbophyllum globuliforme</i>	hoop pine orchid	
<i>Calamus muelleri</i>	vine	
<i>Callicoma serratifolia</i>	black wattle, callicoma	
<i>Capparis arborea</i>	brush caper berry	
<i>Cassia marksiana</i>	brush cassia	<i>C. brewsteri</i> var. <i>marksiana</i>
<i>Castanospermum australe</i>	black bean	
<i>Ceratopetalum apetalum</i>	coachwood	
<i>Choricarpia subargentea</i>	giant ironwood	
<i>Cinnamomum oliveri</i>	Oliver's sassafrass, camphorwood	
<i>Cissus antarctica</i>	native grape vine, water vine	
<i>Cissus hypoglauca</i>	giant water vine	



<b>Appendix A Characteristic Flora Species cont.</b>	<b>common name</b>	<b>synonym</b>
<i>Citrus australasica</i>	finger lime	
<i>Cleistanthus cunninghamii</i>	cleistanthus, omega	
<i>Clematis fawcettii</i>	northern clematis	
<i>Clerodendrum floribundum</i>		
<i>Coatesia paniculata</i>	axe-breaker	<i>Geijera paniculata</i>
<i>Commersonia bartramia</i>		
<i>Cordyline congesta</i>	palm lily	
<i>Cordyline rubra</i>	red-fruited palm-lily	
<i>Corokia whiteana</i>	corokia	
<i>Corynocarpus rupestris</i> subsp. <i>arborescens</i>	southern corynocarpus	
<i>Cryptocarya foetida</i>	stinking cryptocarya	
<i>Cryptocarya obovata</i>	pepperberry tree, white walnut	
<i>Cupaniopsis newmanii</i>	cupaniopsis newmanii	
<i>Cupaniopsis serrata</i>	smooth tuckeroo	
<i>Cynanchum elegans</i>	white-flowered wax plant	
<i>Davidsonia jerseyana</i>	Davidson's plum	
<i>Davidsonia johnsonii</i>	smooth Davidson's plum	
<i>Dendrobium speciosum</i>	rock lily	
<i>Dendrocnide excelsa</i>	giant stinging tree	
<i>Dendrocnide moroides</i>	Gympie stinger	
<i>Desmodium acanthocladum</i>	thorny pea	
<i>Dioscorea transversa</i>	native yam	
<i>Diospyros mabacea</i>	red-fruited ebony	
<i>Diospyros major</i> var. <i>ebenus</i>	shiny-leaved ebony	
<i>Diospyros pentamera</i>	myrtle ebony, grey persimmon, grey plum	
<i>Diploglottis australis</i>	native tamarind	<i>Diploglottis cunninghamii</i>
<i>Diploglottis campbellii</i>	small-leafed tamarind	
<i>Dysoxylum fraserianum</i>	rosewood	
<i>Dysoxylum mollissimum</i>	red bean, Miva mahogany	
<i>Dysoxylum rufum</i>	hairy rosewood, rusty mahogany	
<i>Elaeocarpus grandis</i>		
<i>Elaeocarpus obovatus</i>	hard quandong	
<i>Elattostachys nervosa</i>	green tamarind	
<i>Elaeocarpus sedentarius</i>	Minyon quandong, Rocky Creek quandong	<i>Elaeocarpus</i> sp. Rocky creek
<i>Elaeocarpus williamsianus</i>	hairy quandong	
<i>Endiandra floydii</i>	Crystal Creek walnut	
<i>Endiandra globosa</i>		
<i>Endiandra hayesii</i>	rusty rose walnut	
<i>Endiandra muelleri</i> subsp. <i>bracteata</i>	green-leaved rose walnut	
<i>Endiandra pubens</i>		
<i>Eupomatia bennettii</i>	small bolwarra	
<i>Eustrephus latifolius</i>	wombat berry	
<i>Ficus</i> spp.	figs	
<i>Ficus coronata</i>	creek sandpaper fig	
<i>Ficus fraseri</i>	sandpaper fig	

<b>Appendix A Characteristic Species cont.</b>	<b>common name</b>	<b>synonym</b>
<i>Ficus macrophylla</i>	Moreton Bay fig	
<i>Ficus obliqua</i>	small leaved fig	
<i>Ficus watkinsiana</i>	strangling fig	
<i>Flindersia australis</i>	native teak, crows ash	
<i>Flindersia schottiana</i>	bumpy ash	
<i>Flindersia xanthoxyla</i>	long jack, yellowwood	
<i>Floydia praealta</i>	ball nut	
<i>Fontainea australis</i>	southern fontainea	
<i>Fontainea oraria</i>	coastal fontainea	
<i>Geitonoplesium cymosum</i>		
<i>Glochidion ferdinandi</i>	cheese tree, buttonwood	
<i>Gmelina leichhardtii</i>	white beech	
<i>Gossia bidwillii</i>		
<i>Gossia fragrantissima</i>	sweet myrtle	
<i>Grammitis stenophylla</i>	narrow-leaved finger-fern	
<i>Grevillea hilliana</i>	white yiel yiel	
<i>Grevillea robusta</i>	silky oak	
<i>Guioa semiglauca</i>	guioa	
<i>Helicia glabriflora</i>	smooth or pale helicia, pale oak, leather oak, brown oak	
<i>Helmholtzia glaberrima</i>		
<i>Hicksbeachia pinnatifolia</i>	red boppel nut	
<i>Hymenosporum flavum</i>		
<i>Isoglossa eranthemoides</i>	isoglossa	
<i>Jagera pseudorhus</i>	foambark	
<i>Lenwebbia prominens</i>	velvet myrtle	
<i>Lepiderema pulchella</i>	fine-leaved tuckeroo	
<i>Lindsaea brachypoda</i>	short-footed screw fern	
<i>Linospadix monostachya</i>	walking stick palm	<i>Linospadix monostachyos</i>
<i>Litsea australis</i>		
<i>Livistona australis</i>	cabbage tree palm	
<i>Lophostemon confertus</i>	brushbox	
<i>Macadamia integrifolia</i>	macadamia nut	
<i>Macadamia tetraphylla</i>	rough-shelled bush nut	
<i>Maclura cochinchinensis</i>	cockspur thorn	
<i>Mallotus discolor</i>		
<i>Mallotus philippensis</i>	red kamala	
<i>Marsdenia longiloba</i>	slender marsdenia	
<i>Melia azedarach</i>	white cedar	
<i>Melicope micrococca</i>		
<i>Melicope vitiflora</i>		
<i>Morinda jasminoides</i>		
<i>Myrsine richmondensis</i>	ripple-leaf muttonwood	<i>Rapanea</i> sp. 'Richmond River'
<i>Neolitsea australiensis</i>	bolly gum	
<i>Neolitsea dealbata</i>		
<i>Niemeyera chartacea</i>		

<b>Appendix A Characteristic Species cont.</b>	<b>common name</b>	<b>synonym</b>
<i>Niemeyera whitei</i>	rusty plum	<i>Amorphospermum whitei</i>
<i>Notelaea johnsonii</i>	veinless mockolive	
<i>Notelaea longifolia</i>	mock olive	
<i>Oberonia complanata</i>	yellow-flowered king of the fairies	
<i>Oberonia titania</i>	red-flowered king of the fairies	
<i>Ochrosia moorei</i>	southern ochrosia	
<i>Owenia cepiodora</i>	onion cedar	
<i>Pandorea floribunda</i>	wonga wonga vine	
<i>Pararchidendron pruinatum</i>	snow wood	
<i>Pararistolochia praevenosa</i>		
<i>Parsonsia straminea</i>		
<i>Pellaea falcata</i>		
<i>Pentaceras australe</i>	penta ash, bastard crow's ash	
<i>Peristeranthus hillii</i>	brown fairy-chain orchid	
<i>Phyllanthus microcladus</i>	brush sauropus	
<i>Pittosporum multiflorum</i>	orange thorn	
<i>Pittosporum revolutum</i>	hairy pittosporum, rough-fruited pittosporum	
<i>Pittosporum undulatum</i>	sweet pittosporum	
<i>Planchonella australis</i>	black apple	<i>Pouteria australis</i>
<i>Platynerium bifurcatum</i>		
<i>Platynerium superbum</i>	staghorn fern	
<i>Plectranthus nitidus</i>	Nightcap plectranthus	
<i>Pollia crispata</i>		
<i>Polyscias elegans</i>	silver basswood, celerywood	
<i>Pomaderris notata</i>	McPherson Range pomaderris	
<i>Psilotum complanatum</i>	flat fork fern	
<i>Samadera</i> sp. Mt Nardi (B.L.Walker AQ330746)	southern quassia	
<i>Quintinia verdonii</i>	grey possumwood, smooth possumwood	
<i>Randia moorei</i>	spiny gardenia	
<i>Rhodamnia maideniana</i>	smooth scrub turpentine	
<i>Rhodamnia rubescens</i>		
<i>Sarcochilus dilatatus</i>	brown butterfly orchid	
<i>Sarcochilus fitzgeraldii</i>	ravine orchid	
<i>Sarcochilus weinthalii</i>	blotched sarcochilus	
<i>Sarcomelicope simplicifolia</i>		
<i>Sarcopteryx stipata</i>	steelwood, corduroy	
<i>Senna acclinis</i>	rainforest cassia	
<i>Sloanea australis</i>	maidens blush, blush alder	
<i>Sloanea woollsii</i>	yellow carabeen	
<i>Smilax australis</i>	sarsaparilla	
<i>Sophora fraseri</i>	brush sophora	
<i>Stephania japonica</i> var. <i>discolor</i>		
<i>Streblus pendulinus</i>	whalebone tree	<i>Streblus brunonianus</i>
<i>Syzygium australe</i>	brush cherry, creek satinash	
<i>Syzygium crebrinerve</i>	purple cherry, rose satinash	
<i>Syzygium floribundum</i>	weeping lilly pilly, weeping satinash	<i>Waterhousea floribunda</i>

<b>Appendix A Characteristic Species cont.</b>	<b>common name</b>	<b>synonym</b>
<i>Syzygium francisii</i>	giant watergum, rose satinash	
<i>Syzygium hodgkinsoniae</i>	red lilly pilly	
<i>Syzygium moorei</i>	durobby, coolamon, rose apple	
<i>Tabernaemontana pandacqui</i>	banana bush, windmill bush	<i>Ervatamia angustisepala</i>
<i>Triflorensia cameronii</i>	Cameron's taremma	<i>Taremma cameronii</i>
<i>Tinospora tinosporoides</i>	arrow-head vine	
<i>Toechima dassyrrhache</i>	blunt-leaved steelwood	
<i>Toona ciliata</i>	red cedar	<i>Toona australis</i>
<i>Triunia youngiana</i>	honeysuckle bush, spice bush	
<i>Wilkiea austroqueenslandica</i>	smooth wilkiea	
<i>Wilkiea hugeliana</i>	veiny wilkiea	<i>Wilkiea huegeliana</i>
<i>Zieria collina</i>		

<b>Appendix B Persistent Residual Trees</b>	<b>common name</b>	<b>synonym</b>
<i>Acmena ingens</i>	red apple, southern satinash	<i>Syzygium ingens</i>
<i>Acmena smithii</i>	lilly pilli, lillipilli satinash	<i>Syzygium smithii</i>
<i>Alphitonia excelsa</i>	red ash	
<i>Aphananthe philippinensis</i>	rough leaved elm, grey handlewood	
<i>Araucaria cunninghamii</i>	hoop pine	
<i>Archontophoenix cunninghamiana</i>	bangalow palm	
<i>Argyrodendron trifoliolatum</i>	white booyong	<i>Heritiera trifoliolata</i>
<i>Brachychiton acerifolius</i>	flame tree	
<i>Castanospermum australe</i>	black bean	
<i>Cryptocarya obovata</i>	pepperberry tree, white walnut	
<i>Dendrocnide excelsa</i>	giant stinging tree	
<i>Diospyros pentamera</i>	myrtle ebony, grey persimmon, grey plum	
<i>Diploglottis australis</i>	native tamarind	<i>Diploglottis cunninghamii</i>
<i>Dysoxylum fraserianum</i>	rosewood	
<i>Dysoxylum mollissimum</i>	red bean, Miva mahogany	
<i>Elaeocarpus obovatus</i>	hard quandong	
<i>Elattostachys nervosa</i>	green tamarind	
<i>Endiandra pubens</i>		
<i>Ficus coronata</i>	creek sandpaper fig	
<i>Ficus fraseri</i>	sandpaper fig	
<i>Ficus macrophylla</i>	Moreton Bay fig	
<i>Ficus obliqua</i>	small leaved fig	
<i>Ficus watkinsiana</i>	strangling fig	
<i>Flindersia australis</i>	native teak, crows ash	
<i>Flindersia schottiana</i>	bumpy ash	
<i>Flindersia xanthoxyla</i>	long jack, yellowwood	
<i>Glochidion ferdinandii</i>		
<i>Glochidion ferdinandii</i>	cheese tree, buttonwood	
<i>Gmelina leichhardtii</i>	white beech	
<i>Grevillea robusta</i>	silky oak	
<i>Guioa semiglauca</i>		
<i>Livistona australis</i>	cabbage tree palm	
<i>Lophostemon confertus</i>	brushbox	
<i>Neolitsea australiensis</i>		
<i>Neolitsea dealbata</i>		
<i>Notelaea johnsonii</i>	veinless mockolive	
<i>Sloanea australis</i>	maidens blush, blush alder	
<i>Sloanea woollsii</i>	yellow carabeen	
<i>Streblus pendulinus</i>	whalebone tree	<i>Streblus brunonianus</i>
		<i>Waterhousea floribunda</i>
<i>Syzygium floribundum</i>	weeping lilly pilli, weeping satinash	
<i>Syzygium hodgkinsoniae</i>	red lilly pilli	
<i>Toona ciliata</i>	red cedar	<i>Toona australis</i>

<b>Appendix C Fauna Birds</b>		<b>C'wealth (EPBC Act)</b>	<b>NSW (TSC Act*)</b>	<b>QLD (NCA 1992)</b>
<i>Accipiter novaehollandiae</i>	Grey Goshawk			R
<i>Ailuroedus crassirostris</i>	Green Catbird			
<i>Alectura lathami</i>	Australian Brush Turkey			
<i>Alisteria scapulatis</i>	Australian King Parrot			
<i>Anthochaera chrysoptera</i>	Little Wattlebird			
<i>Cacuata galerita</i>	Sulphur-crested Cockatoo			
<i>Carterornis leucotis</i>	White-eared Monarch		V	
<i>Chalcophaps indica</i>	Emerald Dove			
<i>Colluricincla megarhyncha</i>	Little Shrike-thrush			
<i>Columba leucomela</i>	White-headed Pigeon			
<i>Coracina lineata</i>	Barred Cuckoo-shrike			
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike			
<i>Corvus orru</i>	Torresian crow			
<i>Cracticus tibicen</i>	Australian Magpie			
<i>Cracticus torquatus</i>	Grey Butcherbird			
<i>Cyclopsitta diophthalma coxeni</i>	Coxen's Fig-parrot, Double-eyed Fig-parrot	E	E	E
<i>Dicaeum hirundinaceum</i>	Mistletoe Bird			
<i>Dicrurus bracteatus</i>	Spangled Drongo			
<i>Eolophus roseicapillus</i>	Galah			
<i>Erythrotriorchis radiatus</i>	Red Goshawk	V	E	E
<i>Geopelia humeralis</i>	Bar-shouldered Dove			
<i>Gerygone mouki</i>	Brown Gerygone			
<i>Lalage leucomela</i>	Varied Triller			
<i>Leucosarcia melanoleuca</i>	Wonga Pigeon			
<i>Lopholaimus antarcticus</i>	Topknot Pigeon			
<i>Macropygia amboinensis</i>	Brown cuckoo-dove			
<i>Meliphaga lewinii</i>	Lewin's Honeyeater			
<i>Menura alberti</i>	Albert's Lyrebird		V	R
<i>Myzomela sanguinolenta</i>	Scarlet Honeyeater			
<i>Oriolus sagittatus</i>	Olive-backed Oriole			
<i>Orthonyx temminckii</i>	Australian Logrunner			
<i>Pachycephala pectoralis</i>	Golden Whistler			
<i>Petroica rosea</i>	Rose Robin			
<i>Philemon corniculatus</i>	Noisy Friarbird			
<i>Pitta versicolor</i>	Noisy Pitta			
<i>Platycercu adscitus</i>	Pale-headed Rosella			
<i>Platycercus elegans</i>	Crimson Rosella			
<i>Podargus ocellatus plumiferus</i>	Marbled Frogmouth		V	V
<i>Psophodes olivaceus</i>	Weastern Whipbird			
<i>Ptilinopus magnificus</i>	Wampoo Fruit-dove		V	
<i>Ptilinopus regina</i>	Rose-crowned Fruit-dove			
<i>Ptilinopus superbus</i>	Superb Fruit-dove		V	
<i>Ptilinorhynchus violaceus</i>	Satin Bowerbird			
<i>Ptiloris paradiseus</i>	Paradise Riflebird			
<i>Rhipidura albiscapa</i>	Grey Fantail			
<i>Scythrops novaehollandiae</i>	Channel-billed Cuckoo			
<i>Sericulus chrysocephalus</i>	Regent Bowerbird			

<b>Appendix C Fauna</b>		<b>C'wealth (EPBC Act)</b>	<b>NSW (TSC Act*)</b>	<b>QLD (NCA 1992)</b>
<b>Birds cont.</b>				
<i>Sphecotheres vieilloti</i>	Australasian Figbird			
<i>Sphecotheres viridis</i>	Figbird			
<i>Strepera graculina</i>	Pied Currawong			
<i>Symposiachrus trivirgatus</i>	Spectacled Monarch			
<i>Tregellasia capito</i>	Pale-yellow Robin			
<i>Trichoglossus chlorolepidotus</i>	Scaly-breasted Lorikeet			
<i>Trichoglossus haematodus</i>	Rainbow Lorikeet			
<i>Turnix melanogaster</i>	Black-breasted Button-quail	V	E	V
<i>Tyto tenebricosa</i>	Sooty Owl		V	R
<i>Urodynamis taitensis</i>	Long-tailed Cuckoo, Long-tailed Koel			
<i>Zoothera lunulata</i>	Bassian Thrush			
<i>Zosterops lateralis</i>	Silvereye			

<b>Appendix C Fauna</b>		<b>C'wealth (EPBC Act)</b>	<b>NSW (TSC Act*)</b>	<b>QLD (NCA 1992)</b>
<b>Mammals</b>				
<i>Antechinus subtropicus</i>	Subtropical Antechinus			
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	R
<i>Chalinolobus morio</i>	Chocolate-wattled Bat			
<i>Dasyurus maculatus maculatus</i>	Spotted-tailed Quoll	E	V	V
<i>Kerivoula papuensis</i>	Golden-tipped Bat		V	R
<i>Macropus dorsalis</i>	Black-striped Wallaby		E	
<i>Melomys cervinipes</i>	Fawn-footed Melomys			
<i>Miniopterus australis</i>	Little Bentwing-bat		V	
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat		V	
<i>Nyctimene robinsoni</i>	Eastern Tube-nosed Bat		V	
<i>Nyctophilus bifax</i>	Eastern Long-eared Bat		V	
<i>Pseudocheirus peregrinus</i>	Common Ringtail Possum			
<i>Pteropus alecto</i>	Black Flying-fox		V	
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	
<i>Rhinolophus megaphyllus</i>	Eastern Horseshoe Bat			
<i>Syconycteris australis</i>	Eastern Blossom-bat		V	
<i>Thylogale stigmatica</i>	Red-legged Pademelon		V	
<i>Thylogale thetis</i>	Red-necked Pademelon			



<b>Appendix C Fauna Reptiles and Amphibians</b>		<b>C'wealth (EPBC Act)</b>	<b>NSW (TSC Act*)</b>	<b>QLD (NCA 1992)</b>
<i>Assa darlingtoni</i>	Pouched Frog		V	R
<i>Cacophis krefftii</i>	Dwarf Crowned Snake			
<i>Coeranoscincus reticulatus</i>	Three-toed Snake-tooth Skink	V	V	R
<i>Bellatorias major</i>	Land Mullet			
<i>Gonocephalus spinipes</i>	Southern Angle-headed Dragon			
<i>Hoplocephalus stephensii</i>	Stephens' Banded Snake		V	R
<i>Hypsilurus spinipes</i>	Southern Forest Dragon			
<i>Lechriodus fletcheri</i>	Fletcher's Frog			R
<i>Litoria chloris</i>	Red-eyed Tree-frog			
<i>Litoria pearsoniana</i>	Pearson's Green Tree Frog			E
<i>Litoria phyllochroa</i>	Leaf-green Tree-frog			
<i>Litoria revelata</i>	Whirring Tree Frog			R
<i>Mixophyes balbus</i>	Stuttering Frog			
<i>Mixophyes fleayi</i>	Fleay's Barred Frog	E	E	E
<i>Mixophyes iteratus</i>	Giant Barred Frog	E	E	E
<i>Ophioscincus truncatus</i>	Short-limbed Snake-skink, Yellow-bellied Legless-skink			R
<i>Phyllorhina loveridgei</i>	Loveridge's Frog		E	R
<i>Posargus ocellatus</i>	Marbled Frogmouth			
<i>Saltuarius swainii</i>	Southern Leaf-tailed Gecko			
<i>Saproscincus challengeri</i>	Orange-tailed Shadeskink			
<i>Saproscincus rosei</i>	Rose's Shadeskink, Orange-tailed Shadeskink			R
<i>Saproscincus spectabilis</i>	Spectacled Shadeskink			R
<b>Appendix C Fauna Invertebrates</b>		<b>C'wealth (EPBC Act)</b>	<b>NSW (TSC Act*)</b>	<b>QLD (NCA 1992)</b>
<i>Nurus atlas</i>	Atlas Rainforest Ground-beetle		E	
<i>Nurus brevis</i>	Shorter Rainforest Ground-beetle		E	
<i>Troides richmondia</i>	Richmond Birdwing Butterfly			V
<i>Phyllodes imperialis</i> southern subspecies	Pink Underwing Moth	E	E	
<i>Thersites mitchellae</i>	Mitchell's Rainforest Snail	CE	E	

Appendix D Threatened Species	Common Name	C'wealth (EPBC Act)	NSW (TSC Act*)	QLD (NCA 1992)
Scientific Name				
<b>FLORA SPECIES</b>				
<i>Acacia bakeri</i>	Marblewood		V	
<i>Acalypha eremorum</i>	Acalypha		E	
<i>Acronychia baeuerlenii</i>	Byron Bay Acronychia			NT
<i>Amyema plicatula</i> [syn. <i>Amyema scandens</i> ]		E	E	
<i>Archidendron hendersonii</i>	White Laceflower		V	
<i>Archidendron muellerianum</i>	Veiny Laceflower			NT
<i>Ardisia bakeri</i>	<i>Ardisia bakeri</i>			NT
<i>Arthraxon hispidus</i>	Hairy Jointgrass	V	V	V
<i>Baloghia marmorata</i>	Jointed Baloghia	V	V	V
<i>Belvisia mucronata</i>	Needle-leaf Fern		E	
<i>Bosistoa transversa</i>	Yellow Satinheart, Heart-leaved Bonewood	V	V	
<i>Cassia marksiana</i> [syn. <i>C. brewsteri</i> var. <i>marksiana</i> ]	Brush Cassia		E	V
<i>Choricarpia subargentea</i>	Giant Ironwood		E	NT
<i>Clematis fawcettii</i>	Northern Clematis	V	V	V
<i>Coatesia paniculata</i> [syn. <i>Geijera paniculata</i> ]	Axe-breaker		E	
<i>Corynocarpus rupestris</i> subsp. <i>arborescens</i>	Southern Corynocarpus			V
<i>Cryptocarya foetida</i>	Stinking Cryptocarya	V	V	V
<i>Cupaniopsis newmanii</i>	Long-leaved tuckeroo			NT
<i>Davidsonia jerseyana</i>	Davidson's Plum	E	E	
<i>Davidsonia johnsonii</i>	Smooth Davidson's Plum	E	E	E
<i>Dendrocnide moroides</i>	Gympie Stinger		E	
<i>Desmodium acanthocladum</i>	Thorny Pea	V	V	
<i>Diospyros mabacea</i>	Red-fruited Ebony	E	E	
<i>Diospyros major</i> var. <i>ebenus</i> [syn. <i>Diospyros ellipticifolia</i> f. <i>australiensis</i> ]	Shiny-leaved Ebony		E	
<i>Diploglottis campbellii</i>	Small-leaved Tamarind	E	E	E
<i>Elaeocarpus sedentarius</i>	Minyon Quandong	E	E	
<i>Elaeocarpus williamsianus</i>	Hairy Quandong	E	E	
<i>Endiandra floydii</i>	Crystal Creek Walnut	E	E	E
<i>Endiandra hayesii</i>	Rusty Rose Walnut	V	V	V
<i>Endiandra muelleri</i> subsp. <i>bracteata</i>			E	
<i>Floydia praealta</i>	Ball Nut	V	V	V
<i>Fontainea australis</i>	Southern Fontainea	V	V	V
<i>Fontainea oraria</i>	Coastal Fontainea	E	E	
<i>Gossia fragrantissima</i>	Sweet Myrtle	E	E	E
<i>Grevillea hilliana</i>	White Yiel Yiel		E	
<i>Helmholtzia glaberrima</i>				NT
<i>Hicksbeachia pinnatifolia</i>	Red Boppel Nut	V	V	V
<i>Isoglossa eranthemoides</i>	Isoglossa	E	E	
<i>Lenwebbia prominens</i>	Velvet Myrtle			NT
<i>Lepiderema pulchella</i>	Fine-leaved Tuckeroo		V	V
<i>Lindaea brachypoda</i>			V	
<i>Macadamia integrifolia</i>	Macadamia Nut	V		V
<i>Macadamia tetraphylla</i>	Rough-shelled Bush Nut	V	V	V

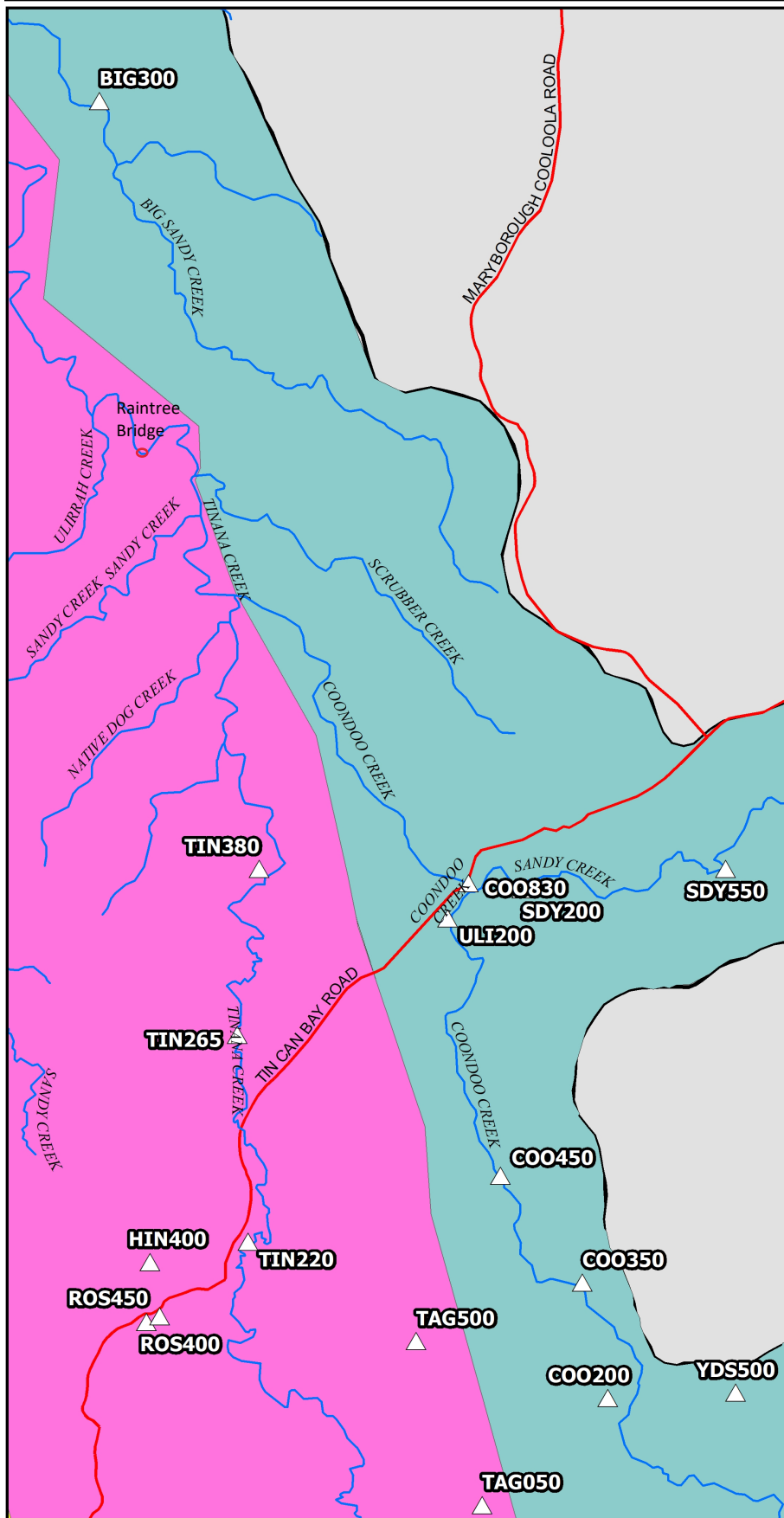
Appendix D Threatened Species	Common Name	C'wealth (EPBC Act)	NSW (TSC Act*)	QLD (NCA 1992)
Scientific Name				
<b>FLORA SPECIES</b>				
<i>Marsdenia longiloba</i>	Slender Marsdenia	V	E	V
<i>Myrsine richmondensis</i> [syn. <i>Rapanea</i> sp. Richmond River (J.H.Maiden & J.L.Boorman NSW 26751)]	Ripple-leaf Muttonwood	E	E	
<i>Niemeyera chartacea</i>			E	
<i>Niemeyera whitei</i> [syn. <i>Amorphospermum whitei</i> ]	Rusty Plum		V	V
<i>Ochrosia moorei</i>	Southern Ochrosia	E	E	E
<i>Owenia cepiodora</i>	Onion Cedar	V	V	V
<i>Pararistolochia praevenosa</i>				NT
<i>Peristeranthus hillii</i>	Brown Fairy-chain Orchid		V	
<i>Phyllanthus microcladus</i>	Brush Sauropus		E	
<i>Randia moorei</i>	Spiny Gardenia	E	E	E
<i>Senna acclinis</i>	Rainforest Cassia		E	NT
<i>Sophora fraseri</i>	Brush Sophora	V	V	V
<i>Syzygium hodgkinsoniae</i>	Red Lilly Pilly	V	V	V
<i>Syzygium moorei</i>	Durobby	V	V	V
<i>Tinospora tinosporoides</i>	Arrow-head Vine	V	V	V
<i>Triflorensia cameronii</i> [syn. <i>Tarenna cameronii</i> ]	Cameron's Tarenna		E	
<i>Xylosma terrae-reginae</i>			V	
<i>Zieria collina</i>		V		V
<b>Number of species</b>		<b>33</b>	<b>51</b>	<b>36</b>

Appendix D Threatened Species	Common Name	C'wealth (EPBC Act)	NSW (TSC Act*)	QLD (NCA 1992)
Scientific Name				
<b>FAUNA SPECIES</b>				
<i>Accipiter novaehollandiae</i>	Grey Goshawk			R
<i>Assa darlingtoni</i>	Pouched Frog		V	R
<i>Carterornis leucotis</i>	White-eared Monarch		V	
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	R
<i>Coeranoscincus reticulatus</i>	Three-toed Snake-tooth Skink	V	V	R
<i>Coracina lineata</i>	Barred Cuckoo-shrike		V	
<i>Cyclopsitta diophthalma coxeni</i>	Coxen's Fig-parrot, Double-eyed Fig-parrot	E	E	E
<i>Dasyurus maculatus maculatus</i>	Spotted-tailed Quoll	E	V	V
<i>Erythrotriorchis radiatus</i>	Red Goshawk	V	E	E
<i>Hoplocephalus stephensii</i>	Stephens' Banded Snake		V	R
<i>Kerivoula papuensis</i>	Golden-tipped Bat		V	R
<i>Lechriodus fletcheri</i>	Fletcher's Frog			R
<i>Litoria pearsoniana</i>	Pearson's Green Tree Frog			E
<i>Litoria revelata</i>	Whirring Tree Frog			R
<i>Macropus dorsalis</i>	Black-striped Wallaby		E	
<i>Menura alberti</i>	Albert's Lyrebird		V	R
<i>Miniopterus australis</i>	Little Bentwing-bat		V	
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat		V	
<i>Mixophyes fleayi</i>	Fleay's Barred Frog	E	E	E
<i>Mixophyes iteratus</i>	Giant Barred Frog	E	E	E
<i>Nurus atlas</i>	Atlas Rainforest Ground-beetle		E	
<i>Nurus brevis</i>	Shorter Rainforest Ground-beetle		E	
<i>Nyctimene robinsoni</i>	Eastern Tube-nosed Bat		V	
<i>Nyctophilus bifax</i>	Eastern Long-eared Bat		V	
<i>Ophioscincus truncatus</i>	Short-limbed Snake-skink			R
<i>Philoria loveridgei</i>	Loveridge's Frog		E	R
<i>Phyllodes imperialis southern subspecies</i>	Pink Underwing Moth	E	E	
<i>Podargus ocellatus plumiferus</i>	Marbled Frogmouth		V	V
<i>Potorous tridactylus tridactylus</i>	Long-nosed Potoroo	V	V	V
<i>Pteropus alecto</i>	Black Flying-fox		V	
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	
<i>Ptilinopus magnificus</i>	Wompoo Fruit-Dove		V	
<i>Ptilinopus regina</i>	Rose-crowned Fruit-Dove		V	
<i>Ptilinopus superbus</i>	Superb Fruit-Dove		V	
<i>Saproscincus rosei</i>	Orange-tailed Shadeskink			R
<i>Saproscincus spectabilis</i>	Spectacled Shade-skink			R
<i>Syconycteris australis</i>	Eastern Blossom-bat		V	
<i>Thersites mitchellae</i>	Mitchell's Rainforest Snail	CE	E	
<i>Thylogale stigmatica</i>	Red-legged Pademelon		V	
<i>Troides richmondia</i> [syn. <i>Ornithoptera richmondia</i> ]	Richmond Birdwing Butterfly			V
<i>Turnix melanogaster</i>	Black-breasted Button-quail	V	E	V
<i>Tyto tenebricosa</i>	Sooty Owl		V	R
<b>Number of species</b>		<b>12</b>	<b>34</b>	<b>24</b>

**APPENDIX D**

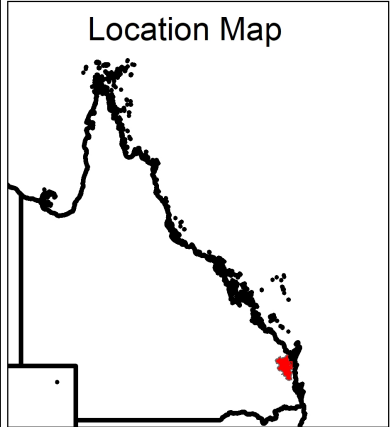
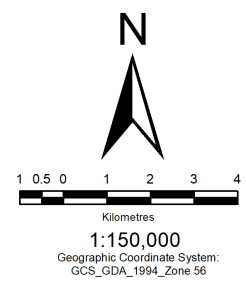
Extract from Gympie Region Waterwatch Report 2016 – 2018

# Mary River Catchment Coordinating Committee Eastern Catchment Waterwatch Network sites (2016-2018) with water types



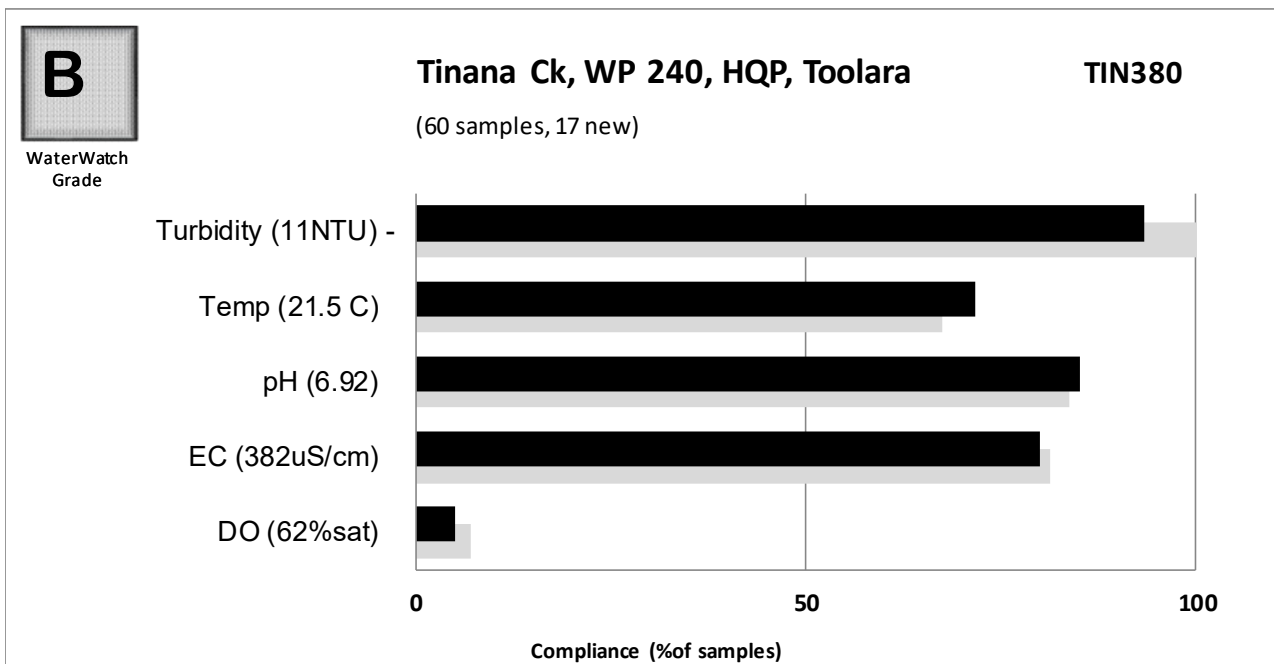
- Legend**
- △ Waterwatch sites
  - Roads
  - Mainland
  - Mary River
  - Tributary
  - Eastern tannin stained waters (G7)
  - North eastern lowland waters (G8)

Note: Refer to the Mary River Catchment Coordinating Committee's Water Quality Guideline Values document for the definition of each water type.



Map produced: September 2018  
Map produced by: Jess Dean  
Mary River Catchment Coordinating Committee

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- Great sample size.
- Dissolved oxygen compliance is low which is consistent with all other Tinana Creek sites.
- Maintaining an overall grade of B (2013 Waterwatch Grade = B) over the past five years.



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