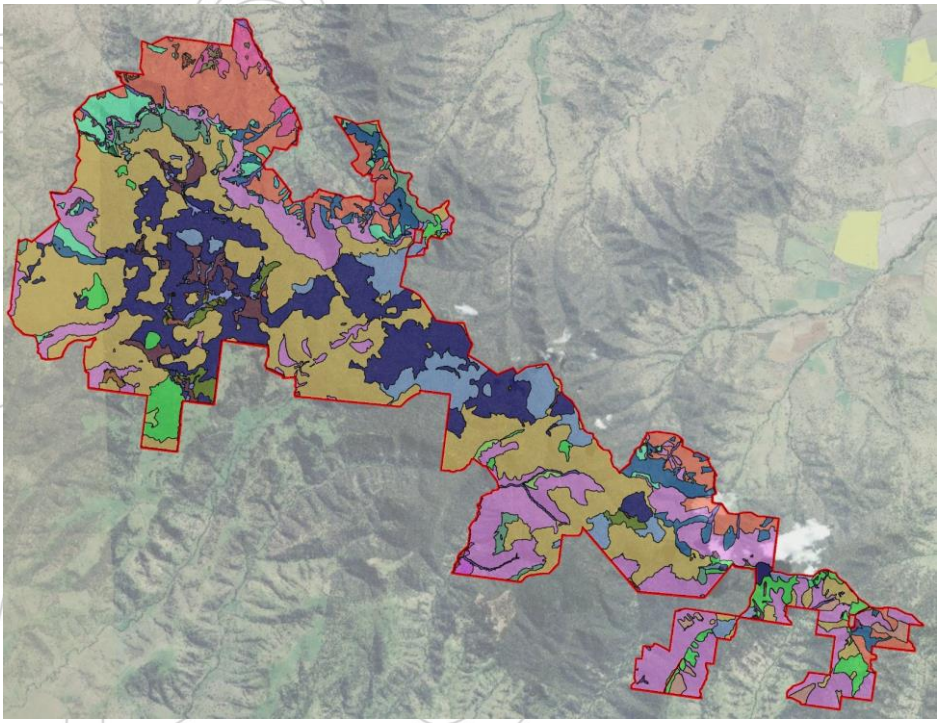
Coolah Tops Vegetation Mapping

National Parks and Wildlife Service: Office of Environment and Heritage



ecological AUSTRALIA
A TETRA TECH COMPANY

1300 646 131
www.ecoaus.com.au

DOCUMENT TRACKING

Project Name	NPWS Coolah Tops Vegetation Mapping
Project Number	12805
Project Manager	Martin Sullivan
Prepared by	Martin Sullivan
Reviewed by	**Sophie Powrie**
Approved by	**Sophie Powrie**
Status	**Final**
Version Number	**2**
Last saved on	**20 December 2019**

This report should be cited as 'Eco Logical Australia 2019. *Coolah Tops Vegetation Mapping*. Prepared for National Parks and Wildlife Service: Office of Environment and Heritage.'

Template 2.8.1

Contents

List of Figures

List of Tables

Abbreviations

Abbreviation	Description
3D	Three dimensions
ADS40	Airborne Digital Sensor

Abbreviation	Description
API	Aerial Photographic Interpretation
BAM	Biodiversity Assessment Methodology
BC Act	NSW *Biodiversity Conservation Act 2016*
CASA	Civil Aviation Authority
CEEC	Critically Endangered Ecological Community
DEM	Digital Elevation Model
DSM	Digital Surface Model
EEC	Endangered Ecological Community
ELA	Eco Logical Australia
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
GIS	Geographic Information System
Ha	Hectares
IBRA	Interim Biogeographic Regionalisation for Australia
Km	Kilometre
LGA	Local Government Area
LLS	Local Land Service
NPWS	NSW National Parks and Wildlife Service
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
PCT	Plant Community Types
RDP	Rapid data point
VIS	Vegetation Information System
WONS	Weed of National Significance

Executive Summary

Eco Logical Australia was commissioned by the NSW Parks and Wildlife Service (NPWS) through the NSW Office of Environment and Heritage to undertake vegetation survey and mapping of Coolah Tops National Park.

This project seeks to review existing data and mapping and align vegetation communities with the current state-wide Plant Community Type classification through the collection of strategic data on floristic and structural diversity.

A range of previous vegetation survey and mapping has been undertaken in Coolah Tops National Park however this existing data does not meet current OEH vegetation classification and mapping standards.

Existing vegetation surveys and mapping were reviewed and supplemented with over 340 rapid data points. Plant Community Type mapping was undertaken at a scale of between 1:2,500 and 1:10,000 using a range of datasets. Development of linework and attribution of Plant Community Types was undertaken in three dimensions using high resolution stereo ADS40 imagery. The final mapped product is considered accurate at a 1:5,000 scale.

A total of 464 species from 82 plant families were recorded, of which 13% were exotic (four being priority weeds). A total of 24 unique Plant Community Types (totalling 16,264 hectares) were mapped in Coolah Tops National Park. In addition, more than 160 separate subtypes were mapped due to significant variability with each Plant Community Type based on the dominant species in each patch. The vast majority of vegetation mapped falls within the Grassy Woodlands Formation, followed by Dry and Wet Sclerophyll Forests respectively.

A range of management considerations are discussed including: management of old growth forests dominated by *Eucalyptus pauciflora* (Snow Gum), *E. nobilis* (Mountain Ribbon Gum) and *E. laevopinea* (Silvertop Stringybark); inappropriate fire regimes; biosecurity including feral animal and weed management; and track maintenance.

Based on the results of this project, the following recommendations have been developed:

- Conduct detailed research into the likely fire ecology of each PCT including recent and likely historic fire regimes as well as sensitive species to better inform fire management requirements.
- Review and update relevant fire management plans taking into consideration the minimum fire intervals, mosaic burning practises, the adequacy of existing trail networks, management of fire in long unburnt forests and consideration of impacts to conservation significant species.
- Establish a biodiversity monitoring program to determine changes and help manage the effects of climate change over time. As an isolated basalt plateau, many of the species and communities that occur in the reserve are restricted and are unlikely to be able to adapt in a changing climate.
- Control priority and environmental weeds. Early detection and eradication of any Scotch Broom or Gorse is recommended.
- Control feral animals including goats, pigs and deer.

- Should additional funding become available, additional targeted vegetation survey across a range of PCTs, particularly in the south east where access is limited, would help to further define and understand the floristic and structural diversity of the reserve.
- Spring surveys for rare and threatened species including orchids are recommended in wetland areas, high altitude forests and in steep gullies and rock outcrops.
- Investigate the significance of rare and regionally significant PCTs with the intent of nominating communities for listing under the BC Act and/or EPBC Act. Specifically, a review of PCT 497 Tea tree shrubland / sedgeland / forbland swamp wetland should be undertaken for consideration of amendment to the listing of the BC Act Endangered Ecological Community *Upland Wetlands of the Drainage Divide of the New England Tableland Bioregion.*

It is understood that OEH is currently undertaking a review of the state-wide PCT classification including a complete reanalysis with the intent of refining each PCT and developing positive diagnostic species. This review may help to redefine some of the PCTs mapped as part of this project, and some new PCTs may be created and old PCTs retired. A review of the mapping undertaken as part of this project is recommended once the OEH review has been completed.

1. Introduction

Eco Logical Australia (ELA) was commissioned by the NSW Parks and Wildlife Service (NPWS) through the NSW Office of Environment and Heritage (OEH) to undertake vegetation survey and mapping of Coolah Tops National Park (the reserve).

This project seeks to review existing data and mapping and align vegetation communities with the current state-wide Plant Community Type (PCT) classification through the collection of strategic data on floristic and structural diversity.

The reserve is positioned on the Liverpool Range, at the junction of the Liverpool and Warrumbungle ranges, 30 km east of the town of Coolah in in Central West NSW (**Figure 1**). The reserve covers an area of 16,264 hectares (ha) and is wholly contained within the Liverpool Range subregion within the Brigalow Belt South Interim Biogeographic Regionalisation for Australia (IBRA) region (**Figure 1**).

Information developed as part of this project will be used in park planning, operations and environmental assessments. It provides a basis for managing species of conservation significance, preparation of weed control strategies, plans of management and rehabilitation plans, as well as developing appropriate fire management strategies for the protection of life and property on and surrounding the reserve.

1.1 Background

The reserve includes the former Bundella and Warung State Forests and was gazetted as National Park in 1996. The reserve forms part of the Liverpool Range which makes up the largest lava field province in NSW, dated between 32 and 40 million years covering an area of over 6,000 km^2 with up to 400 m thickness of basalt. The reserve includes a relatively isolated basalt plateau rising nearly 1,000 m from the surrounding valley floors to heights over 1,250 m elevation (**Figure 2**) and forms the upper catchment boundary of the Central West, Namoi and Hunter Central-Rivers Catchment (**Figure 1**).

The reserve includes parts of the Central West, North West and Hunter Local Land Service (LLS) areas. These LLS areas conform to the Local Government Areas (LGAs) of Warrumbungle Shire Council, Liverpool Plains Shire Council and Upper Hunter Shire Council respectively. The reserve is located within the NPWS Castlereagh area, part of the NPWS Northern Inland Branch.

The high elevation and patches of remnant old growth forest make the reserve a unique feature in the landscape which is otherwise made up largely of lower elevation grazing lands to the south and west, and partially forested ranges to the north and east (Binns, 1997). The reserve contains old growth areas of *Eucalyptus pauciflora* (Snow Gum), *E. nobilis* (Mountain Ribbon Gum) and *E. laevopinea* (Silvertop Stringybark) forests which includes the tallest recorded individuals of some species. The reserve is likely to be the western distribution limit of *E. nobilis* and several other flora and fauna species (Binns, 1997).

Some small areas of land within the reserve boundary have been cleared for agriculture, but the vegetation structure and floristics are generally uniform. Several species of conservation significance have been recorded including *Discaria pubescens*, *Teucrium* species D, *Macrozamia concinna* and *Asplenium trichomanes* subsp. *quadrivalens* (Binns, 1997).

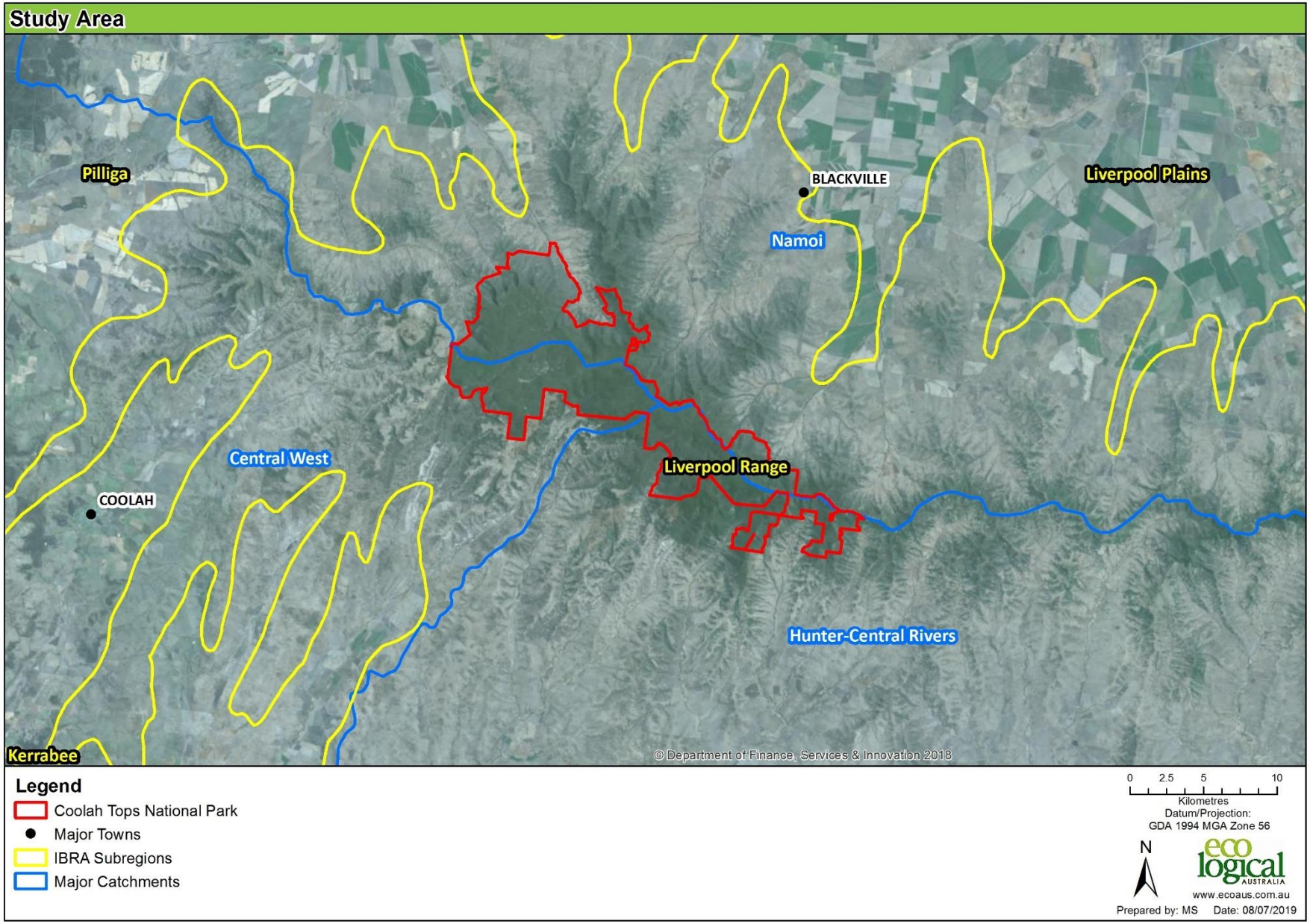


Figure 1: Study Area

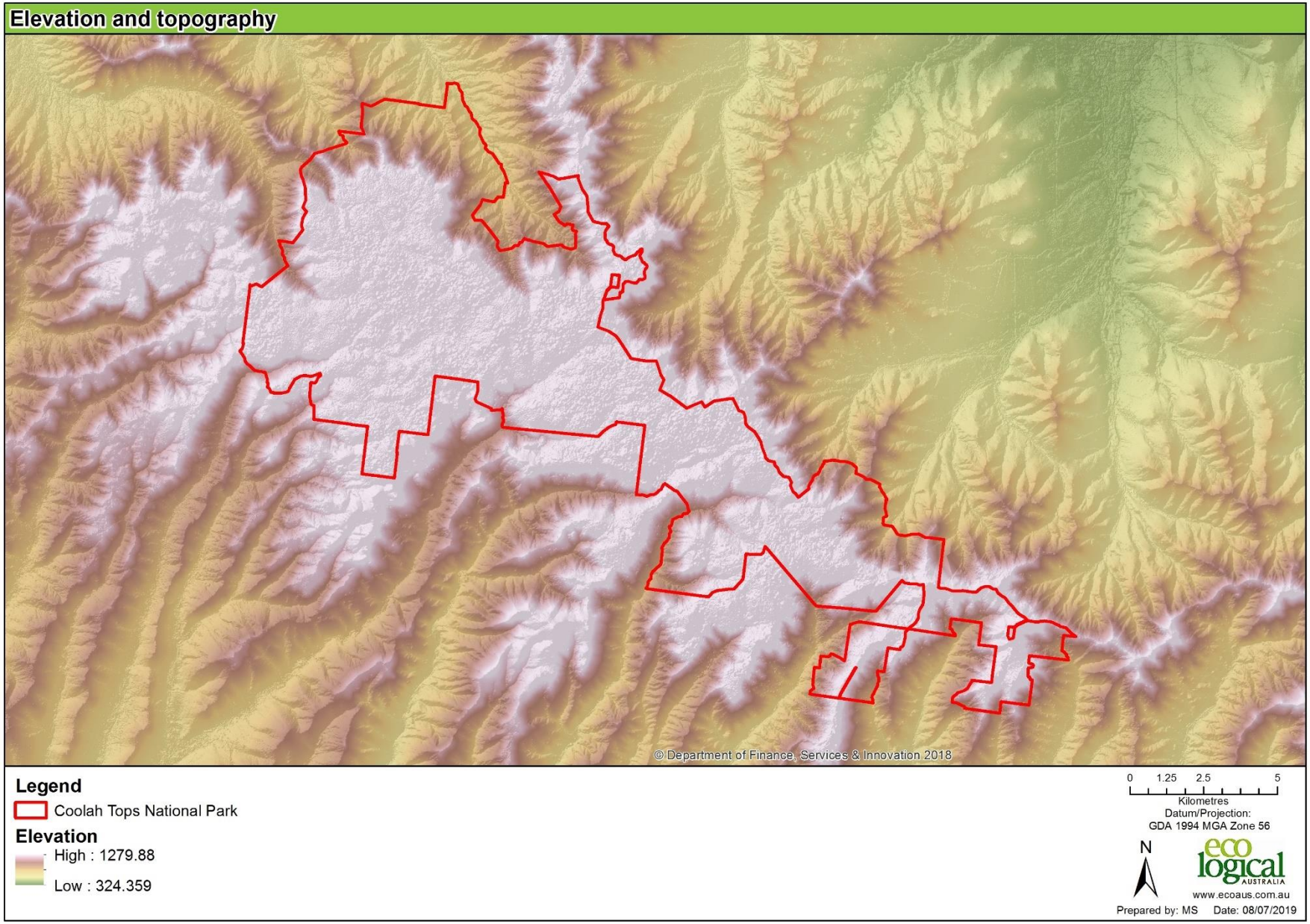


Figure 2: Elevation and topography

1.2 Climate

The Brigalow Belt South Bioregion occurs in northern NSW and southern Qld, from the mid-Qld coast to south of Dubbo in central-western NSW (OEH 2016). The bioregion is characterised by a subhumid climate, with no dry season and a hot summer. In the southeast of the bioregion, including the Liverpool Range subregion, there are minor patches falling within the temperate zone, with no dry season and a warm summer (OEH 2016).

The nearest Bureau of Meteorology weather station at Coolah (Binnia St), at a lower elevation of 495 m, has recorded an annual mean maximum temperature of 22 °c, mean minimum temperature of 8.4 °c and mean annual rainfall of 654.3 mm (BOM, 2019). As most of the reserve is above 1000 m, the area has a cool temperature climate with frequent frosts and occasional snow (NPWS, 2002). It is noted that the weather station at Coolah does not provide a reasonable summary of conditions at Coolah Tops due to an approximate temperate differential of 5 degrees or more, with far greater rainfall, frosts and occasional snow observed at Coolah Tops.

1.3 Geology and soil landscapes

Geological mapping of the region has been undertaken at a 1:250,000 scale by the Department of Mineral Resources (DMR, 2002), and is mapped entirely as a single unit composed of undifferentiated basalt, dolerite, polymictic conglomerate, quartzose sandstone and shale bole in the Liverpool Range Volcanics group. Due to its simplicity, geological mapping has not been reproduced in this report.

Soil landscapes of the study area have been mapped at a 1:100,00 scale (OEH 2018) and includes 13 different soil landscapes in the reserve (**Figure 4**). The dominant process for the development of soil landscapes relevant to this study include residual (deep soil formed in situ), colluvial (soil formed by slow downslope creep) and erosional (soil formed by running water).

Other processes that occur to a lesser extent include swamp (seasonally wet), vestigial (shallow soils fromed in situ), transferral (deep soils deposits from upslope material) and alluvial (soils formed from deposition along rivers and streams).

1.4 NSW Landscapes

NSW Landscapes are a system of ecosystem classification mapped at the 1:250,000 scale, based on a combination of soils, topography and vegetation (DECC, 2008). NSW Landscapes are used in regional conservation planning in NSW and form a basis for the threatened component of the Biodiversity Assessment Methodology (BAM) under the NSW *Biodiversity Conservation Act 2016* (BC Act). Two Mitchell Landscapes have been mapped within the reserve (**Figure 4**, **Table 1**).

Table 1: Mitchell Landscapes

Mitchell Landscape	Description
Liverpool Range and Valleys Footslopes	Multiple Tertiary basalt flows with intervening sediments and ash fall material, overlying Jurassic quartz sandstones and shale. Long slopes below the Liverpool Tops ecosystem, general elevation 450 to 1000m, local relief to 400m. Shallow stony clay soils on steep slopes grading to deep black earths on lower slopes. Tallow wood, blackbutt and blue gum on basaltic eastern slopes with small areas of vine forest. White Box with Rough-barked Apple, Belah in the creeks on northern aspects. Yellow Box, Manna Gum, Blakely's Red Gum and Sweet Pittosporum on southern aspects. Warm temperate rainforest elements of Brown Beech with fern understorey along creek

Mitchell Landscape	Description
	lines at the eastern end of the range. Sandstone gullies with Grey Gum, Narrow-leaved Stringybark, Broad-leaved Ironbark, Currawang, Forest Phebalium, Australian Boxthorn, and Hopbush. River Oak along lower streams. Extensive open areas with grasslands merging to the Liverpool Alluvial Plains Ecosystem.
Liverpool Tops	Undulating plateau top above 1000m altitude, on Tertiary basalt with steep margins grading down to the Liverpool Range Valleys and Footslopes Ecosystem, local relief 200 to 500m. Stony red brown loams, open forest of Silvertop Stringybark, Manna Gum and Mountain Gum with Snow Gum in cold air drainage hollows. Small areas of dry rainforest in sheltered locations with southern aspects on the eastern end of the range.

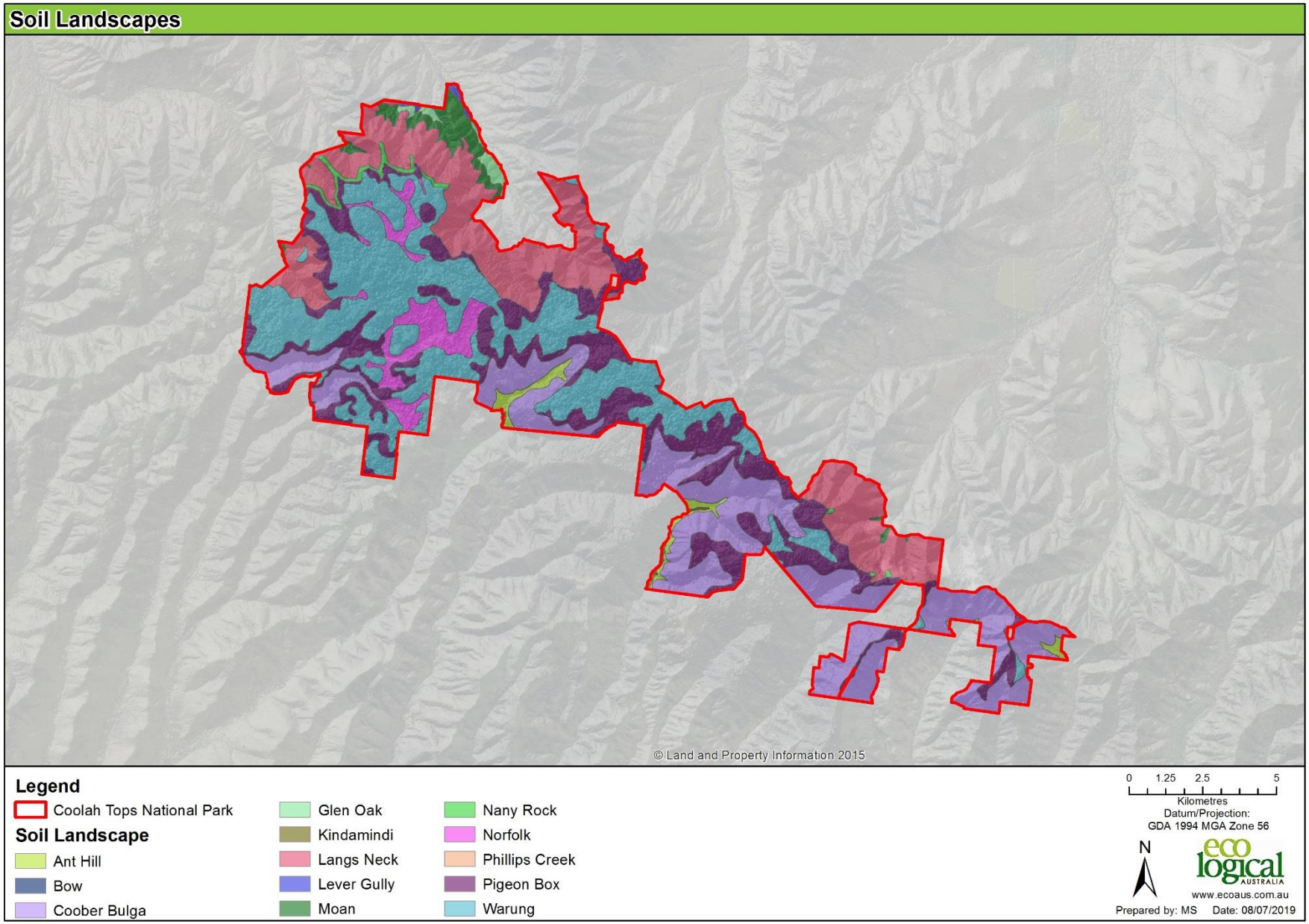


Figure 3: Soil Landscapes

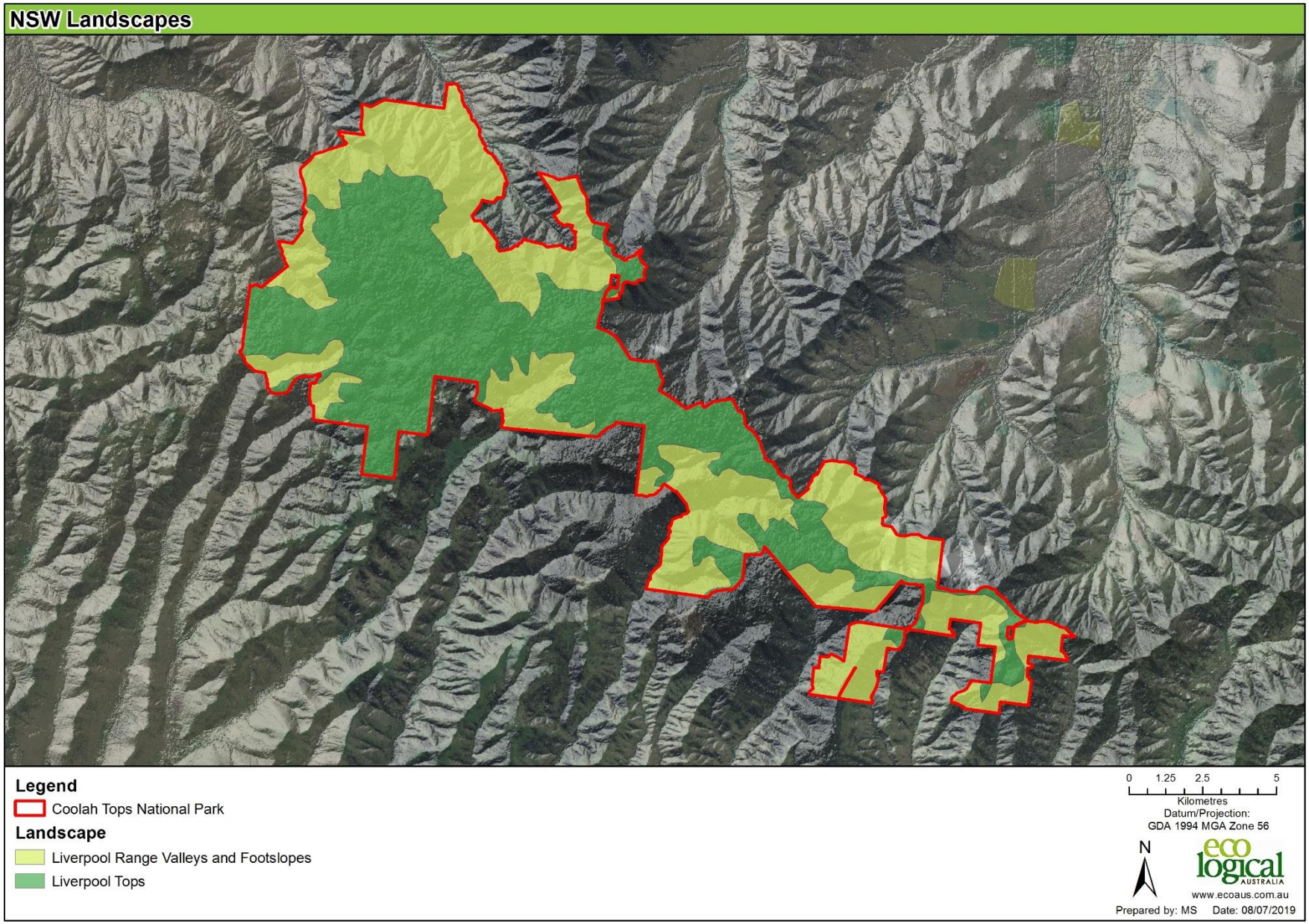


Figure 4: NSW Landscapes

2. Methodology

2.1 Previous surveys and mapping

2.1.1 Vegetation survey

Vegetation surveys have previously been undertaken across the reserve through various vegetation survey and mapping programs by NPWS and State Forests. A total of 106 full floristic vegetation plots were identified from the Vegetation Information System (VIS) flora survey module within the Bionet Atlas (OEH, 2019a) that were suitable for inclusion in this project (**Figure 5**). Additional individual flora records were obtained from Bionet (OEH 2019) to assist in the attribution of Plant Community Types (**Figure 5**). Some of the additional flora records obtained from Bionet appear to be the result of full floristic surveys not contained within VIS, with many records located at single geographic locations.

Existing PCT mapping and associated floristic plots were extracted using multiple techniques from VIS as the data contained is from a variety of surveys using different methodologies (e.g. cover scores, cover-abundance scores, or simply abundance scores). Existing survey data is well replicated and adequately stratified across the landscape (**Figure 5**).

2.1.2 Vegetation mapping

Five vegetation mapping projects were identified which partly or wholly covered the reserve:

- State Vegetation Type Maps:
  - Border Rivers Gwydir / Namoi Region Version 2.0. VIS_ID 4467 (OEH, 2015a)
  - State Vegetation Type Map: Central West / Lachlan Region Version 1.3. VIS_ID 4468 (OEH, 2015b)
  - Upper Hunter v1.0. VIS_ID 4894 (OEHc, 2019)
- Native vegetation of Cobbora, Coolah, Coonabarabran, Mendooran and Tambar Springs VIS_ID 2099 (Centre for National Resources, 2004)
- Blackville API 1:100K vegetation map. VIS_ID 3849 (Resource and Conservation Assessment Council, 2003)
- Forest Types in New South Wales VIS_ID 865 (Forestry Commission of NSW, 1989)

A review of these mapping products identified that the State Vegetation Type maps were most suitable for identification and likely distribution of potential Plant Community Types, whilst the Coolah and Blackville mapping projects were most suitable for preliminary linework delineation and survey stratification.

These mapping products were utilised for survey stratification purposes as well as developing an understanding of the likely PCTs present in each of the reserve. A description of vegetation types has previously been undertaken by Binns (1997) which also utilised the floristic data but did not include vegetation mapping.

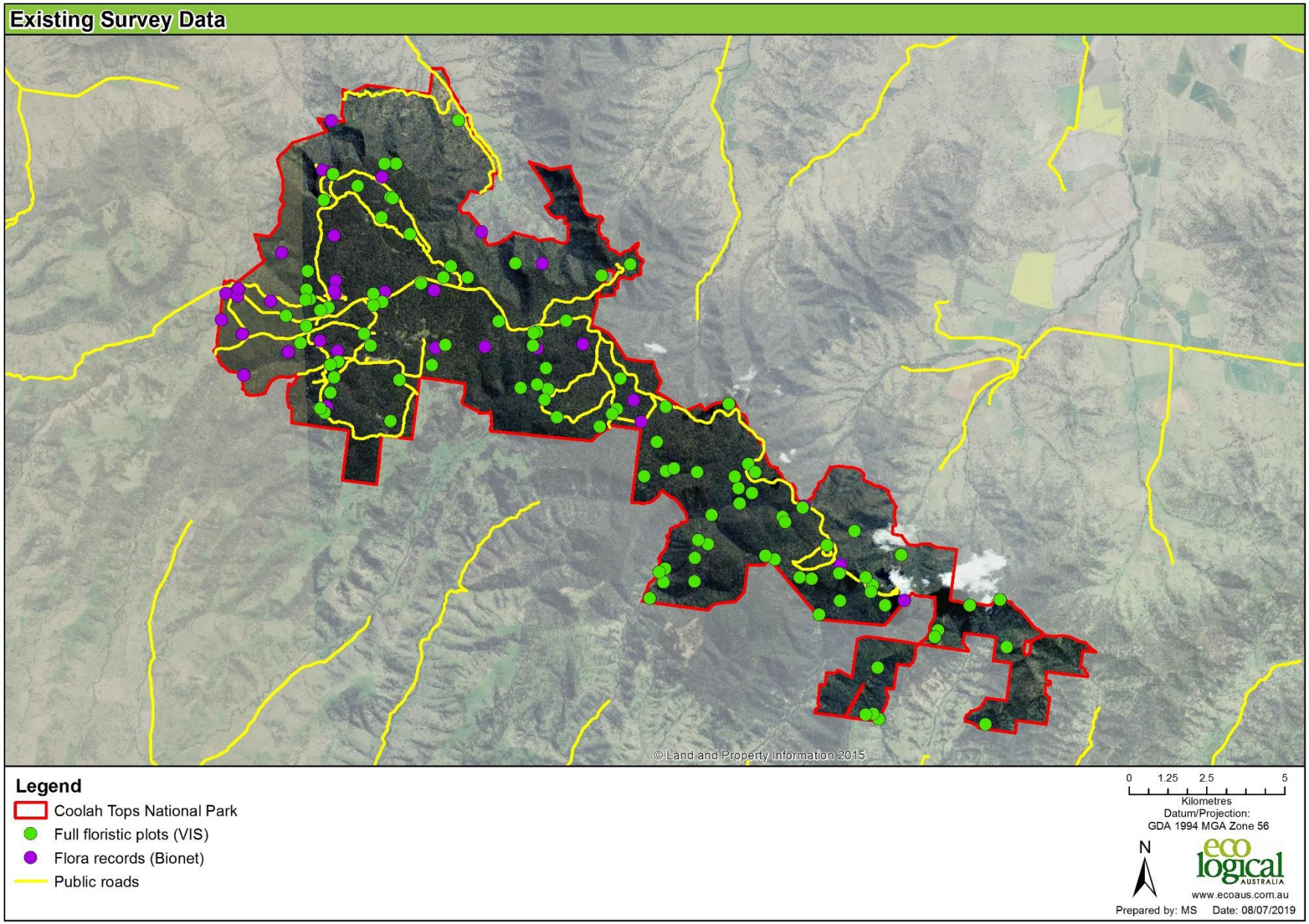


Figure 5: Existing Survey Data

2.2 Datasets utilised

A range of datasets were used in this project including high resolution (50 cm) stereo Airborne Digital Sensor (ADS40) imagery, existing vegetation mapping, contour and elevation mapping, drainage mapping, full floristic vegetation plot data and rapid data point (RDP) data (**Table 2**).

Table 2: Data sources

Data	Purpose
High resolution (50 cm) stereo ADS40 imagery	Distinct patterns in the imagery representing vegetation community boundaries were identified, linework created and attributed.
Digital Surface Model (DSM)	A DSM was utilised to ensure high vertical positional accuracy was acquired during the creation of linework. This was particularly important for areas with high elevation and/or significant relief.
Vegetations mapping products obtained from SEED https://www.seed.nsw.gov.au/edphome/home.aspx	Existing vegetation mapping was used as a guide to the occurrence, boundaries and extent of vegetation communities, as well as the assignment of PCTs.
Previous vegetation survey data obtained from the VIS (OEH 2019)	Floristics from previous surveys was utilised in the development of species lists and PCTs.
Rapid Data Points	Field survey data was used to identify and assign PCTs.
Contours and drainage (LPI, 2015)	Topography, drainage and landscape position.
Soil landscape mapping (OEH 2018)	Soil mapping used to assist in identifying boundaries between PCTs.

2.3 Preliminary Plant Community Types

Each of the 106 existing full floristic vegetation plots extracted from the VIS database were assigned an initial PCT based on a quantitative analysis of plot data by comparing site data against the vegetation descriptions, characteristic species in the upper, mid and ground structural layers, vegetation structure, soils, landform and other relevant data contained within the VIS Classification database.

Potential PCTs were identified from both existing mapping datasets, and through a review of the PCT database. The PCT database was searched for PCTs containing 'Liverpool Range', 'Coolah' and 'Coolah Tops' in the title or description to identify PCTs associated with the area. All PCTs identified as potentially occurring in the reserve were combined into a single dataset for quantitative analysis.

Quantitatively analysing plot data against the PCT database is problematic for a number of reasons. Firstly, the PCT database includes communities which have been described from a range of datasets, each of variable scale and quality. Secondly, while some PCTs have excellent descriptions and characteristic species lists (particularly those described by Benson in the Brigalow Belt South), many have very basic descriptions and depauperate species lists. Finally, the name of some communities does not appear to fit well with the list and order of characteristic species included. A series of separate classification projects are underway, by OEH, to upgrade the PCT classification on the NSW east coast. These projects may result in further definition of plant communities applicable within the reserve.

2.4 Sampling strategy

A sampling strategy was developed to supplement existing surveys with strategic data to describe the floristic and structural diversity of the reserve. The sampling strategy was devised based on the existing vegetation units present and the number of existing vegetation plots in each unit. Approximately 100 transects were mapped across the landscape sampling a variety of stratification units in undersampled areas to focus field survey efforts (**Figure 6**). A moderate level of redundancy was incorporated into the design to allow for modification and refinement during field surveys.

2.5 Field survey

A total of 342 Rapid Data Points (RDPs) were surveyed as part of this project across the reserve (**Figure 7**). Surveys were undertaken between 20 and 24 May 2019 by ELA botanists Martin Sullivan, David Allworth and Gordon Patrick with support from Sophie Powrie, Liam Scanlan, Angelina Siegrist and Rebecca Croake.

Weather leading into and during the survey was mostly fine and suitable for classification of plant communities. Current widespread drought conditions in the region did not effect the identification of dominant species in each structural layer as required to determine Plant Community Types.

Vegetation surveys were undertaken in the field using mobile devices loaded with Collector for ArcGIS software and relevant Geographic Information System (GIS) datasets (target plots, aerial photography, vegetation mapping, drainage, contours etc.).

At each RDP the dominant canopy, midstorey and groundcover species; structural cover condition; vegetation structure; PCT; priority or environmental weed species and cover; threatened species and count; soil texture; fire history; vegetation condition; landform element and pattern; notes; photo number; surveyor; and date were recorded. RDPs are less comprehensive than full floristic vegetation plots, however they allow for rapid identification of PCTs which could then be interpreted through Aerial Photographic Interpretation (API).

Targeted surveys for threatened flora species were not specifically undertaken as part of this project, however any observations of conservation significant flora were noted.

2.5.1 Unmanned Aerial Vehicle survey

An Unmanned Aerial Vehicle, commonly referred to as a ‘drone’ was utilised to enhance the accuracy of Plant Community Type Mapping. A DJI Mavic Air was flown by a registered operator in accordance with the Civil Aviation Safety Authority (CASA) standard operating conditions. The drone was used in the following manner:

- Eight high quality (4K) aerial video transects (an example shown in **Figure 8**) were flown at discreet, precipitous locations within the reserve. The video transects allowed for post flight analysis of dominant canopy species, vegetation structure, condition, and transitions between Plant Community Types.
- Approximately 290 high resolution photographs were taken across the offset sites. Aerial photographs captured allowed for post flight analysis of dominant canopy species, vegetation structure, condition and interpretation of cover of various Plant Community Types. Aerial

photographs were captured at variety of angles including oblique and top-down to provide additional information not available in existing aerial photography.

While drones have been previously utilised in vegetation mapping projects (e.g. (Cruzan, et al., 2016)), they typically have been used to create high resolution aerial photography mosaics, DEMs or spectral imagery. The use of a drone to support vegetation mapping in manner undertaken for this project is has allowed far greater coverage of vegetated areas than possible using traditional means, especially in largely inaccessible areas below cliffs and on steep slopes. Drone photos and video have allowed detailed interpretation of aerial imagery where uncertainty occurs (e.g. in shaded areas). Furthermore, in combination with both high resolution stereo Aerial Photographic Interpretation (API) and on-ground vegetation survey, the final accuracy of mapping across the reserves is exceptional.

2.6 Plant Community Type mapping

Vegetation mapping was undertaken using an on-screen digitising approach in ArcGIS10.2 and Summit Evolution at a scale of between 1:2,500 and 1:10,000. Spatial data were loaded into the Geographic Information System (GIS) and RDPs were combined with full floristic vegetation plots to form a combined dataset which was overlain on the high resolution three-dimensional (3D) ADS40 (50 cm) imagery.

RDPs and vegetation plots were used as an initial guide to identify Plant Community Types. API was then used to generate linework in 3D based on distinct patterns in the imagery representing vegetation community boundaries with the most appropriate community attributed.

The final mapped product is considered accurate at a 1:5,000 scale. Supplementary datasets such as the DSM were used to help inform the API and to delineate boundaries between vegetation communities. Attributing and mapping vegetation communities in three dimensions (3D) provides a level of accuracy unable to be achieved in two dimensions (i.e. standard orthorectified imagery) (Plate 1 and 2). Individual tree species, canopy height, midstorey structure as well as grassy/shrubby understoreys are readily identifiable in 3D, with landscape position, elevation and topographical features greatly assisting in the accurate identification of vegetation communities

The fine scale nature of the available imagery and the features of mapping in 3D allowed for the identification of Plant Community Types across the landscape based on landscape position, signature and structure.

PCTs were attributed in accordance with VIS Classification database (OEH, 2019a) which follows the NSW Vegetation Classification Assessment (Benson, et al., 2010). Where possible, PCTs were assigned based on a quantitative comparison of vegetation plot and RDP data with the vegetation descriptions, characteristic species in the upper, mid and ground structural layers, vegetation structure, soils, landform and other relevant data contained within the VIS Classification database (OEH, 2019a).

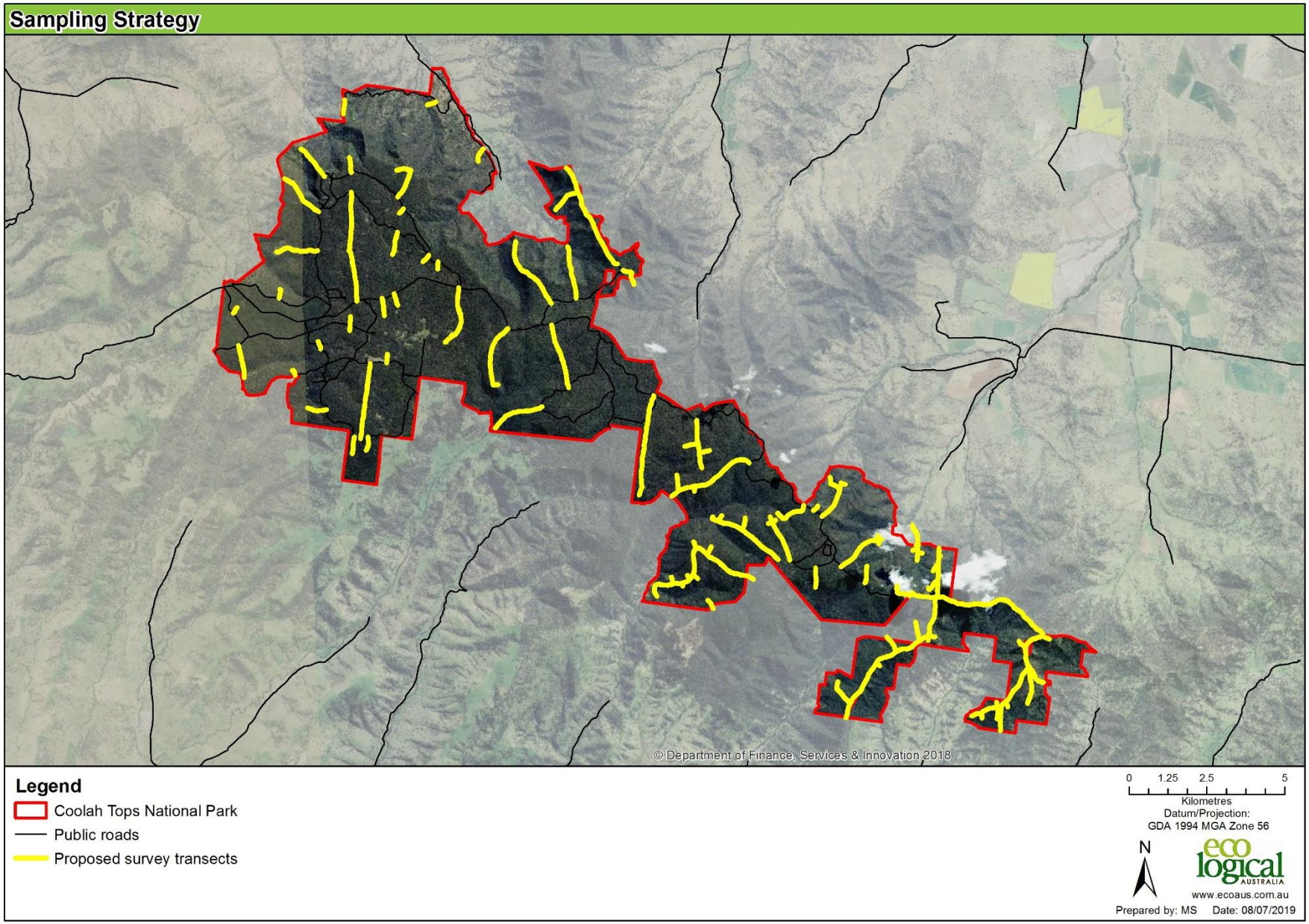


Figure 6: Sampling Strategy

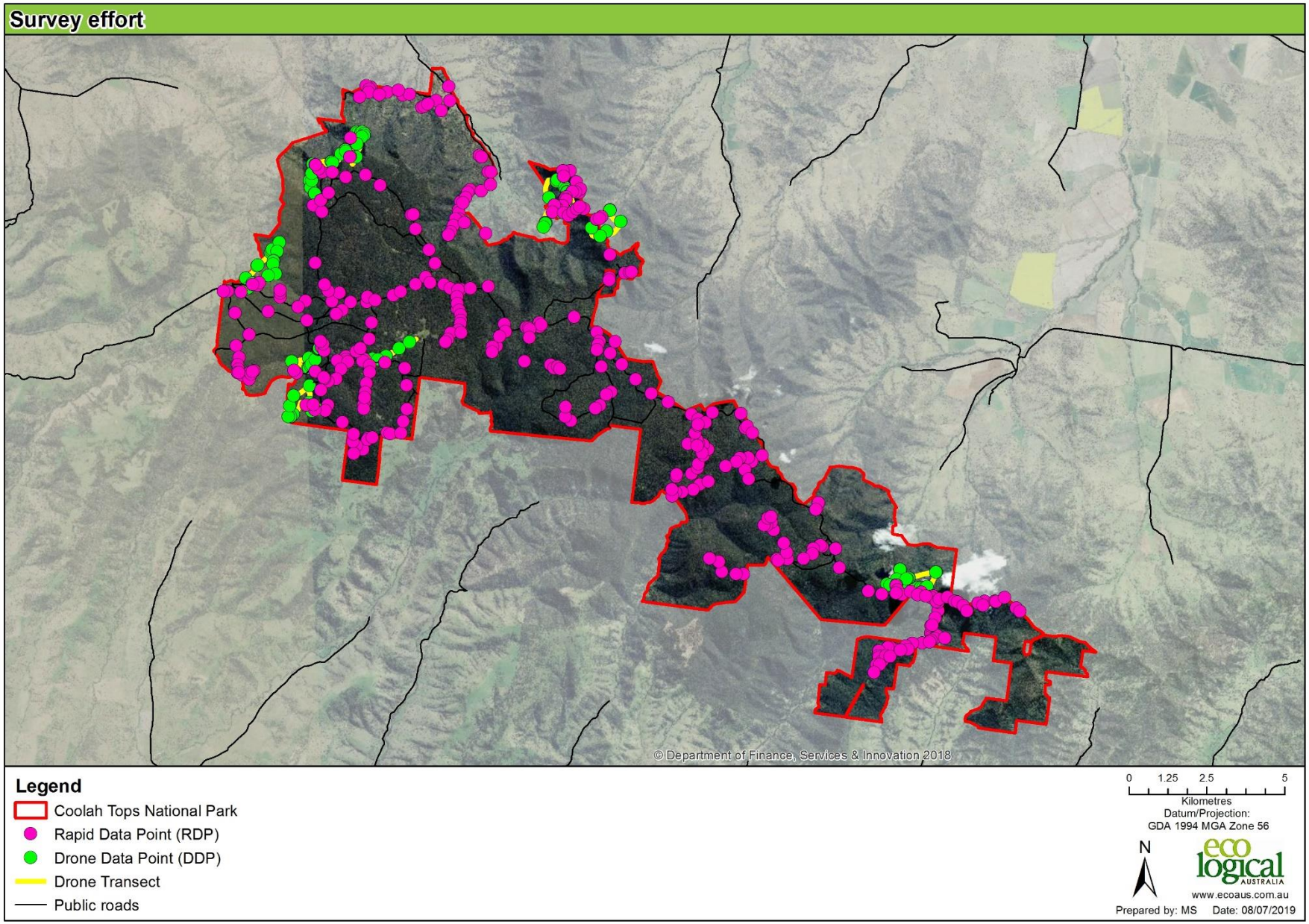


Figure 7: Survey Effort

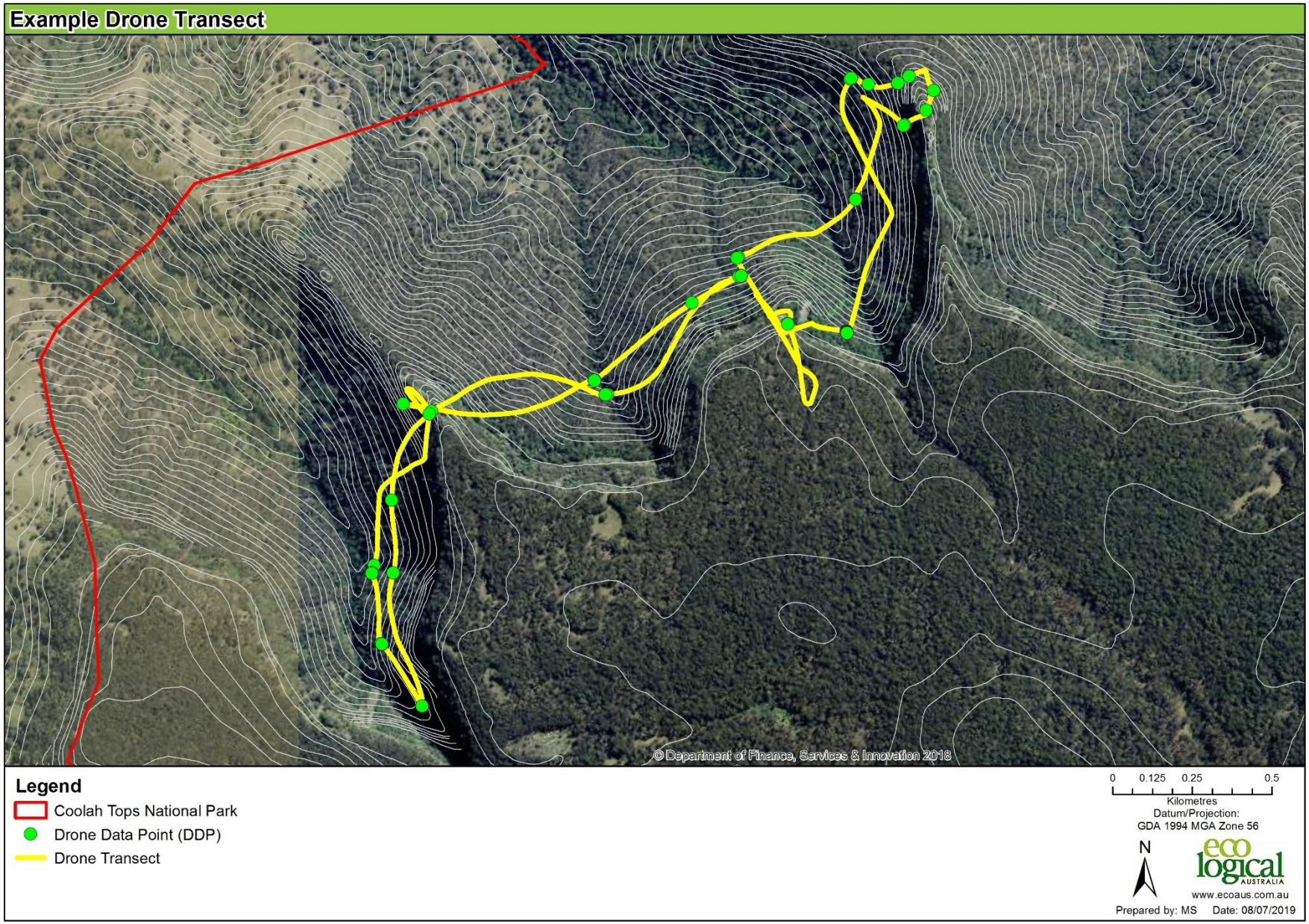


Figure 8: Example Drone Transect

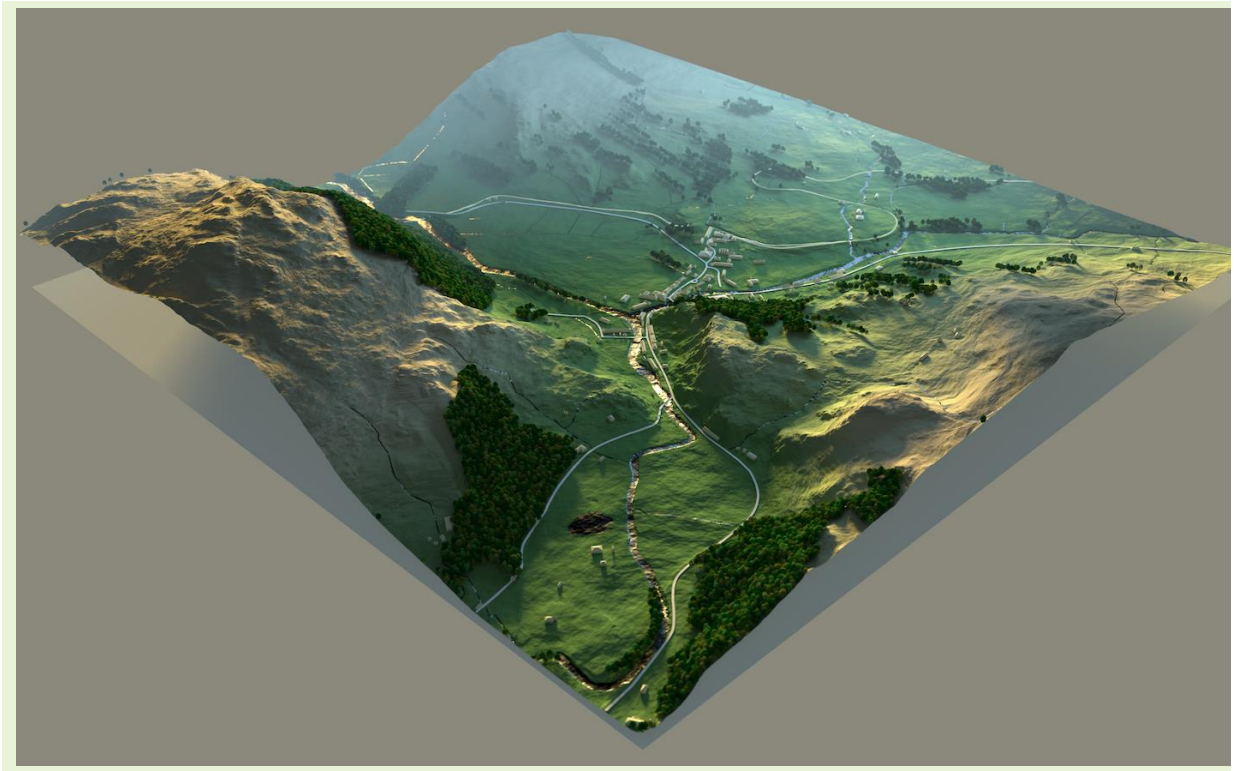
Each polygon was assigned the following attributes:

- PCTID – PCT identification code
- NAME – PCT community name
- DOMINANTs – Abbreviated dominant species in each polygon as per **Table 3**
- CONFIDENCE – mapping confidence for each polygon:
  - 1 – field validated
  - 2 – high confidence API only
  - 3 – moderate confidence API only
- CLASS – Vegetation class
- FORMATION – Vegetation formation
- FIRE – Recommended fire intervals
- PCCLEARED – Percent cleared
- HECTARES – Area of polygon in hectares

Table 3: Dominant species

Abbreviation	Detail	Abbreviation	Detail
AB	Apple Box	RP	Radiata Pine
BG	Brittle Gum	RS	Red Stringybark
BK	Bracken	SG	Snow Gum
BP	Black Cypress Pine	SG	Snow Grass
BS	Black Sallee	SP	Sweet Pittosporum
CB	Cough Bush	SSB	Silvertop Stringybark
HF	Herb Field	TF	Tree Fern
MG	Mountain Gum	TT	Tea Tree
NB	Norton's Box	TV	Tree Violet
RBA	Rough Barked Apple	WAB	Wallaby Bush
RF	Rainforest	WB	White Box
RG	Ribbon Gum	WP	White Cypress Pine
RO	River Oak	YB	Yellow Box
		TL	Tree Lomatia

Visualisation of 3D mapping utilising Summit Evolution Software



Conceptualisation of the 3D mapping process including the ability to visualise vegetation structure, landscape position, elevation and topography. © Owen Powell

Plate 1 and 2

2.7 Fire ecology

The fire ecology for each PCT was briefly reviewed as part of this project. Pertinent information relevant to the management of each community including whether they are threatened by fire, notes on fire ecology, recommended fire intervals and minimum fire intervals for landscape management were determined.

General notes on fire ecology and recommended fire intervals were sourced from the VIS (OEH, 2019a) and minimum fire intervals for state-wide vegetation formations were sourced from the NSW Biodiversity Strategy (NSW Government, 2004) and NSW RFS (RFS, 2006). Vegetation formation fire intervals are given for land management zones (LMZ) which are optimal for biodiversity, and strategic fire advantage zones (SFAZ) which are optimal for asset protection and hazard reduction.

3. Results

3.1 Floristic diversity

A total of 464 species from 82 plant families have been recorded from the reserve (**Appendix A** and **Appendix D**). The average number of species per vegetation plot was 41, with the highest being 94 species and the lowest being 18 species. Across vegetation formations average floristic diversity was highest in Forested Wetlands (61 species), Grassy Woodlands (49 species) and Heathlands (48 species), followed by Wet Sclerophyll Forests (42 species) and Dry Sclerophyll Forests (40 species). Freshwater Wetlands (28 species) and Rainforests (23 species) had the lowest diversity. More detailed analysis of floristic diversity within Plant Community Types is limited due to low sampling sizes in many units.

The families which have the greatest representation include Asteraceae (60 species), Poaceae (48 species), Fabaceae (Faboideae) (29 species), Cyperaceae (24 species), Myrtaceae (23 species), Orchidaceae (17 species), Caryophyllaceae (13 species), Haloragaceae (10 species) and Juncaceae (10 species). The remaining 73 families had <10 species each.

Of the 464 species recorded, 13% (60) were exotic, however 38 of these (63%) were only recorded in one or two sites. The most commonly recorded exotic species were *Cirsium vulgare* (Spear Thistle), *Conyza sumatrensis* (Tall Fleabane), *Hypericum perforatum* (St Johns Wort), *Hypochaeris radicata* (Catsear), *Sonchus oleraceus* (Common Sowthistle), *Taraxacum officinale* (Dandelion), *Trifolium repens* (White Clover) and *Verbena bonariensis* (Purpletop). All of these weeds, with the exception of *Hypericum perforatum* are largely cosmopolitan weeds that are frequently recorded in native vegetation and generally pose no risk to ecosystem health in small numbers. Further information on weed species is report in Section 3.4.

3.1.1 Conservation significant species

No threatened flora species are known to occur in the reserve. Previously recorded species considered to be of conservation significance were identified during this study including *Discaria pubescens* and *Teucrium* species *D*.

3.2 Plant Community Types

Twenty-four Plant Community Types including one derived type were mapped in the reserve (**Table 4**, **Figure 9**). More detailed Plant Community Type maps with the reserve divided into western and eastern sections are shown on **Figure 10** and **Figure 11**.

Five Plant Community Types accounted for more than 80% of the total area, namely Silvertop Stringybark - Forest Ribbon Gum very tall moist open forest (PCT 490, 32%), Silvertop Stringybark - Yellow Box - Apple Box - Rough-barked Apple shrub grass open forest (PCT 492, 18%), Snow Gum - Mountain Gum - Silver Wattle tall open forest (PCT 494, 15%), White Box shrubby woodland (PCT 393, 10%) and Forest Ribbon Gum - Snow Gum - Snow Grass grassy open forest (PCT 1551, 5%).

The most restricted Plant Community Types had less than 75 hectares mapped each, with an average of only 28 hectares and a minimum of 6 hectares (**Table 4**). The remaining ten Plant Community Types had between 100 and 600 hectares mapped each (**Table 4**).

Due to significant variance within Plant Community Types, the dominant species in each mapped polygon (sub-types) were assigned a combined dominant species code (as per Section 2.6). More than 160 separate units were mapped within the 24 Plant Community Types Mapped (**Appendix B**). Up to 29 separate subtypes were identified for each Plant Community Type, with five having more than 10 separate subtypes: Silvertop Stringybark - Yellow Box - Apple Box - Rough-barked Apple shrub grass open forest (PCT 492, 29 subtypes), Silvertop Stringybark - Forest Ribbon Gum very tall moist open forest (PCT 490, 25 subtypes), White Box shrubby woodland (PCT 393, 18 subtypes), Snow Gum - Mountain Gum - Silver Wattle tall open forest (PCT 494, 14 subtypes) and Long-leaved Box +/- Nortons Box - red gum grassy woodland (PCT 489, 11 subtypes). The Plant Community Types with the largest number of mapped subtypes were also those with the greatest area mapped in the reserve. Due to the large complexity, subtypes of each Plant Community Type have not been mapped in this report but are included in the spatial data attribution. Observable patterns in sub type distribution are evident in the digital dataset and reflect changes to slope, aspect, substrate, ruggedness and disturbance history. Detailed Plant Community Type profiles are included in **Appendix C**.

Plant Community Types 434 and 1693 are equivalent to the Endangered Ecological Community (EEC) White Box Yellow Box Blakely's Red Gum Woodland under the BC Act and the Critically Endangered Ecological Community (CEEC) White Box-Yellow Box-Blakely's Red Gum Woodland and Derived Native Grassland under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

Table 4: Plant Community Types

PCTID	Name	Class	Formation	Hectares
84	River Oak - Rough-barked Apple - red gum - box riparian tall woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar Bioregion	Eastern Riverine Forests	Forested Wetlands	110.2
383	Apple Box - Rough-barked Apple terrace flats woodland of the southern Brigalow Belt South Bioregion	Western Slopes Grassy Woodlands	Grassy Woodlands	47.1
393	White Box shrubby woodland of the western Liverpool Range, Warrumbungle Range and south-west Pilliga forests, Brigalow Belt South Bioregion	North-west Slopes Dry Sclerophyll Woodlands	Dry Sclerophyll Forests (Shrub/grass sub-formation)	1,565.7
420	Red Stringybark - Rough-barked Apple +/- Nortons Box open forest on hillslopes in the Warrumbungle NP - Coolah regions	Western Slopes Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrubby sub-formation)	32.3
434	White Box grass shrub hill woodland on clay to loam soils on volcanic and sedimentary hills in the southern Brigalow Belt South Bioregion	Western Slopes Grassy Woodlands	Grassy Woodlands	196.9
435	White Box - White Cypress Pine shrub grass hills woodland in the Brigalow Belt South Bioregion and Nandewar Bioregion	North-west Slopes Dry Sclerophyll Woodlands	Dry Sclerophyll Forests (Shrub/grass sub-formation)	20.1
446	Riparian tea tree - bottlebush - pennywort forbland / shrubland / wetland of montane creeks in the Brigalow Belt South Bioregion	Northern Montane Heaths	Heathlands	304.0

PCTID	Name	Class	Formation	Hectares
487	Sweet Pittosporum - Forest Oak - Rough-barked Apple depauparate gully rainforest on the Liverpool Range	North Coast Wet Sclerophyll Forests	Wet Sclerophyll Forests (Shrubby sub-formation)	6.1
488	Silvertop Stringybark - Yellow Box +/- Nortons Box grassy woodland on basalt hills mainly on northern aspects of the Liverpool Range, Brigalow Belt South Bioregion	New England Grassy Woodlands	Grassy Woodlands	597.8
489	Long-leaved Box +/- Nortons Box - red gum grassy woodland on hills in the southern Brigalow Belt South Bioregion	New England Grassy Woodlands	Grassy Woodlands	438.0
490	Silvertop Stringybark - Forest Ribbon Gum very tall moist open forest on basalt plateau on the Liverpool Range, Brigalow Belt South Bioregion	New England Grassy Woodlands	Grassy Woodlands	5,262.1
491	Forest Ribbon Gum - Silvertop Stringybark - Mountain Gum tall open forest on basalt on the Liverpool Range, mainly Brigalow Belt South Bioregion	New England Grassy Woodlands	Grassy Woodlands	558.7
492	Silvertop Stringybark - Yellow Box - Apple Box - Rough-barked Apple shrub grass open forest mainly on southern slopes of the Liverpool Range, Brigalow Belt South Bioregion	New England Grassy Woodlands	Grassy Woodlands	2,957.3
493	Forest Oak - Rough-barked Apple - Silvertop Stringybark shrub grass open forest on protected slopes of the Liverpool Range	New England Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrub/grass sub-formation)	121.7
494	Snow Gum - Mountain Gum - Silver Wattle tall open forest of the Liverpool Range, Brigalow Belt South Bioregion	New England Grassy Woodlands	Grassy Woodlands	2,357.6
495	Brittle Gum - Silvertop Stringybark grassy open forest of the Liverpool Range, Brigalow Belt South Bioregion	New England Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrub/grass sub-formation)	326.9
496	Yellow Box - White Box - Silvertop Stringybark - Blakely's Red Gum grass shrub woodland mainly on the Liverpool Range, Brigalow Belt South Bioregion	New England Grassy Woodlands	Grassy Woodlands	24.2
497	Tea tree shrubland / sedgeland / forbland swamp wetland on the Liverpool Range, mainly Brigalow Belt South Bioregion	Montane Bogs and Fens	Freshwater Wetlands	134.8
498	Black Sallee plateau low woodland in the southern Brigalow Belt South Bioregion	New England Grassy Woodlands	Grassy Woodlands	161.2
499	Tree Violet - cough bush basalt scree slopes shrubland of the Liverpool Range - Wollemi region, Brigalow Belt South Bioregion and Sydney Basin Bioregion	Northern Montane Heaths	Heathlands	64.0
547	Wild Quince - Mock Olive - Rusty Fig - Iamboto - Sweet Pittosporum dry rainforest of rocky and scree areas of the Nandewar Bioregion and New England Tableland Bioregion	Dry Rainforests	Rainforests	8.0

PCTID	Name	Class	Formation	Hectares
569	Derived Snow Grass +/- Kangaroo Grass +/- Wild Sorghum tussock grassland of the NSW Northern Tablelands	Temperate Montane Grasslands	Grasslands	78.5
1551	Forest Ribbon Gum - Snow Gum - Snow Grass grassy open forest of the Liverpool Ranges and New England Tableland	Northern Tableland Wet Sclerophyll Forests	Wet Sclerophyll Forests (Grassy sub-formation)	869.0
1693	Yellow Box - Rough-barked Apple grassy woodland of the upper Hunter and Liverpool Plains	Western Slopes Grassy Woodlands	Grassy Woodlands	20.2
0	Cleared	NA	NA	1.5
Total				16,263.8

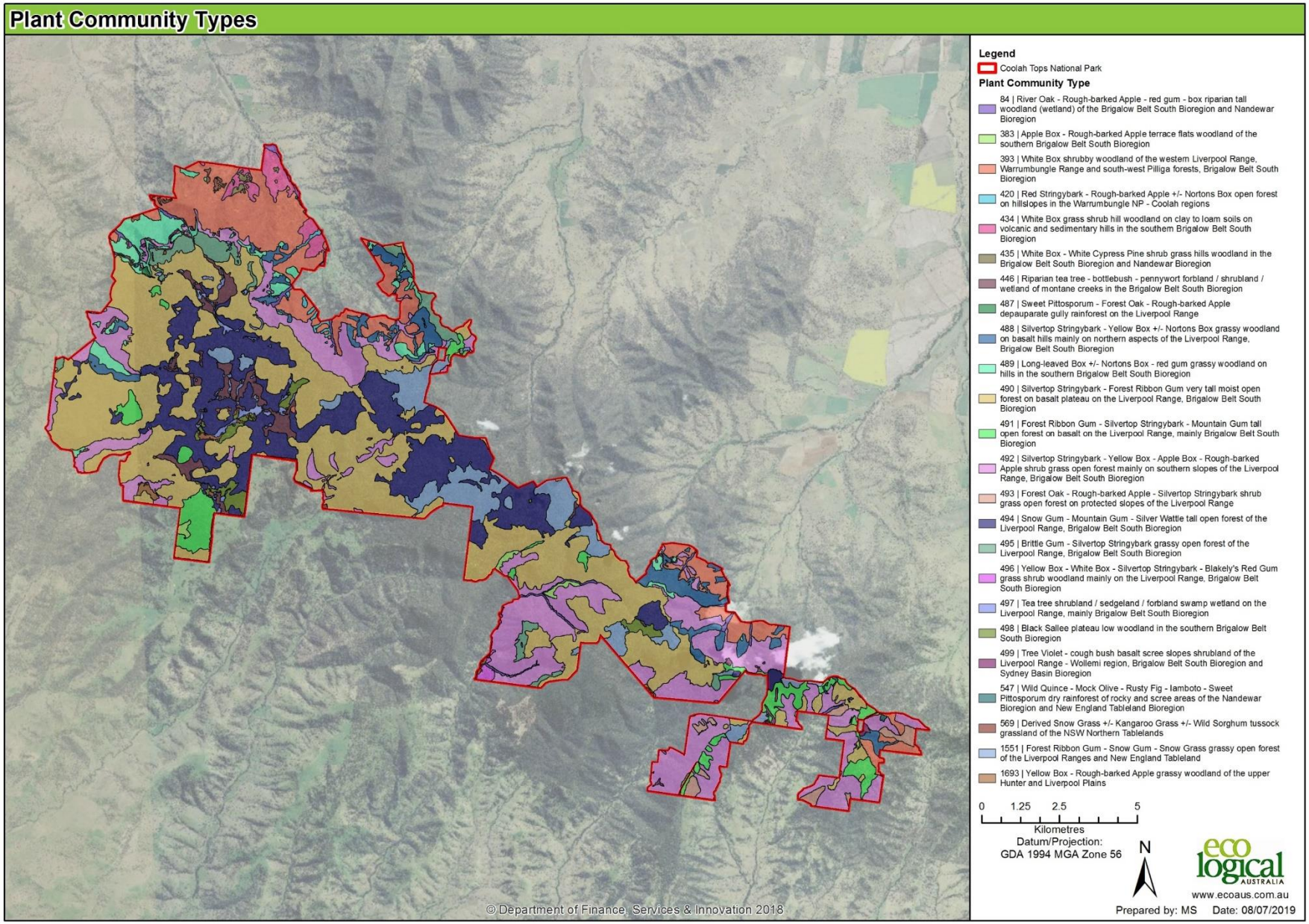


Figure 9: Plant Community Types (overview)

Plant Community Types (West)

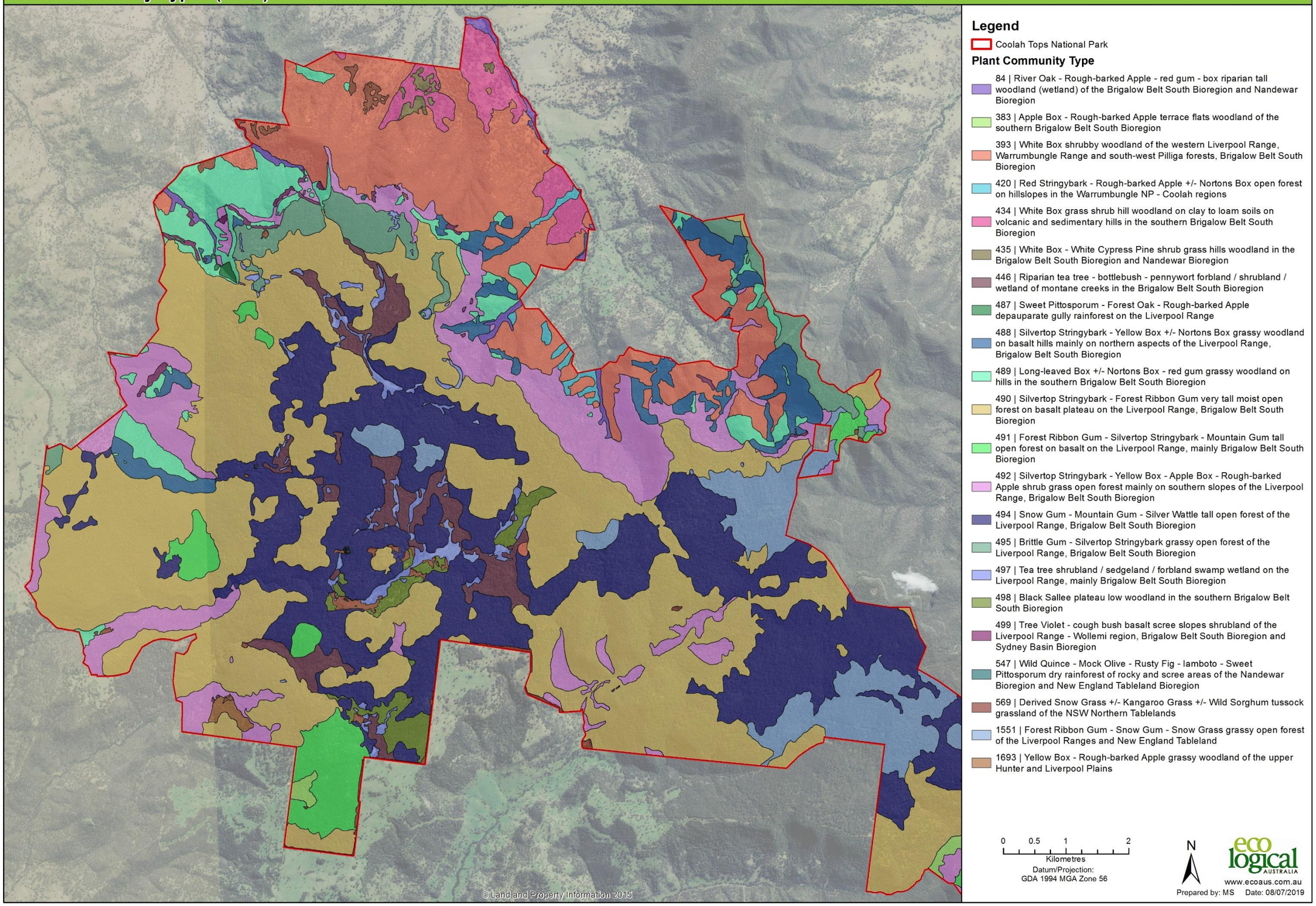
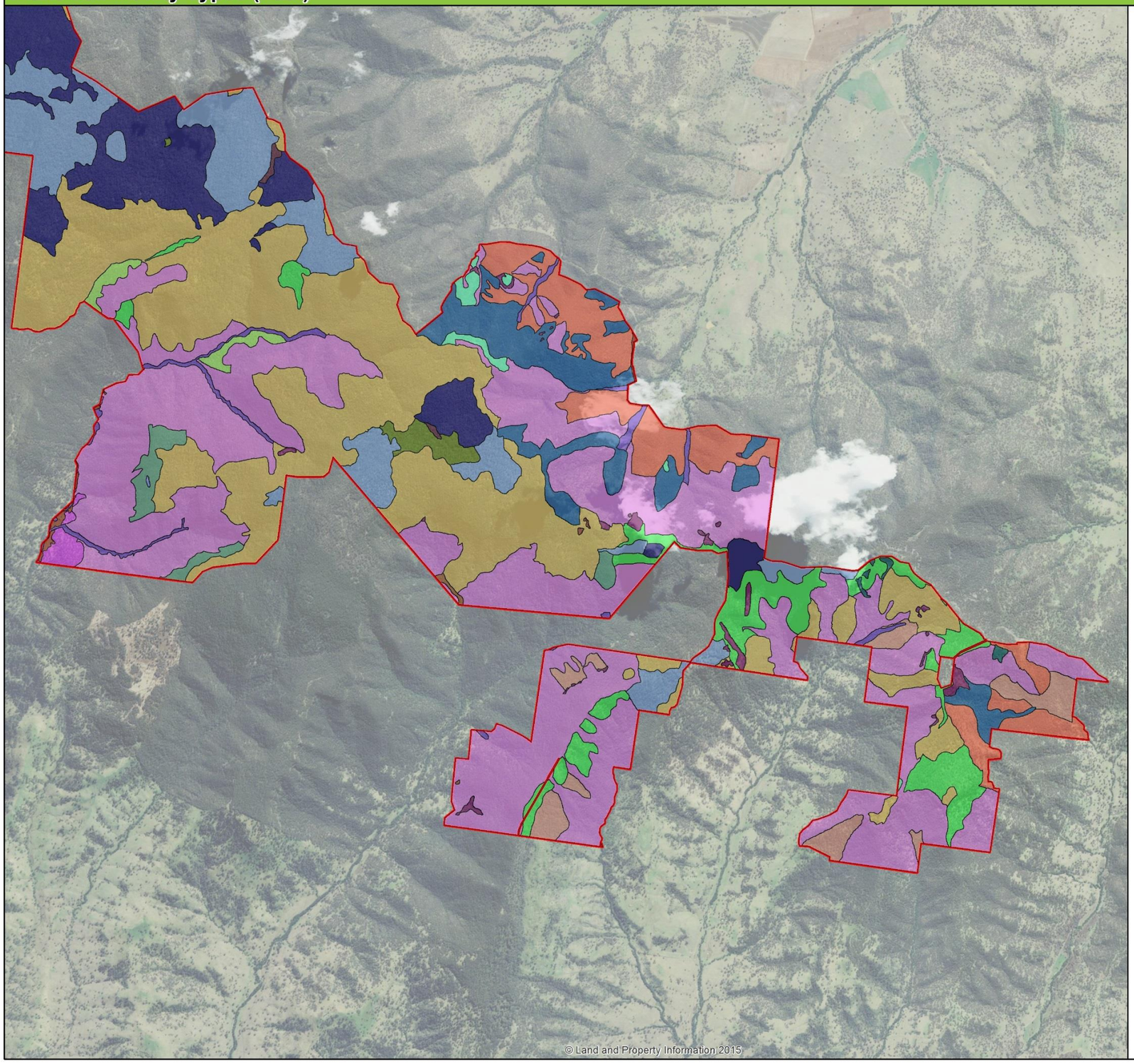


Figure 10: Plant Community Types (West)

Plant Community Types (East)



Legend

Coolah Tops National Park

Plant Community Type

- 84 | River Oak - Rough-barked Apple - red gum - box riparian tall woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar Bioregion
- 383 | Apple Box - Rough-barked Apple terrace flats woodland of the southern Brigalow Belt South Bioregion
- 393 | White Box shrubby woodland of the western Liverpool Range, Warrumbungle Range and south-west Pilliga forests, Brigalow Belt South Bioregion
- 446 | Riparian tea tree - bottlebush - pennywort forbland / shrubland / wetland of montane creeks in the Brigalow Belt South Bioregion
- 488 | Silvertop Stringybark - Yellow Box +/- Nortons Box grassy woodland on basalt hills mainly on northern aspects of the Liverpool Range, Brigalow Belt South Bioregion
- 489 | Long-leaved Box +/- Nortons Box - red gum grassy woodland on hills in the southern Brigalow Belt South Bioregion
- 490 | Silvertop Stringybark - Forest Ribbon Gum very tall moist open forest on basalt plateau on the Liverpool Range, Brigalow Belt South Bioregion
- 491 | Forest Ribbon Gum - Silvertop Stringybark - Mountain Gum tall open forest on basalt on the Liverpool Range, mainly Brigalow Belt South Bioregion
- 492 | Silvertop Stringybark - Yellow Box - Apple Box - Rough-barked Apple shrub grass open forest mainly on southern slopes of the Liverpool Range, Brigalow Belt South Bioregion
- 493 | Forest Oak - Rough-barked Apple - Silvertop Stringybark shrub grass open forest on protected slopes of the Liverpool Range
- 494 | Snow Gum - Mountain Gum - Silver Wattle tall open forest of the Liverpool Range, Brigalow Belt South Bioregion
- 495 | Brittle Gum - Silvertop Stringybark grassy open forest of the Liverpool Range, Brigalow Belt South Bioregion
- 496 | Yellow Box - White Box - Silvertop Stringybark - Blakely's Red Gum grass shrub woodland mainly on the Liverpool Range, Brigalow Belt South Bioregion
- 497 | Tea tree shrubland / sedgeland / forbland swamp wetland on the Liverpool Range, mainly Brigalow Belt South Bioregion
- 498 | Black Sallee plateau low woodland in the southern Brigalow Belt South Bioregion
- 499 | Tree Violet - cough bush basalt scree slopes shrubland of the Liverpool Range - Wollemi region, Brigalow Belt South Bioregion and Sydney Basin Bioregion
- 547 | Wild Quince - Mock Olive - Rusty Fig - lamboto - Sweet Pittosporum dry rainforest of rocky and scree areas of the Nandewar Bioregion and New England Tableland Bioregion
- 569 | Derived Snow Grass +/- Kangaroo Grass +/- Wild Sorghum tussock grassland of the NSW Northern Tablelands
- 1551 | Forest Ribbon Gum - Snow Gum - Snow Grass grassy open forest of the Liverpool Ranges and New England Tableland
- 1693 | Yellow Box - Rough-barked Apple grassy woodland of the upper Hunter and Liverpool Plains

0 0.5 1 2
Kilometres
Datum/Projection:
GDA 1994 MGA Zone 56

N

eco logical AUSTRALIA
www.ecoaus.com.au

Prepared by: MS Date: 08/07/2019

Figure 11: Plant Community Types (East)

3.3 Vegetation Class and Formation

The 24 Plant Community Types mapped in the reserve fall within 12 Vegetation Classes (**Table 5**) and 10 Vegetation Formations (**Table 6**). The vast majority of vegetation falls within the New England Grassy Woodland Class (76%) and the corresponding Grassy Woodlands Formation. The Shrubby Dry Sclerophyll Forests of the New-England and North-west Slopes were the second most abundant Formation (12%), followed by the Wet Sclerophyll Forests of the North Coast and Northern Tablelands (5%). All other Classes and Formations made up less than 5% of the total reserve.

Table 5: Vegetation Class

Vegetation Class	Hectares
Dry Rainforests	8.0
Eastern Riverine Forests	110.2
Montane Bogs and Fens	134.8
New England Dry Sclerophyll Forests	448.6
New England Grassy Woodlands	12,356.8
North Coast Wet Sclerophyll Forests	6.1
Northern Montane Heaths	368.0
Northern Tableland Wet Sclerophyll Forests	869.0
North-west Slopes Dry Sclerophyll Woodlands	1,585.8
Temperate Montane Grasslands	78.5
Western Slopes Dry Sclerophyll Forests	32.3
Western Slopes Grassy Woodlands	264.2
Total	16,263.8

Table 6: Vegetation Formation

Vegetation Formation	Hectares
Dry Sclerophyll Forests (Shrub/grass sub-formation)	2,034.4
Dry Sclerophyll Forests (Shrubby sub-formation)	32.3
Forested Wetlands	110.2
Freshwater Wetlands	134.8
Grasslands	78.5
Grassy Woodlands	12,621.0
Heathlands	368.0
Rainforests	8.0
Wet Sclerophyll Forests (Grassy sub-formation)	869.0
Wet Sclerophyll Forests (Shrubby sub-formation)	6.1
Grand Total	16,263.8

3.4 Priority weeds

A total of 59 exotic species were recorded in the reserve (**Figure 12**, **Appendix A**). Four of these species are priority weeds listed under the NSW *Biosecurity Act* 2015 for the Central West, North West and Hunter LLS and are two also listed as Weeds of National Significance (WoNS).

Table 7: Priority weeds at Coolah Tops National Park

Species	Common Name	Biosecurity Duty	WoNS
***Rubus fruticosus* sp. agg.**	Blackberry	Prohibition on dealings Must not be imported into the State or sold	Y
Senecio madagascariensis	Fireweed	Prohibition on dealings Must not be imported into the State or sold	Y
Hypericum perforatum	St. John's Wort	Regional Recommended Measure An exclusion zone is established for all lands in the region, except the core infestation area comprising the Gunnedah Shire council, Gwydir Shire council, Liverpool Plains Shire council and Tamworth Regional council (NW LLS)	N
Rosa rubignosa	Sweet briar	Regional Recommended Measure An exclusion zone is established for all lands in the region, except the core infestation area comprising the Gunnedah Shire council, Gwydir Shire council, Liverpool Plains Shire council and Tamworth Regional council (NW LLS)	N

Rubus fruticosus sp. agg. was recorded in low abundance at four sites and *Senecio madagascariensis* was recorded in low abundance at two sites. *Hypericum perforatum* was recorded in low-moderate abundance at ten sites, and *Rosa rubiginosa* was recorded in low abundance at five sites. None of the other weeds recorded are considered high risk to the ecological values of the reserve.

Importantly there were no observations of *Cytisus scoparius* (Scotch Broom) which is well established at Barrington Tops, or *Ulex europaeus* (Gorse) which is well established in the Blue Mountains. These invasive species which occur in similar landscapes pose a significant risk to the ecological value of Coolah Tops National Park.

3.5 Fire ecology

The fire ecology of each Plant Community Type was reviewed as part of this project. Detailed information on the fire ecology of Plant Community Types in Coolah Tops National Park is not available which limits the ability to provide detailed advice on the management requirements for fire.

A search of sentinel hotspots within Coolah Tops National Park boundary showed hotspots from 2003, 2011, 2015, 2016 and 2019, occurring mostly in the south west areas of the reserve, with no hotspots recorded prior to 2003 (Geoscience Australia 2019). Fire history has also been mapped within Coolah Tops National Park by NPWS (**Figure 13**), with documented wildfires and prescribed burns occurring from 1997 onwards. Generally fires have been localised and small scale with an average

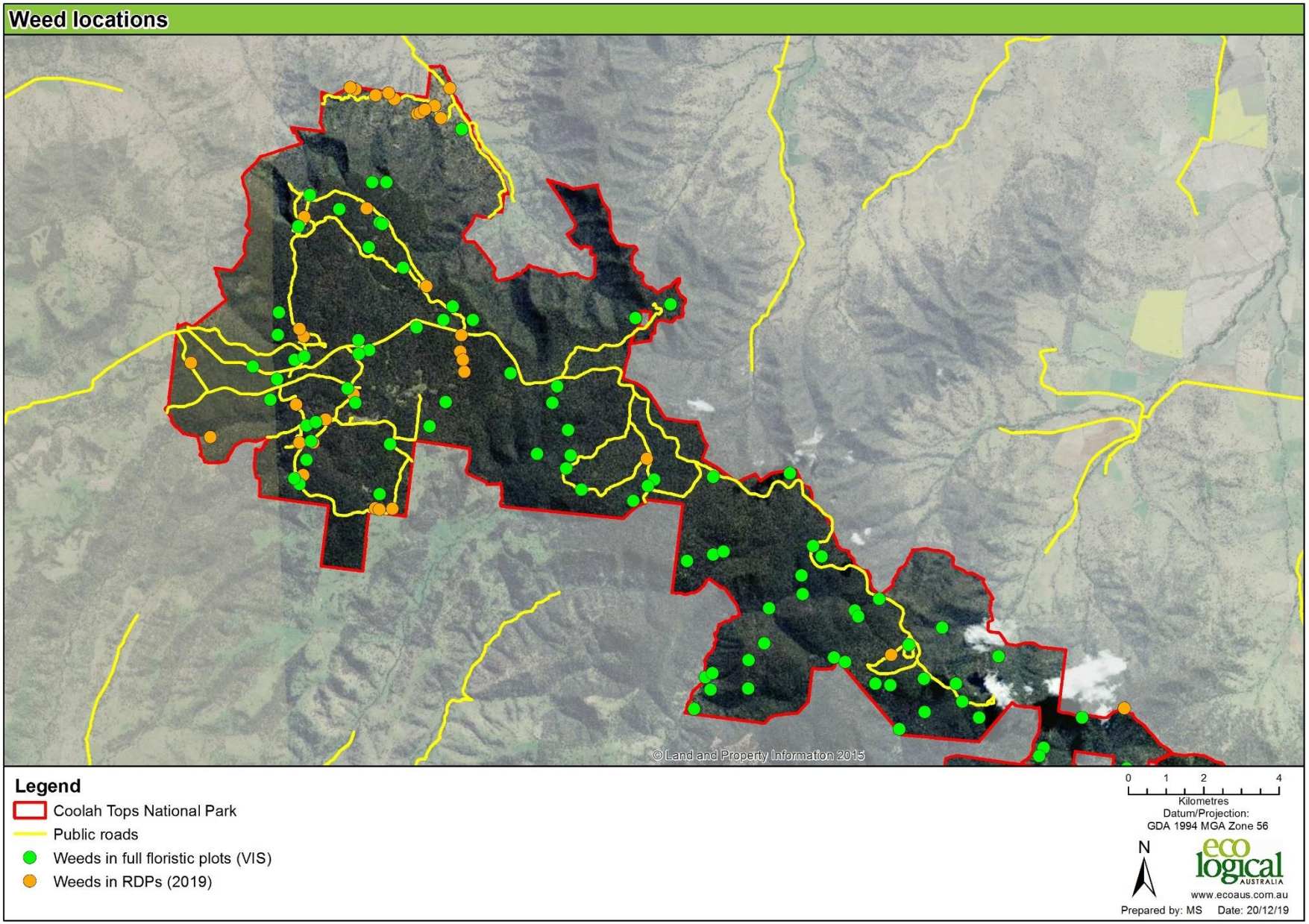


Figure 12: Weed locations

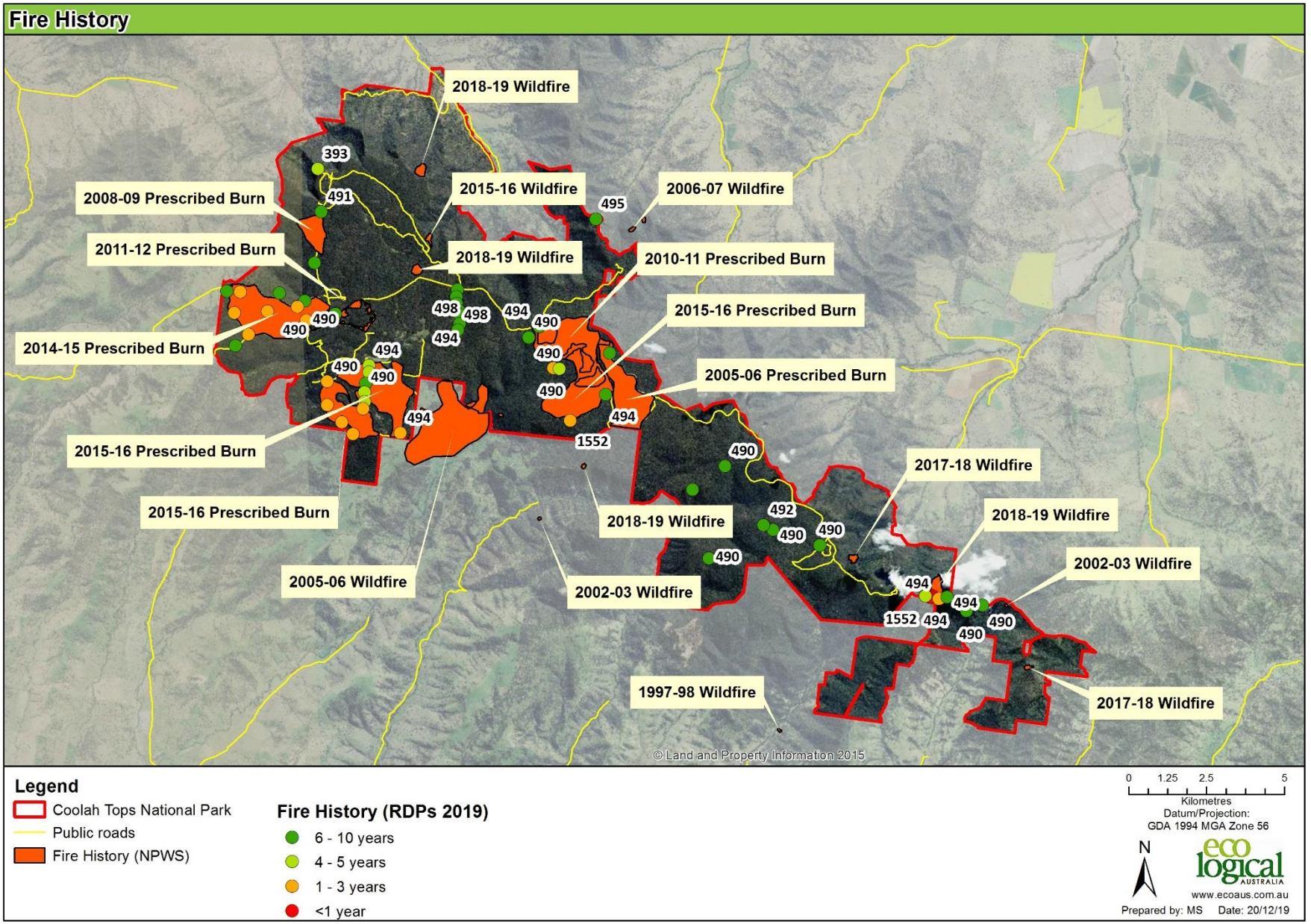


Figure 13: Fire History

The majority of RDPs surveyed as part of this project (84%) identified that most areas of the reserve are long unburnt (estimated at >10 years). Five percent of RDPs identified that fire had occurred in the past three years, while a further 11% had identified fire within the last 10 years (**Figure 13**).

All of the PCTs mapped are likely to be significantly threatened by fire due to their landscape position, structure and composition, with shrubby communities on slopes and crests more likely to be adversely affected by wildfire.

Significant areas of well-developed old growth forests occur in the reserve and need to be managed sympathetically to minimise the risk of significant wildfire causing tree death or oversimplification of vegetation structure through too frequent fire.

Appropriate management of fire for biodiversity conservation is considered one of the highest priorities for Coolah Tops National Park. There is also a need to recognise long-unburnt sections of the landscape as they may contain fire sensitive species that could be lost under a regime of more regular burning.

Table 8. Fire interval guidelines

Vegetation Formation	PCT	Minimum interval	Maximum interval	Note
Dry Sclerophyll Forests (Shrub/grass sub-formation)	393, 435, 493, 495	5	50	Occasional intervals greater than 25 years may be desirable
Dry Sclerophyll Forests (Shrubby sub-formation)	420	7	30	Occasional intervals greater than 25 years may be desirable
Forested Wetlands	84	7	35	Occasional intervals greater than 20 years may be desirable
Freshwater Wetlands	497	6	35	Occasional intervals greater than 30 years may be desirable
Grasslands	569	2	10	Maximum interval is indicative only
Grassy Woodlands	383, 434, 488, 489, 490, 491, 492, 494, 496, 498, 1693	10	40	Occasional intervals greater than 20 years may be desirable
Heathlands	446, 499	7	30	Occasional intervals greater than 20 years may be desirable
Rainforests	547	No burning permitted	No burning permitted	Fire should be avoided and areas should be protected from burning from adjoining dry forest areas
Wet Sclerophyll Forests (Grassy sub-formation)	1551	10	50	Low intensity fire only, avoid crown fires
Wet Sclerophyll Forests (Shrubby sub-formation)	487	25	50	Low intensity fire only, avoid crown fires

It is recommended that ecological burning be planned and undertaken in a manner which ensures a mosaic of burnt and unburnt patches in the landscape and that monitoring be undertaken to determine the effects on conservation significant species and ecological communities.

The response of some species (e.g. *Discaria pubescens*) to fire is unknown. Appropriate consideration of the impacts to species and ecological communities is required prior to undertaking ecological or hazard reduction burns within the reserve.

4. Management considerations

Vegetation across the reserve has been variously disturbed and modified by a history of forestry, however due to sympathetic forestry management, there are significant areas of old growth forest dominated by *Eucalyptus pauciflora* (Snow Gum), *E. nobilis* (Mountain Ribbon Gum) and *E. laevopinea* (Silvertop Stringybark) which are of considerable conservation significance.

Despite prior forestry activities, the condition of vegetation across the reserve is considered to be excellent, with very limited areas requiring active management. Very few areas exhibited the trademarks of clear-felling, with most patches including a variety of stem size classes right up to large mature trees. Patches that contained modified understorey composition or structure are denoted in the condition attribute in the digital data.

Signs of feral animal activity was observed across the reserve including pigs, goats and deer. Active management of these species will assist in the conservation of herbaceous species in grassy and wetland environments. Heavy macropod grazing was observed in most of the natural wetlands visited.

Weed abundance across the reserve is generally low, and rapid detection and eradication of any additional invasive species will assist in preserving the reserve conservation values. Monitoring for both Scotch Broom and Gorse will be essential to minimising the risk to the reserve from these species. Any new detections of these species should be controlled immediately.

While no dieback was observed during this study, dieback due to drought and other factors has been observed at similar elevations at both Mt Kaputar National Park and Kosciusko National Park. Dieback in both *Eucalyptus niphophila* (Snow Gum) and *E. lacrimans* (Weeping Snow Gum) in Kosciusko National Park appears to be related to climate change (reduced snowfall, higher summer temperatures, increase in high intensity rainfall events and delayed commencement of winter rains leading to moisture stress) which has lead to a greater infestation of the native *Phorocantha* sp. (Longicorn Beetle) which effectively ring-barks these trees (Dr Matthew Brookhouse pers comms). While the Snow Gums being impacted at Kosciusko National Park are different (albeit related to) *E. pauciflora* (Snow Gum) which grows in the reserve, monitoring for dieback as a result of climate change impacts is likely to be required in future years.

Nearly the entire perimeter of the reserve, as well as many of the slopes from the plateau are largely inaccessible from public roads. To effectively manage the reserve, strong relationships with surrounding landowners are required for both access and joint management of issues in peripheral areas.

Key management issues include:

- Inappropriate fire regimes which may alter the floristic composition and structure of vegetation communities.
- Priority and environmental weeds including *Senecio madagascariensis*, *Rubus fruticosus* sp. agg., *Hypericum perforatum* and *Rosa rubiginosa* invading native plant communities. Any Scotch Broom or Gorse that is detected in the future should be eradicated immediately.
- Visitor biosecurity should be encouraged including identification signage to prevent environmental weeds from spreading from other visitor destinations e.g. Scotch Broom from

Barrington Tops National Park, and fungus related to Eucalyptus die-back from Barrington Tops National Park and Kosciuszko National Park.

- Several access trails were overgrown at the time of survey and required maintenance, formalisation or closure. Other trails observed were not marked on the available spatial data and could provide a useful resource for reserve management. A review of access trails is recommended to ensure fire management objectives can be met.

5. Recommendations

Following the completion of PCT mapping across the reserve the following recommendations have been developed.

- Conduct detailed research into the likely fire ecology of each PCT including recent and likely historic fire regimes as well as sensitive species to better inform fire management requirements.
- Review and update relevant fire management plans taking into consideration the minimum fire intervals, mosaic burning practises, the adequacy of existing trail networks, management of fire in long unburnt forests and consideration of impacts to conservation significant species.
- Establish a biodiversity monitoring program to determine changes and help manage the effects of climate change over time. As an isolated basalt plateau, many of the species and communities that occur in the reserve are restricted and are unlikely to be able to adapt in a changing climate.
- Control priority and environmental weeds. Early detection and eradication of any Scotch Broom or Gorse is recommended.
- Control feral animals including goats, pigs and deer.
- Should additional funding become available, additional targeted vegetation survey across a range of PCTs, particularly in the south east where access is limited, would help to further define and understand the floristic and structural diversity of the reserve.
- Spring surveys for rare and threatened species including orchids are recommended in wetland areas, high altitude forests and in steep gullies and rock outcrops.
- Investigate the significance of rare and regionally significant PCTs with the intent of nominating communities for listing under the BC Act and/or EPBC Act. Specifically, a review of PCT 497 Tea tree shrubland / sedgeland / forbland swamp wetland should be undertaken for consideration of amendment to the listing of the BC Act Endangered Ecological Community *Upland Wetlands of the Drainage Divide of the New England Tableland Bioregion.*

5.1 Limitations

- All of the Plant Community Types mapped as part of this study were developed by OEH using qualitative data only. 15 of the 24 (63%) were assigned a 'high' classification confidence level while the remaining 9 (37%) were assigned only 'low' or 'moderate'. This is highlighted through the significant variability observed within Plant Community Types in the reserve, and the resulting attribution of subtypes undertaken as part of this study.
- It is understood that OEH is currently undertaking a review of the state-wide PCT classification including a complete reanalysis with the intent of refining each PCT and developing positive diagnostic species. This review may help to redefine some of the PCTs mapped as part of this project, and some new PCTs may be created and old PCTs retired. A review of the mapping undertaken as part of this project is recommended once the OEH review has been completed.

REFERENCES

Benson, J., Richards, P., Waller, S. & Allen, C., 2010. New South Wales vegetation classification and assessment: part 3 plant communities of the NSW Brigalow Belt South, Nandewar and west New England Bioregions and update of NSW Western Plains and South-western Slopes plant communities, Version 3 of the NSWVC. *Cunninghamia,* pp. 457-579.

Binns, D., 1997. Floristics and vegetation patterns of Coolah Tops, New South Wales. *Cunninghamia,* pp. 233-274.

BOM, 2019. *Climate Statistics for Coolah (Binnia St).* [Online] Available at: http://www.bom.gov.au/climate/data/index.shtml. Commonwealth Government.

Centre for National Resources, 2004. *Native vegetation of Cobbora, Coolah, Coonabarabran, Mendooran and Tambar Springs VIS_ID 2099,* Sydney: State Government of NSW and Office of Environment and Heritage (OEH).

Cruzan, M. et al., 2016. *Small unmanned aerial vehicles (micro-UAVs, drones) in plant ecology in Appl Plant Sci. 4(9),* s.l.: Botanical Society of America.

DECC, 2008. *Descriptions for NSW (Mitchell) Landscapes, Version 3. Government Document, NSW Department of Environmnet and Climate Change.,* s.l.: s.n.

DMR, 2002. *Geology database.* s.l.:s.n.

Forestry Commission of NSW, 1989. *Forest Types in New South Wales VIS_ID 865,* Sydney: State Government of NSW and Office of Environment and Heritage (OEH).

GeoscienceAustralia, 2019. *Sentinel Hotspots.* [Online] Available at: https://sentinel.ga.gov.au/#/

LPI, 2015. *Digital Topographic Database. NSW Land and Property Information, Sydney. ,* s.l.: s.n.

NPWS, 2002. *Coolah Tops National Park Plan of Management,* s.l.: NSW National Parks and Wildlife Service.

NSW Government, 2004. *Guideline for ecologically sustainable fire management.* Hurstville: NSW Government.

OEH, 2015a. *State Vegetation Type Map: Border Rivers Gwydir / Namoi Region Version 2.0. VIS_ID 4467,* SYdney: State Government of NSW and Office of Environment and Heritage (OEH).

OEH, 2015b. *State Vegetation Type Map: Central West / Lachlan Region Version 1.3. VIS_ID 4468,* Sydney: State Government of NSW and Office of Environment and Heritage (OEH).

OEH, 2018. *Soil and Land Resources of Central and Eastern NSW.* s.l.:s.n.

OEH, 2019a. s.l.: NSW BioNet Atlas [online]. http://bionet.nsw.gov.au. Office of Environmnet and Heritage, Sydney. Accessed June 2019.

OEH, 2019b. *Bioregion overviews.* [Online] Available at: https://www.environment.nsw.gov.au/bioregions/BioregionOverviews.htm

OEHc, 2019. *State Vegetation Type Map: Upper Hunter v1.0. VIS_ID 4894,* Sydney: State Government of NSW and Office of Environment and Heritage (OEH).

Resource and Conservation Assessment Council, 2003. *Blackville API 1:100K vegetation map. VIS_ID 3849,* Sydney: State Government of NSW and Office of Environment and Heritage (OEH).

RFS, 2006. *Bush fire environmental assessment code for New South Wales,* s.l.: NSW Rural Fire Service.

Appendix A Species Matrix

Species	Family	Exotic	Growth Form	BUN001	BUN002	BUN003	BUN005	BUN006	BUN007	COBB0556	EC_B_006	EC_B_015	EC_B_042	EC_T_002	EC_T_003	EC_T_005	EC_T_022	EC_T_023	EC_T_031
Acacia dealbata	Fabaceae (Mimosoideae)		Tree (TG)					2	2					1					1
Acacia filicifolia	Fabaceae (Mimosoideae)		Shrub (SG)																
Acacia implexa	Fabaceae (Mimosoideae)		Shrub (SG)																
Acacia melanoxylon	Fabaceae (Mimosoideae)		Tree (TG)								2					1			1
Acacia neriifolia	Fabaceae (Mimosoideae)		Shrub (SG)		2														
Acacia paradoxa	Fabaceae (Mimosoideae)		Shrub (SG)		1														
Acacia salicina	Fabaceae (Mimosoideae)		Tree (TG)																
Acaena echinata	Rosaceae		Forb (FG)																
Acaena novae-zelandiae	Rosaceae		Forb (FG)	1			1	2	2		2		1		1	3	2	1	2
Acaena ovina	Rosaceae		Forb (FG)																
Acianthus fornicatus	Orchidaceae		Forb (FG)								1				2				
Acianthus spp.	Orchidaceae		Forb (FG)							2									
Acrothamnus hookeri	Ericaceae		Shrub (SG)																1
Acrotriche serrulata	Ericaceae		Shrub (SG)									1		1					
Adiantum aethiopicum	Adiantaceae		Fern (EG)				2								2		2	4	
Adiantum formosum	Adiantaceae		Fern (EG)																
Agrostis venusta	Poaceae		Grass & grasslike (GG)																
Ajuga australis	Lamiaceae		Forb (FG)							1	1	1		1	1				2
Allocasuarina torulosa	Casuarinaceae		Tree (TG)														3	3	
Ammobium alatum	Asteraceae		Forb (FG)														1		
Amyema congener subsp. congener	Loranthaceae		Other (OG)																
Amyema miquelii	Loranthaceae		Other (OG)																
Amyema pendula	Loranthaceae		Other (OG)																
Amyema spp.	Loranthaceae		Other (OG)																
Anagallis spp.	Primulaceae	*																	
Angophora floribunda	Myrtaceae		Tree (TG)		2							1		3	3			4	
Anthosachne scabra					1		1								1				
Anthoxanthum odoratum	Poaceae	*																	
Arenaria serpyllifolia	Caryophyllaceae	*																	
Aristida personata	Poaceae		Grass & grasslike (GG)		1														
Aristida ramosa	Poaceae		Grass & grasslike (GG)																
Arthropodium milleflorum	Anthericaceae		Forb (FG)		2		1	2	1										
Arthropodium minus	Anthericaceae		Forb (FG)																
Arthropodium sp. B	Anthericaceae		Forb (FG)	1															
Arthropodium spp.	Anthericaceae		Forb (FG)											1			1	1	
Asperula conferta	Rubiaceae		Forb (FG)					1	2	1	1	1		1	2	1	1	1	2
Asperula gunnii	Rubiaceae		Forb (FG)																
Asplenium flabellifolium	Aspleniaceae		Fern (EG)				2						1		1	3		1	
Asplenium trichomanes	Aspleniaceae		Fern (EG)				1												
Australina pusilla	Urticaceae		Forb (FG)																
Austrostipa aristiglumis	Poaceae		Grass & grasslike (GG)																
Austrostipa rudis	Poaceae		Grass & grasslike (GG)																
Austrostipa rudis subsp. nervosa	Poaceae		Grass & grasslike (GG)		1		1	1	2										
Austrostipa spp.	Poaceae		Grass & grasslike (GG)																
Berula erecta	Apiaceae	*																	
Bidens pilosa	Asteraceae	*																2	
Bidens subalternans	Asteraceae	*																1	
Billardiera scandens	Pittosporaceae		Other (OG)			1													
Blechnum minus	Blechnaceae		Fern (EG)																
Blechnum neohollandicum													1			4		2	
Blechnum nudum	Blechnaceae		Fern (EG)																
Blechnum spinulosum							2										1		
Bothriochloa macra	Poaceae		Grass & grasslike (GG)		3														
Botrychium australe	Ophioglossaceae		Fern (EG)																
Brachychiton populneus	Malvaceae		Tree (TG)		1														
Brachyloma daphnoides	Ericaceae		Shrub (SG)								1								
Brachyscome dissectifolia	Asteraceae		Forb (FG)	2	2		1												
Brachyscome microcarpa	Asteraceae		Forb (FG)			1		1	1	2									1
Brachyscome procumbens	Asteraceae		Forb (FG)									1							
Brachyscome stuartii	Asteraceae		Forb (FG)																
Bromus racemosus	Poaceae	*																	
Bromus spp.	Poaceae	*	Grass & grasslike (GG)																
Brunoniella australis	Acanthaceae		Forb (FG)																
Bulbine bulbosa	Asphodelaceae		Forb (FG)																
Bulbostylis densa	Cyperaceae		Grass & grasslike (GG)	2															
Bursaria spinosa	Pittosporaceae		Shrub (SG)			1					2	2	1	2	1				1
Bursaria spinosa subsp. spinosa	Pittosporaceae		Shrub (SG)																
Caesia calliantha	Anthericaceae		Forb (FG)																
Callistemon pallidus	Myrtaceae		Shrub (SG)																
Callistemon sieberi	Myrtaceae		Shrub (SG)				3												
Callitris endlicheri	Cupressaceae		Tree (TG)																
Calochilus spp.	Orchidaceae		Forb (FG)							1									
Calochlaena dubia	Dicksoniaceae		Other (OG)																
Cardamine astoniae	Brassicaceae		Forb (FG)										1			2			
Cardamine paucijuga	Brassicaceae		Forb (FG)														1		
Carex appressa	Cyperaceae		Grass & grasslike (GG)																
Carex breviculmis	Cyperaceae		Grass & grasslike (GG)				1	2	2										
Carex chlorantha	Cyperaceae		Grass & grasslike (GG)																
Carex declinata	Cyperaceae		Grass & grasslike (GG)				1												
Carex fascicularis	Cyperaceae		Grass & grasslike (GG)																
Carex incomitata	Cyperaceae		Grass & grasslike (GG)																
Carex inversa	Cyperaceae		Grass & grasslike (GG)																
Carex spp.	Cyperaceae		Grass & grasslike (GG)								1	1			2		1	1	1
Cassia spp.	Fabaceae (Caesalpinioideae)		Tree (TG)																
Cassinia compacta	Asteraceae		Shrub (SG)								1								1
Cassinia laevis	Asteraceae		Shrub (SG)																
Cassinia quinquefaria	Asteraceae		Shrub (SG)		3	1						4		4	1				
Cassinia spp.	Asteraceae		Shrub (SG)														1		
Casuarina cunninghamiana subsp. cunninghamiana	Casuarinaceae		Tree (TG)																
Centaurium erythraea	Gentianaceae	*			1		1												
Cerastium balearicum	Caryophyllaceae	*																	
Cerastium vulgare	Caryophyllaceae	*																	
Cheilanthes distans	Pteridaceae		Fern (EG)		1														
Cheilanthes sieberi	Pteridaceae		Fern (EG)																
Cheilanthes sieberi subsp. sieberi	Pteridaceae		Fern (EG)		2														
Cheilanthes spp.	Pteridaceae		Fern (EG)																
Chenopodium album	Chenopodiaceae	*																	
Chiloglottis spp.	Orchidaceae		Forb (FG)							2									
Chiloglottis trilabra	Orchidaceae		Forb (FG)					1											
Chrysocephalum apiculatum	Asteraceae		Forb (FG)																
Cirsium vulgare	Asteraceae	*				1	1	1	1	1			1			1	1	1	
Clematis aristata	Ranunculaceae		Other (OG)									2		1	1	1		1	
Clematis glycinoides	Ranunculaceae		Other (OG)																
Clematis microphylla	Ranunculaceae		Other (OG)			1													
Conium maculatum	Apiaceae	*																	
Convolvulus erubescens	Convolvulaceae		Other (OG)																
Conyza bonariensis	Asteraceae	*															1		
Conyza spp.	Asteraceae	*														1			
Conyza sumatrensis	Asteraceae	*							1								1	2	1
Coprosma quadrifida	Rubiaceae		Shrub (SG)																
Correa reflexa var. reflexa	Rutaceae		Shrub (SG)		1														
Corybas fimbriatus	Orchidaceae		Forb (FG)					2	1										
Crassula peduncularis	Crassulaceae		Forb (FG)																
Crassula sieberiana	Crassulaceae		Forb (FG)		1		1								1		1		
Cymbonotus lawsonianus	Asteraceae		Forb (FG)														1		
Cymbonotus preissianus	Asteraceae		Forb (FG)									2			1				1
Cymbonotus spp.	Asteraceae		Forb (FG)																
Cymbopogon refractus	Poaceae		Grass & grasslike (GG)																
Cynodon dactylon	Poaceae		Grass & grasslike (GG)								1					2			
Cynoglossum australe	Boraginaceae		Forb (FG)					2	1						1	1	1		
Cyperus brevifolius	Cyperaceae	*																	
Cyperus lhotskyanus	Cyperaceae		Grass & grasslike (GG)																
Cyperus lucidus	Cyperaceae		Grass & grasslike (GG)																

Species	EC_T_033	EC_T_038	EC_T_040	EC_T_047	EC_T_089	GEDB1069	GEDB1070	JVM005	JVM006	JVM007	JVM009	JVM010	JVM011	JVM012	JVM013	JVM014	JVM015	JVM016	JVM017	JVM018	JVM019	JVM078	JVM082	JVM085	JVM089	JVM092	JVM093	JVM094	JVM095	JVM096	JVM097	JVM099	JVM101	JVM102	JVM103	JVM104	JVM105	JVM106	JVM107	JVM108	JVM109	JVM110
Acacia dealbata								1	10	5		20	45	10	60		20	30	10	70	5					10		10			5			5	15		1		1	10	10	10
Acacia filicifolia																																					1					
Acacia implexa							2																						1													
Acacia melanoxylon	1		3	3	1					25														1		1	10		15	10	10											
Acacia neriifolia																																										
Acacia paradoxa																																										
Acacia salicina																					1																					
Acaena echinata																																										
Acaena novae-zelandiae	1	3	1		3			10						1			1	1	20	1	5	1	1		1		1	1	1					1	20	50	30	5	1	20	10	15
Acaena ovina							2																	1													1					
Acianthus fornicatus					1																																					
Acianthus spp.																																										
Acrothamnus hookeri																		1			1																					
Acrotriche serrulata																																										
Adiantum aethiopicum		2			1																			1																		
Adiantum formosum																																										
Agrostis venusta																																										
Ajuga australis			1											1	1		1		1		1						1	1	1				1	1	1			1	1		1	
Allocasuarina torulosa		2						50																																		
Ammobium alatum																																										
Amyema congener subsp. congener																																										
Amyema miquelii																														1	1								1			
Amyema pendula																																										
Amyema spp.							2																																			
Anagallis spp.					1																																					
Angophora floribunda		1	3		1		2																	5								10		1								
Anthosachne scabra										1		1	5		1							1		1										1	1		5	1				5
Anthoxanthum odoratum																																										
Arenaria serpyllifolia																																					1	1				
Aristida personata																																										
Aristida ramosa							2																1													5						
Arthropodium milleflorum								1	1			1	1		1	1	10		1	5	1			1		1				1				1			1				1	
Arthropodium minus																																										
Arthropodium sp. B																																										
Arthropodium spp.																																										
Asperula conferta	1			1	1	2	1		1	1		1	1	5	1	1	1	1	1	1	1	1	1		1	1		1			1	1		1	1	5	5	1			1	1
Asperula gunnii																																										
Asplenium flabellifolium																																						1				
Asplenium trichomanes																																										
Australina pusilla																																										
Austrostipa aristiglumis																																										
Austrostipa rudis										5				5					1		1			5				1									1	1		1	1	1
Austrostipa rudis subsp. nervosa																																										
Austrostipa spp.							1																																			
Berula erecta																																										
Bidens pilosa		4																				1																				
Bidens subalternans		1																																								
Billardiera scandens																		1																								
Blechnum minus																																										
Blechnum neohollandicum					2																							1														
Blechnum nudum					1																																					
Blechnum spinulosum																																										
Bothriochloa macra						3	3															5	5											1				1				
Botrychium australe																																										
Brachychiton populneus							2																																			
Brachyloma daphnoides																																									1	
Brachyscome dissectifolia						1																																				
Brachyscome microcarpa	1										1	1	1	1	1		1	1			1														1				1		1	
Brachyscome procumbens																																										
Brachyscome stuartii																																			1							
Bromus racemosus																																										
Bromus spp.							1																																			
Brunoniella australis																						1																				
Bulbine bulbosa							2																																			
Bulbostylis densa																																										
Bursaria spinosa	1		2	1	1		2				1											5	10	5			5	1	15	1	1			1				1				
Bursaria spinosa subsp. spinosa													1																													
Caesia calliantha																																										
Callistemon pallidus			1										1																			1										
Callistemon sieberi																																										
Callitris endlicheri							1																																			
Calochilus spp.																																										
Calochlaena dubia			2																																							
Cardamine astoniae																																										
Cardamine paucijuga																																										
Carex appressa																																										
Carex breviculmis																																										
Carex chlorantha																																										
Carex declinata																																										
Carex fascicularis																																										
Carex incomitata																																										
Carex inversa																			1		1	1		1													1	1				1
Carex spp.	1		1	1	1																																					
Cassia spp.				1																																						
Cassinia compacta																																										
Cassinia laevis								1			1							1				10	30	15	10					1		10		1				1		1		
Cassinia quinquefaria																													1													
Cassinia spp.		1	2		1	2	2																																			
Casuarina cunninghamiana subsp. cunninghamiana					2		3																	10																		
Centaurium erythraea														1								1	1																			
Cerastium balearicum					1																																					
Cerastium vulgare																																										
Cheilanthes distans																																										
Cheilanthes sieberi																																		1				1				
Cheilanthes sieberi subsp. sieberi																																										
Cheilanthes spp.						2	2																																			
Chenopodium album																																										
Chiloglottis spp.																																										
Chiloglottis trilabra																																										
Chrysocephalum apiculatum							2																																			
Cirsium vulgare	1	1	1		1	1		1						1	1	1		1	1		1	5	1		1								1			1	1	1			1	1
Clematis aristata	1	1	1	1	1																																					
Clematis glycinoides																						1		1								1								1	1	
Clematis microphylla							2																																			
Conium maculatum							2																																			
Convolvulus erubescens																																					1					
Conyza bonariensis																																										
Conyza spp.			1			2	2																																			
Conyza sumatrensis	1	3		1	1			1		1	1	1	1	1	1	1	1	1	1		1		1	1	1										1	5				1		1
Coprosma quadrifida																																										
Correa reflexa var. reflexa																																										
Corybas fimbriatus																																										
Crassula peduncularis						2																																				
Crassula sieberiana					1	2																								1												
Cymbonotus lawsonianus						2	2	1					1										1															1				
Cymbonotus preissianus																																										
Cymbonotus spp.			1	1	1																																					
Cymbopogon refractus							3																																			
Cynodon dactylon			1	1	2																																					
Cynoglossum australe										1		1	1		1		1	1	1																1		1	1		1		1
Cyperus brevifolius																																				1						
Cyperus lhotskyanus																																			1							
Cyperus lucidus																																										

Species	JVM111	JVM112	JVM113	JVM114	JVM115	JVM117	JVM119	OL2-3	OL3-3	OL4-3	RL1-3	RL2-3	RL3-3	RL4-3	UL1-3	UL2-3	UL3-3	UL4-2	WAR002	WAR003	WAR004	WAR005	WAR006	WAR007	WAR008	WAR009	WAR010	WAR011	WAR012	WAR013	WAR014	WAR016	WAR017	WAR018	WAR020	WAR021	WAR022	WAR026	WAR027	WAR028	WAR029	WAR030	WAR031	WAR032
Acacia dealbata	15	10	10	10		15		1	2				2	3		3	4				2		2	2		3	4			4	3			1			1							
Acacia filicifolia																																												
Acacia implexa																																												
Acacia melanoxylon	5																		2	3	1							1	2	1			3		2	1	1			2		2	1	
Acacia neriifolia																																												
Acacia paradoxa																																												
Acacia salicina																																												
Acaena echinata																			1																						1			2
Acaena novae-zelandiae	20	1	10	5		1	10	2				2	1	1	3		1		3	2	2		3	4	4	4	2	3	2			3	3	2		3	2	3	2	2	1	3	3	3
Acaena ovina							5																																					
Acianthus fornicatus																																											2	
Acianthus spp.																																												
Acrothamnus hookeri																								1	1				1	1												1		
Acrotriche serrulata																			1					1	2				3												1		2	
Adiantum aethiopicum																			1	3								1					1					2	2	2		2		1
Adiantum formosum																				2																								
Agrostis venusta																																								1		2	1	
Ajuga australis		1	1	1		1		1	1	2	1	1	1			1	1		1		1		1	1	1	1	1		1	1	1					1	1		1		1	1	1	1
Allocasuarina torulosa																																						2	2					
Ammobium alatum																																												
Amyema congener subsp. congener																																						1						
Amyema miquelii																																												
Amyema pendula																	2						2			1					2													
Amyema spp.																																												
Anagallis spp.																																												
Angophora floribunda																				2																		1	2	2	3	2		
Anthosachne scabra	1		1				1	1	1	1			2	1	1	1				1			1	1	1	1	1	1				1	1				1	1	1	1	2	1		1
Anthoxanthum odoratum																																							1					
Arenaria serpyllifolia																																												
Aristida personata																																												
Aristida ramosa																																												
Arthropodium milleflorum	1	1	5	1				2	2	1		2	2	2	1	2	2		1	1	2	1	1				2	2		1	3		2			2			2	1	1	1		1
Arthropodium minus			1																																									
Arthropodium sp. B																																						2						
Arthropodium spp.																																												
Asperula conferta		1			1	1	1	2	2	1		1	2	3	2	2	2		2		2		2	2	2	2	2	1	2	2	2		2			2						2	1	2
Asperula gunnii	1																																											
Asplenium flabellifolium							1												1									1							1						1			
Asplenium trichomanes																																												
Australina pusilla																				3													2		4					2		1		
Austrostipa aristiglumis	1	1																																										
Austrostipa rudis			1	57																																								
Austrostipa rudis subsp. nervosa								2		1	2	2		1	2								1	2	2	1		1										1						
Austrostipa spp.																																												
Berula erecta																				1													2							1		2		
Bidens pilosa																																							2					
Bidens subalternans																																												
Billardiera scandens														1																														
Blechnum minus																												3					2							1		2		
Blechnum neohollandicum										1								1		4															1			1		2				
Blechnum nudum																																	1											
Blechnum spinulosum																												1												1				
Bothriochloa macra																												1																
Botrychium australe																																												1
Brachychiton populneus																																												
Brachyloma daphnoides																																												
Brachyscome dissectifolia																												1																
Brachyscome microcarpa		1						1			1		1	1	1	1	1		2		1		1	2	1	1	1		1	2	1	1				2							1	
Brachyscome procumbens																																												
Brachyscome stuartii																																												
Bromus racemosus							1																																					
Bromus spp.																																												
Brunoniella australis																																							2					
Bulbine bulbosa																			1												2											1		
Bulbostylis densa																																												
Bursaria spinosa		1	1				1												1										2									1			2		2	1
Bursaria spinosa subsp. spinosa																																												
Caesia calliantha																1	1																											
Callistemon pallidus																				2													1									2		
Callistemon sieberi																																												
Callitris endlicheri																																												
Calochilus spp.																																												
Calochlaena dubia																		4		2																								
Cardamine astoniae																																												
Cardamine paucijuga																			2	1															1	2						1		
Carex appressa																																										1		
Carex breviculmis								2	1	2			2	1	2	2	2	2	1		1		1	1	1	2		1	2	1	2		2	1		2	2	2	2	1	1	2		1
Carex chlorantha																																								1				
Carex declinata																																												
Carex fascicularis																																										2		
Carex incomitata										1										1	1						1			1								1	1	1				
Carex inversa	1	1	1																																									
Carex spp.																																												
Cassia spp.																																												
Cassinia compacta																			2	1																								
Cassinia laevis					10		25																																					
Cassinia quinquefaria		1																																				2	2		4	1	2	1
Cassinia spp.																																												
Casuarina cunninghamiana subsp. cunninghamiana																																								4				
Centaurium erythraea																												1												1				1
Cerastium balearicum																																												
Cerastium vulgare																																								2				1
Cheilanthes distans																																									1			
Cheilanthes sieberi																																												
Cheilanthes sieberi subsp. sieberi																												1																
Cheilanthes spp.																																												
Chenopodium album																							1																					
Chiloglottis spp.																																												
Chiloglottis trilabra									1				1					1									1			1	1						1							
Chrysocephalum apiculatum																																												
Cirsium vulgare	1	1	1	1	1	1		1		1		1	1	1	1		1	1	1	1	1		1	1	1	1	1	1	1		1		1					1	1	1		1	1	1
Clematis aristata																		1		2							1			2			1		1		1							
Clematis glycinoides			1			1																																1	2	1	1	1		1
Clematis microphylla																																												
Conium maculatum																																												
Convolvulus erubescens																																												
Conyza bonariensis																																												
Conyza spp.																																												
Conyza sumatrensis	1		1				1				1			1						1								1			1								2	1		1		1
Coprosma quadrifida																														1			3									2		
Correa reflexa var. reflexa																																										1		
Corybas fimbriatus																																												
Crassula peduncularis																																												
Crassula sieberiana																			1	1								1								1		1			1	1		
Cymbonotus lawsonianus	1																																											
Cymbonotus preissianus										2			1						1		1				1	1		1														1		1
Cymbonotus spp.																																												
Cymbopogon refractus																																												
Cynodon dactylon																																												
Cynoglossum australe	1	1	1	1				1	1	1		2	1	2			1						1							1	1						1			1		1		
Cyperus brevifolius																																												
Cyperus lhotskyanus																																												
Cyperus lucidus																												1																

Species	Family	Exotic	Growth Form	BUN001	BUN002	BUN003	BUN005	BUN006	BUN007	COBB0556	EC_B_006	EC_B_015	EC_B_042	EC_T_002	EC_T_003	EC_T_005	EC_T_022	EC_T_023	EC_T_031	EC_T_033	EC_T_038	EC_T_040	EC_T_047	EC_T_089	GEDB1069	GEDB1070	JVM005	JVM006	JVM007	JVM009	JVM010	JVM011	JVM012	JVM013	JVM014	JVM015	JVM016	JVM017	JVM018	JVM019	JVM078	JVM082	JVM085	JVM089	JVM092	JVM093	JVM094	JVM095	JVM096	JVM097	JVM099	JVM101	JVM102	JVM103	JVM104	JVM105	JVM106	JVM107	JVM108	JVM109	JVM110	JVM111	JVM112	JVM113	JVM114	JVM115	JVM117	JVM119	OL2-3	OL3-3	OL4-3	RL1-3	RL2-3	RL3-3	RL4-3	UL1-3	UL2-3	UL3-3	UL4-2	WAR002	WAR003	WAR004	WAR005	WAR006	WAR007	WAR008	WAR009	WAR010	WAR011	WAR012	WAR013	WAR014	WAR016	WAR017	WAR018	WAR020	WAR021	WAR022	WAR026	WAR027	WAR028	WAR029	WAR030	WAR031	WAR032
Cyperus sanguinolentus	Cyperaceae		Grass & grasslike (GG)	2																																																	1																												2						1						1										
Cyperus sphaeroideus	Cyperaceae		Grass & grasslike (GG)	3			2																																															5																												3												1										
Dactylis glomerata	Poaceae	*																																																																					1																																						
Daucus glochidiatus	Apiaceae		Forb (FG)																								2	1									1							1																							1		1											1				1	1			1	1				2						1
Daviesia genistifolia	Fabaceae (Faboideae)		Shrub (SG)											1																																																																											1												2		2	
Daviesia ulicifolia	Fabaceae (Faboideae)		Shrub (SG)								1																									1						5																																									1							1																
Dawsonia polytrichoides	Dawsoniaceae											1			1																																																																																								
Desmodium brachypodum	Fabaceae (Faboideae)		Forb (FG)																									1																	1	1												1					1								1	1																																				1		1		
Desmodium gunnii	Fabaceae (Faboideae)		Forb (FG)							2		2		2			2	2		2			2	1																																																																																			
Desmodium varians	Fabaceae (Faboideae)		Other (OG)		1	2	1	1					1	2	2	2						2				1	1	1		1		1		1		5	5		1		1				1	1		1		1	1	1	1		5	5	1	1		1		5	5			1	1	1	1	1	3	2	2		1	2	1			2	3	2			2	2	1		1	2	1			2			3	3	2	2	1	1	1	1	3
Dianella caerulea	Phormiaceae		Forb (FG)																																																																																1									1	1																
Dianella longifolia	Phormiaceae		Forb (FG)																																																																													1				1			1		1						1					1	1													
Dianella revoluta	Phormiaceae		Forb (FG)																												1				1			1																																																														1		
Dianella spp.	Phormiaceae		Forb (FG)																	1																																																																																				
Dichelachne crinita	Poaceae		Grass & grasslike (GG)																															1					1																	1									1														1												2																						
Dichelachne inaequiglumis	Poaceae		Grass & grasslike (GG)																																																												1																																												
Dichelachne micrantha	Poaceae		Grass & grasslike (GG)	1	2	1																								1						1			1				5					1	1							1		1	1			1	1		1										1			1	2			1		1	1	1						2	2	2	1	1	2		1	2							1		1		1	
Dichelachne rara	Poaceae		Grass & grasslike (GG)								1	1																																																																	1								2			1	1									1						2				
Dichondra repens	Convolvulaceae		Forb (FG)		2			1	2		1		1	2	1	3	2	2	1	2	2		1	3	2	2	10	1	1			1						5	5	1	5	5	5	1	1		1		1		1			1	10		5	1		10		1		5	5	10	1	1		2	2	2	2	2	2	2	2	1	2		2	2	3		2	2		2	1	1	2		3	2	3	1		2	3	2	3	2	2	2	2	2
Dichondra sp. A	Convolvulaceae		Forb (FG)																															1																						1																																																			
Dichopogon spp.	Anthericaceae		Forb (FG)																									2																																																																																
Dipodium roseum	Orchidaceae		Forb (FG)																														1																															1																	1																	1	1															1		
Dipodium spp.	Orchidaceae		Forb (FG)											1																																																																																												
Discaria pubescens	Rhamnaceae		Shrub (SG)																																																																																											2															
Dodonaea viscosa subsp. angustissima	Sapindaceae		Shrub (SG)																																																																																																							1		
Drosera peltata	Droseraceae		Forb (FG)																								2																																																																																	
Dysphania pumilio	Chenopodiaceae		Forb (FG)																																																																							1																																	
Echinopogon caespitosus	Poaceae		Grass & grasslike (GG)										1							1		1																	1			1	1	5	5										1	1		5	5					1								1																														1							1			1
Echinopogon ovatus	Poaceae		Grass & grasslike (GG)					1	1	3		1		1		2		2			1		1						15	1	1	1		1	1	1	1			1	5		5	5	5	5	5			1	1		1		1		1	1					5	1	5	5	5	5	1				5	1	2	2	2	2	2	1	2			1	1	2	1			3	2	3	2	2	2	2	1			2		1	1	2	3	3	2	1	2	2	3
Echinopogon spp.	Poaceae		Grass & grasslike (GG)												1			1					1	1																																																																																				
Einadia hastata	Chenopodiaceae		Forb (FG)																1																																																																																						
Einadia nutans	Chenopodiaceae		Forb (FG)		1												1																																																																														1	1					
Einadia nutans subsp. nutans	Chenopodiaceae		Forb (FG)																		1							1																																																																														
Einadia trigonos	Chenopodiaceae		Forb (FG)															1																								1																																																																		
Einadia trigonos subsp. leiocarpa	Chenopodiaceae		Forb (FG)																																																																																																			1				
Eleocharis dietrichiana	Cyperaceae		Grass & grasslike (GG)	3			1																																																																												4																						
Eleocharis gracilis	Cyperaceae		Grass & grasslike (GG)																																																			10																																																		
Epilobium billardierianum	Onagraceae		Forb (FG)																								1							1		1	1	1																5					1	1	5	5	1	1				1																																					
Epilobium billardierianum subsp. cinereum	Onagraceae		Forb (FG)					1	1							1	1																																																										1		1		1		1			1			2	1	1		1	1	2	2		2					1	1			1	1		2		1	1	1
Epilobium billardierianum subsp. hydrophilum	Onagraceae		Forb (FG)				2																																																																											1						2													2		2		
Epilobium hirtigerum	Onagraceae		Forb (FG)	1																																																																													1																					
Epilobium spp.	Onagraceae		Forb (FG)										1																																																																																												
Eragrostis benthamii	Poaceae		Grass & grasslike (GG) |2|																																																																																																					
Erodium cicutarium	Geraniaceae	*																								1																																																																																
Eucalyptus albens	Myrtaceae		Tree (TG)																									3																		40									45												30																																						
Eucalyptus blakelyi	Myrtaceae		Tree (TG)																																																																	50																																				
Eucalyptus bridgesiana	Myrtaceae		Tree (TG)											1								2	1						15					15																																																3			4														3			3		3	
Eucalyptus dalrympleana	Myrtaceae		Tree (TG)																					1						15			15		10								60		15	10	15	5			10				30	70			10	20																																												
Eucalyptus dalrympleana subsp. heptantha	Myrtaceae		Tree (TG) |1|																																																																																																					
Eucalyptus goniocalyx	Myrtaceae		Tree (TG)																										10																							30																	20								2		2								3	2	1			3		3						3			1							
Eucalyptus laevopinea	Myrtaceae		Tree (TG)		1	4	3	3	3	6	3	4	1	3	4	2	1	1	3	4			3				60		60	5	65		25	1		20	40			50	5	15	10		10	20	15	20	20		20	30	45			1	40	35	40	20			85	75	90		5		3	3	4	5	4	1	3	4			4	3	3				3					4	4		4	2				4	2	3	2	3	2	3	
Eucalyptus melliodora	Myrtaceae		Tree (TG)		1							1		3				1											45											10	20																																																									3	3		2		1	4
Eucalyptus moluccana	Myrtaceae		Tree (TG)																																		35	5			50															20	30											30																																				
Eucalyptus nobilis	Myrtaceae		Tree (TG)				1	2	3	4	3				1	2	1			3										55	40		10		5		20	15	25					5				10	15										30		10	70	10	15					3	4			3	3		3		2				1				2	3		2	1	2		4		3	4				2		1		
Eucalyptus nortonii	Myrtaceae		Tree (TG)		2																																																																																																					
Eucalyptus pauciflora	Myrtaceae		Tree (TG)																									15				30		50		40		55	60											10										55																	3			3	3				3	3			4	3	1			4						1							
Eucalyptus praecox	Myrtaceae		Tree (TG)			3																				2			10																																																				3																								4	
Eucalyptus rossii	Myrtaceae		Tree (TG)																																		10																																																																					
Eucalyptus saligna	Myrtaceae		Tree (TG)																										5																																																																													
Eucalyptus spp.	Myrtaceae		Tree (TG)												1										1																																					1																																											
Eucalyptus stellulata	Myrtaceae		Tree (TG)					1								1																15		15					20																60								10																3				2				3				2	5	1		3		2				2								1		
Euchiton involucratus	Asteraceae		Forb (FG)		1												1	1												1	1		1	1	1	1		1		1						1	1				1		1	1		1	1	1	1		1	1	1																			1				1							1				1		
Euchiton japonicus	Asteraceae	*	Forb (FG)	2	2	1	2	1												1																																																	2	1	1	1	2	1	1	2				2			2		2	2	2		2	2		1	2	1	2		2	1			1		2	2	2
Euchiton sphaericus	Asteraceae		Forb (FG)												2	1							1	1	1																																																																																
Euchiton spp.	Asteraceae		Forb (FG)																								2																												1																																																			
Eustrephus latifolius	Luzuriagaceae		Other (OG)			1	1		1	2	1	1	2	2			1	2	1	2	1	2	1	1			1	1	1	1	1	1	1	1			1	1					1		1	1	1	1		1		1	1		1	1	1	1	1	1			1		1			1	1	1	1	1	1		1	1		1	1	1	2		1	1			1			1	1	1	2		2		1	1	1	1	1	1	1	1
Exocarpos cupressiformis	Santalaceae		Shrub (SG)																				1	1																							1															20	5																		1					2																					
Festuca asperula	Poaceae		Grass & grasslike (GG)												1																																																														1																										
Fimbristylis dichotoma	Cyperaceae		Grass & grasslike (GG)		1																																																																																																					
Galium ciliare	Rubiaceae		Forb (FG)																										1													1												1	1		1					1		1	1	5		1										2									1														1					
Galium gaudichaudii	Rubiaceae		Forb (FG)									1	1			2	2				1			1																																																														1																						2		
Galium migrans	Rubiaceae		Forb (FG)				1		1		1			1	1	2	2		2		1																1						1		1			1																						1					1		1						1	1		1	1	1				1			1			1		1		1	2	2	2		2
Galium propinquum	Rubiaceae		Forb (FG)											1	1																																										1																																																	
Geranium homeanum	Geraniaceae		Forb (FG)																																																																														1																		3	1	2				
Geranium potentilloides	Geraniaceae		Forb (FG)		1		2									4															5						1	1																					1			1	1													2	1		1					1		1		1	2				2	3											
Geranium potentilloides var. potentilloides	Geraniaceae		Forb (FG)									1		2	2		2																																																																																								
Geranium retrorsum	Geraniaceae		Forb (FG)																																																																						1																1					2										
Geranium solanderi	Geraniaceae		Forb (FG)					1	2				2														5		1									1			1	1	5	5	1	1		1	1		1				1	1	5	1		1		1			1	1	1		1			1														2						1			1													2		2	2	2
Geranium solanderi var. grande	Geraniaceae		Forb (FG)																																																																																			2																		
Geranium solanderi var. solanderi	Geraniaceae		Forb (FG)															2		2	2			2																																																																																		
Geranium spp.	Geraniaceae	*	Forb (FG)								1		1			1			2			1	1		2	2																																																																														
Geum urbanum	Rosaceae		Forb (FG)																																																																																																			2		2		
Glossostigma diandrum	Scrophulariaceae		Forb (FG)				1																																																																																																			
Glyceria latispicea	Poaceae		Grass & grasslike (GG)																																																																		1																			2				1													
Glycine clandestina	Fabaceae (Faboideae)		Other (OG)		2		1		1		2	1		1	2			2	2	2		1	1	1				1		1									1						1	1				1	1					1																	1	1	2	2	1	1	2	2	1	2	2	2	1	2	2			2	2		2	2	1	2	2	1	2	2	2	2	2			1	2	1	2	2	2	2		
Glycine latifolia	Fabaceae (Faboideae)		Other (OG)																												5						1																													1	5																																									
Glycine spp.	Fabaceae (Faboideae)		Other (OG)										1				2				2																																																																																					
Glycine tabacina	Fabaceae (Faboideae)		Other (OG)																								1		1			5		1		5	1	1	5	5	1	1	5		1								1	1		5	5		5	1	1	10	1	1	1	1		1																																							
Gonocarpus elatus	Haloragaceae		Forb (FG)																																																							1																																													
Gonocarpus humilis	Haloragaceae		Forb (FG)																2																												1																																																									
Gonocarpus micranthus	Haloragaceae		Forb (FG)																																																																																4																					
Gonocarpus spp.	Haloragaceae		Forb (FG)								1		1									1	1	1																																																																																
Gonocarpus tetragynus	Haloragaceae		Forb (FG)				1																					1	1	1	1			1		1		1					1				1																			1						1	1	1		1	2		2		2			1	1			1	1								2								2	2
Gratiola peruviana	Scrophulariaceae		Forb (FG)				3																																																																																2				2								2		
Gymnostachys anceps	Araceae		Forb (FG)						2																																																																																															
Gypsophila tubulosa	Caryophyllaceae		Forb (FG)		2																																																																																																					
Hackelia latifolia																1																																																															1	1																								
Hakea microcarpa	Proteaceae		Shrub (SG)	2																																																	10																												3																						
Haloragis heterophylla	Haloragaceae		Forb (FG)	2	1		1																	3																													1		1							1																										2		1				1					2									
Hardenbergia violacea	Fabaceae (Faboideae)		Other (OG)								1	1		1	1					1		1	1					1			1															1		1		1																1															1	1					1		1		1			1			1															1	1
Hibbertia obtusifolia	Dilleniaceae		Shrub (SG)		1	2		1	1	1	1	1		1	2				1	1			1				1	1	5	1	1	1	1	5	1	1	5	1	1	5	1	1	1	1	1	1	1	1	1		1	1	1	1	1	10	1		5	1	5		5	1			1		1	1	1	2	2	1	2	2	2	2	1	1		2		1	2	1	2	1		2	2	2									1	1	1	2	
Hovea lanceolata	Fabaceae (Faboideae)		Shrub (SG)																1							3																																																																																		1		
Hydrocotyle laxiflora	Apiaceae		Forb (FG)		1	1		2	3	3	1	1	1		2	2	2	2	2	2	2	2	1	2	1	2	1		1	1	1	1	1	1	1	5	1	5	5	5	1	1	1		1	1	1	5				1	1	1	5	10	1	5	10	1	5	5	5	5	10		1	1	3	2	4	2	3	2	3	3	2	2	2	2	3	3		2	2	2	2	2	1	2	2	1	2	2		2	3	3	1	1	1		1	1	2
Hydrocotyle sibthorpioides	Apiaceae		Forb (FG)	4			3			2																																												10																				2					1		3					2	3	4		1				3					2	5	1					4		3		
Hydrocotyle tripartita	Apiaceae		Forb (FG)	3			2																	2																																																																2																	
Hypericum gramineum	Clusiaceae		Forb (FG)	1	2							1			1				1													1						1						1													1			1			1		1											1					1		1		1		1	1	1	1	1		1	1						1		1							1		2	2
Hypericum japonicum	Clusiaceae		Forb (FG)	3			2																																															1																											1			2						1					1	3		1							2		
Hypericum perforatum	Clusiaceae	*																										3															10		1												1		1	5		1											10																			1			1																		
Hypochaeris radicata	Asteraceae	*		1	1		2	2			1				1	1							1	1	1	1										1	1		1			1												1		1		1				1	1	1			1	1			1	1	2	1		1	1		1		1		1		1		1		1	1	2	2	2	2	1	1			1	1		1	1		1		1	2	1	1
Hypolepis glandulifera	Dennstaedtiaceae		Fern (EG)																					1																																																									3													3						3		2		
Hypoxis hygrometrica	Hypoxidaceae		Forb (FG)	2																																																									1																																			2										
Imperata cylindrica	Poaceae		Grass & grasslike (GG)																																																									1																																												
Indigofera australis	Fabaceae (Faboideae)		Shrub (SG)								2																										1								1																																				2																													
Isolepis australiensis	Cyperaceae		Grass & grasslike (GG)	1																																																																																																				
Isolepis cernua	Cyperaceae		Grass & grasslike (GG)																																																																																																	2				
Isolepis inundata	Cyperaceae		Grass & grasslike (GG)	1																																																																																																				
Isolepis multicaulis	Cyperaceae		Grass & grasslike (GG)	1																																																																																																				
Isotoma fluviatilis	Lobeliaceae		Forb (FG)																																																			5																																																		
Isotoma fluviatilis subsp. borealis	Lobeliaceae		Forb (FG)	3																																																																													2						2						2										
Jacksonia scoparia	Fabaceae (Faboideae)		Shrub (SG)																																																			1																																																		
Juncus alexandri subsp. melanobasis	Juncaceae		Grass & grasslike (GG)																																																																																																	1		2		
Juncus bufonius	Juncaceae	*		2																																																																																																				
Juncus continuus	Juncaceae		Grass & grasslike (GG)																					1																																																																																		

Species	Family	Exotic	Growth Form	BUN001	BUN002	BUN003	BUN005	BUN006	BUN007	COBB0556	EC_B_006	EC_B_015	EC_B_042	EC_T_002	EC_T_003	EC_T_005	EC_T_022	EC_T_023	EC_T_031	EC_T_033	EC_T_038	EC_T_040	EC_T_047	EC_T_089	GEDB1069	GEDB1070
Juncus fockei	Juncaceae		Grass & grasslike (GG)	2																						
Juncus sandwithii	Juncaceae		Grass & grasslike (GG)				2																			
Juncus spp.	Juncaceae		Grass & grasslike (GG)																						2	
Juncus subsecundus	Juncaceae		Grass & grasslike (GG)																							
Juncus vaginatus	Juncaceae		Grass & grasslike (GG)				2																			
Lachnagrostis aemula	Poaceae		Grass & grasslike (GG)																							
Lachnagrostis filiformis	Poaceae		Grass & grasslike (GG)	2																						
Lactuca serriola	Asteraceae	*			1																					
Lagenifera stipitata	Asteraceae		Forb (FG)																							
Lemna trisulca	Lemnaceae		Forb (FG)																							
Lepidosperma laterale	Cyperaceae		Grass & grasslike (GG)								1	2		2	1							1	2	1		
Leptospermum gregarium	Myrtaceae		Shrub (SG)	4																						
Leptospermum polygalifolium	Myrtaceae		Shrub (SG)																							
Leptospermum polygalifolium subsp. montanum	Myrtaceae		Shrub (SG)																							
Lespedeza juncea subsp. sericea	Fabaceae (Faboideae)		Forb (FG)																							
Leucopogon juniperinus	Ericaceae		Shrub (SG)																							
Leucopogon lanceolatus	Ericaceae		Shrub (SG)								2								1			1				
Libertia paniculata	Iridaceae		Forb (FG)																							
Lilaeopsis polyantha	Apiaceae		Forb (FG)																							
Lomandra filiformis	Lomandraceae		Grass & grasslike (GG)			1		1	1			2		1				1								2
Lomandra filiformis subsp. coriacea	Lomandraceae		Grass & grasslike (GG)																	1						
Lomandra longifolia	Lomandraceae		Grass & grasslike (GG)				1	1	1	1	1		1		2	1						1	2	1		
Lomandra multiflora subsp. multiflora	Lomandraceae		Grass & grasslike (GG)			1						2		1				1	2	2						1
Lomandra spp.	Lomandraceae		Grass & grasslike (GG)								1															
Lomatia arborescens	Proteaceae		Shrub (SG)										1			1										
Lotus corniculatus	Fabaceae (Faboideae)	*																								
Luzula flaccida	Juncaceae		Grass & grasslike (GG)					1	1																	
Luzula spp.	Juncaceae		Grass & grasslike (GG)														1									
Lysimachia arvensis	Primulaceae																										1
Macrozamia concinna	Zamiaceae		Other (OG)											1												
Macrozamia spp.	Zamiaceae		Other (OG)																				1			
Marsdenia rostrata	Apocynaceae		Other (OG)																							
Medicago lupulina	Fabaceae (Faboideae)	*																								
Melichrus urceolatus	Ericaceae		Shrub (SG)								1	1		1									1			1
Melicytus dentatus	Violaceae		Shrub (SG)				1									2	1	1		1	1					
Mentha diemenica	Lamiaceae		Forb (FG)				1						1									1	1			
Mentha satureioides	Lamiaceae		Forb (FG)																					1		
Microlaena stipoides	Poaceae		Grass & grasslike (GG)										1		1	2	2	2		1	3	1		2	2	2
Microlaena stipoides var. stipoides	Poaceae		Grass & grasslike (GG)		2		2	2	3	2																
Microseris lanceolata	Asteraceae		Forb (FG)					1																		
Microtis spp.	Orchidaceae		Forb (FG)																						2	
Microtis unifolia	Orchidaceae		Forb (FG)																							
Modiola caroliniana	Malvaceae	*																								
Monotoca scoparia	Ericaceae		Shrub (SG)								1															
Myriophyllum lophatum	Haloragaceae		Forb (FG)																							
Myriophyllum pedunculatum	Haloragaceae		Forb (FG)	3			1																			
Myriophyllum variifolium	Haloragaceae		Forb (FG)																							
Myriophyllum verrucosum	Haloragaceae		Forb (FG)																							
Myrsine howittiana	Primulaceae		Shrub (SG)																							
Notelaea microcarpa	Oleaceae		Tree (TG)																							
Notelaea microcarpa var. microcarpa	Oleaceae		Tree (TG)				2																			2
Olearia alpicola	Asteraceae		Shrub (SG)																							
Olearia elliptica	Asteraceae		Shrub (SG)		2		1					2		2	2		2									2
Olearia spp.	Asteraceae		Shrub (SG)																		1					
Ophioglossum lusitanicum	Ophioglossaceae		Fern (EG)																							
Oplismenus imbecillis	Poaceae		Grass & grasslike (GG)															3			3					
Oreomyrrhis eriopoda	Apiaceae		Forb (FG)																							
Oxalis chnoodes	Oxalidaceae		Forb (FG)		1					1							1									
Oxalis perennans	Oxalidaceae		Forb (FG)														1									
Panicum effusum	Poaceae		Grass & grasslike (GG)																						2	
Paronychia brasiliana	Caryophyllaceae	*																							1	
Paspalidium gracile	Poaceae		Grass & grasslike (GG)		1																					
Pellaea falcata	Adiantaceae		Fern (EG)		1							1					1	1				1				
Persicaria decipiens	Polygonaceae		Forb (FG)				2																			
Petrorhagia dubia	Caryophyllaceae	*			1																					
Petrorhagia nanteuilii	Caryophyllaceae	*																								
Phyllanthus virgatus	Phyllanthaceae		Forb (FG)																							
Phytolacca octandra	Phytolaccaceae	*																								
Picris angustifolia	Asteraceae		Forb (FG)		1			1				1				1	1	1		1			1			
Picris angustifolia subsp. angustifolia	Asteraceae		Forb (FG)																1							
Picris spp.	Asteraceae		Forb (FG)								2			1	1				1							
Pimelea curviflora	Thymelaeaceae		Shrub (SG)																							
Pimelea curviflora var. divergens	Thymelaeaceae		Forb (FG)																							
Pimelea curviflora var. sericea	Thymelaeaceae		Forb (FG)																							
Pimelea glauca	Thymelaeaceae		Shrub (SG)																								2
Pimelea ligustrina	Thymelaeaceae		Shrub (SG)																							
Pimelea micrantha	Thymelaeaceae		Shrub (SG)		2																					
Pimelea stricta	Thymelaeaceae		Shrub (SG)																							
Pimelea strigosa	Thymelaeaceae		Shrub (SG)														1			1						
Pittosporum undulatum	Pittosporaceae		Shrub (SG)															4								
Plantago debilis	Plantaginaceae		Forb (FG)		1							2	1	1	2	1	1	1					1	1		
Plantago hispida	Plantaginaceae		Forb (FG)														1									
Plantago varia	Plantaginaceae		Forb (FG)																						1	
Plectranthus parviflorus	Lamiaceae		Forb (FG)														1	2			1					
Poa bulbosa	Poaceae	*																		1						
Poa labillardierei var. labillardierei	Poaceae		Grass & grasslike (GG)				1	5	2																	
Poa sieberiana	Poaceae		Grass & grasslike (GG)							4	1			2			3				2	1	2	1		2
Poa sieberiana var. cyanophylla	Poaceae		Grass & grasslike (GG)										2													
Poa sieberiana var. sieberiana	Poaceae		Grass & grasslike (GG)									1			2	2		1	5	2						
Polycarpon tetraphyllum	Caryophyllaceae	*			1								1				2									
Polygala japonica	Polygalaceae		Forb (FG)																							
Polymeria longifolia	Convolvulaceae		Forb (FG)		2																					
Polyscias sambucifolia	Araliaceae		Shrub (SG)								2															
Polystichum fallax	Dryopteridaceae		Fern (EG)				2						1													
Polystichum proliferum	Dryopteridaceae		Fern (EG)																							
Poranthera microphylla	Phyllanthaceae		Forb (FG)			1			1						2				1				1			
Potamogeton tricarinatus	Potamogetonaceae		Forb (FG)																							
Pratia purpurascens	Lobeliaceae		Forb (FG)																							
Pratia spp.	Lobeliaceae		Forb (FG)																								1
Prostanthera lasianthos	Lamiaceae		Shrub (SG)																							
Prunella vulgaris	Lamiaceae	*																								
Pteridium esculentum	Dennstaedtiaceae		Fern (EG)					3	3	3	2		2			2	1		4	2		4		1		
Pteris tremula	Pteridaceae		Fern (EG)				1																			
Pterostylis coccina	Orchidaceae		Forb (FG)																							
Pterostylis decurva	Orchidaceae		Forb (FG)																							
Pterostylis laxa	Orchidaceae		Forb (FG)																							
Pterostylis obtusa	Orchidaceae		Forb (FG)																							
Pterostylis sp. B	Orchidaceae		Forb (FG)			1																				
Pterostylis spp.	Orchidaceae		Forb (FG)								1							1						1		
Pultenaea cuneata	Fabaceae (Faboideae)		Shrub (SG)																							
Pultenaea polifolia	Fabaceae (Faboideae)		Shrub (SG)																							
Pultenaea retusa	Fabaceae (Faboideae)		Shrub (SG)																							
Pultenaea setulosa	Fabaceae (Faboideae)		Shrub (SG)																							
Pultenaea spp.	Fabaceae (Faboideae)		Shrub (SG)																				1			
Ranunculus amphitrichus	Ranunculaceae		Forb (FG)																							
Ranunculus inundatus	Ranunculaceae		Forb (FG)																							
Ranunculus lappaceus	Ranunculaceae		Forb (FG)					2	2				1		2	1										
Ranunculus spp.	Ranunculaceae		Forb (FG)																1					1		
Rhodanthe anthemoides	Asteraceae		Forb (FG)												3		1					1		1		
Rhodanthe diffusa	Asteraceae		Forb (FG)																							
Rosa rubiginosa	Rosaceae	*																								
Rubus parvifolius	Rosaceae		Shrub (SG)				1				1		1			2	1		2	2		2		1		
Rubus ulmifolius	Rosaceae	*																								

Species	JVM005	JVM006	JVM007	JVM009	JVM010	JVM011	JVM012	JVM013	JVM014	JVM015	JVM016	JVM017	JVM018	JVM019	JVM078	JVM082	JVM085	JVM089	JVM092	JVM093	JVM094	JVM095	JVM096	JVM097	JVM099	JVM101	JVM102	JVM103	JVM104	JVM105	JVM106	JVM107	JVM108	JVM109	JVM110	JVM111	JVM112	JVM113	JVM114	JVM115	JVM117	JVM119
Juncus fockei																																										
Juncus sandwithii																																										
Juncus spp.																																										
Juncus subsecundus																													1													
Juncus vaginatus																																										
Lachnagrostis aemula																														1												
Lachnagrostis filiformis															1													1								1						
Lactuca serriola								1																																		
Lagenifera stipitata																		1																			1			1		
Lemna trisulca																																										
Lepidosperma laterale				1			1									5									1		1										1			5		
Leptospermum gregarium																																										
Leptospermum polygalifolium																												25	1							1						
Leptospermum polygalifolium subsp. montanum																																										
Lespedeza juncea subsp. sericea																																										
Leucopogon juniperinus																1												1														
Leucopogon lanceolatus																				5		5	1																			
Libertia paniculata																																										
Lilaeopsis polyantha																																										
Lomandra filiformis					1	1					1				1																						1					
Lomandra filiformis subsp. coriacea																																										
Lomandra longifolia		15	1	5	1	1	1	10	15	1	1		1	5			5		1	5	5	10	5	5	5	1	10							15	1		1	1	1		5	
Lomandra multiflora subsp. multiflora			1		1			1		1				1		1									1		1		1		1			1		1	1					
Lomandra spp.																																										
Lomatia arborescens								1																																		
Lotus corniculatus																																										
Luzula flaccida					1	1		1		1	1		1														1									1		1	1			
Luzula spp.																																										
Lysimachia arvensis															1																											
Macrozamia concinna																																										
Macrozamia spp.																																										
Marsdenia rostrata																																										
Medicago lupulina															1	1																									
Melichrus urceolatus																1									1								1									
Melicytus dentatus	10																																									
Mentha diemenica															5	1	1											5		1												
Mentha satureioides																																										
Microlaena stipoides	15				1	1				1	1	1	1	1	5	5	10													5	1		5	5	5	5	1	1	1			
Microlaena stipoides var. stipoides																																										
Microseris lanceolata																																										
Microtis spp.																																										
Microtis unifolia								1																																		
Modiola caroliniana															1			1																						1		
Monotoca scoparia																																										
Myriophyllum lophatum																												1														
Myriophyllum pedunculatum																																										
Myriophyllum variifolium																																										
Myriophyllum verrucosum																																										
Myrsine howittiana																																										
Notelaea microcarpa																			15					10																			
Notelaea microcarpa var. microcarpa																																										
Olearia alpicola								1						1						1	1	1		1														1				
Olearia elliptica	1														70	5	5	20							5						1									15		1
Olearia spp.																																										
Ophioglossum lusitanicum																																										
Oplismenus imbecillis																																										
Oreomyrrhis eriopoda																																										
Oxalis chnoodes			1		1	1					1	1		1														1			1							1	1			
Oxalis perennans	1								1						1		1								1																	1
Panicum effusum																																										
Paronychia brasiliana																																										
Paspalidium gracile																																										
Pellaea falcata																	1						1		1																	
Persicaria decipiens																																										
Petrorhagia dubia																																										
Petrorhagia nanteuilii															1																1											
Phyllanthus virgatus															1																											
Phytolacca octandra																																										
Picris angustifolia																																										
Picris angustifolia subsp. angustifolia	1	1				5		1		1	1	1	1			1	1			1							1				1												
Picris spp.																																										
Pimelea curviflora					1	1					1		1			1		1							1															1		
Pimelea curviflora var. divergens		5															1		1																						
Pimelea curviflora var. sericea	1														1																											
Pimelea glauca																																										
Pimelea ligustrina																																										
Pimelea micrantha																																										
Pimelea stricta																																										
Pimelea strigosa																																										
Pittosporum undulatum																																							15		
Plantago debilis															5	5	1							1							1									1	1	
Plantago hispida																																										
Plantago varia																																										
Plectranthus parviflorus																																										
Poa bulbosa																																										
Poa labillardierei var. labillardierei				1											5	1	5		15		20	30												10								1
Poa sieberiana	1	10	25		55	60	1	55		60	50	20	60	30	1	1	1	1		25			5	15	5	1	5	5		5		30	5		1	5		1	10		40	5
Poa sieberiana var. cyanophylla																																										
Poa sieberiana var. sieberiana																																										
Polycarpon tetraphyllum	1																																									
Polygala japonica						1				1			1															1														
Polymeria longifolia																																										
Polyscias sambucifolia								1												5	1																					
Polystichum fallax																						1		5																			
Polystichum proliferum																																										
Poranthera microphylla		1	1		1		1		1		5									1	1	1			1		1	1			1	1	1	1									
Potamogeton tricarinatus																																										
Pratia purpurascens																										1																
Pratia spp.																																										
Prostanthera lasianthos																																										
Prunella vulgaris																																										
Pteridium esculentum		5	15	5	5	5	10		5	15	30	5	15	40			1		10	10	1	15	5	10		10				30		15	15	10			40	40	20		5	
Pteris tremula																																										
Pterostylis coccina																																										
Pterostylis decurva																																										
Pterostylis laxa																																										
Pterostylis obtusa									1																																	
Pterostylis sp. B																																										
Pterostylis spp.																																										
Pultenaea cuneata																																										
Pultenaea polifolia																												1								5						
Pultenaea retusa																																										
Pultenaea setulosa																																										
Pultenaea spp.																																										
Ranunculus amphitrichus																																										
Ranunculus inundatus																																										
Ranunculus lappaceus		1	1		1	1	1	1	1	1	1	1	1	1				1	1	1	1	1	1	1		1	1	1	1			1		1	1	1	1	1	1		1	
Ranunculus spp.																																										
Rhodanthe anthemoides																																										
Rhodanthe diffusa																	1																								
Rosa rubiginosa															1																					1					5
Rubus parvifolius						1					1	1	1						1		1	1	1				5							1	1						1
Rubus ulmifolius																	1																									1

Species	OL2-3	OL3-3	OL4-3	RL1-3	RL2-3	RL3-3	RL4-3	UL1-3	UL2-3	UL3-3	UL4-2	WAR002	WAR003	WAR004	WAR005	WAR006	WAR007	WAR008	WAR009	WAR010	WAR011	WAR012	WAR013	WAR014	WAR016	WAR017	WAR018	WAR020	WAR021	WAR022	WAR026	WAR027	WAR028	WAR029	WAR030	WAR031	WAR032
Juncus fockei															2						1						1										
Juncus sandwithii																					2																
Juncus spp.																																					
Juncus subsecundus																																					
Juncus vaginatus																																					
Lachnagrostis aemula																																					
Lachnagrostis filiformis																					1	1					1										
Lactuca serriola													1			1			1					1														
Lagenifera stipitata		1	1						1	2										2			1		1	1				1	1						
Lemna trisulca																																	1				
Lepidosperma laterale																						1										1		2			1
Leptospermum gregarium															3						3						2								2		
Leptospermum polygalifolium																																					
Leptospermum polygalifolium subsp. montanum																											4										
Lespedeza juncea subsp. sericea																					2																
Leucopogon juniperinus																																					
Leucopogon lanceolatus												3	1	1								2	1						1							
Libertia paniculata													1													1							1				
Lilaeopsis polyantha																					1					1							2				
Lomandra filiformis	1			1				1										1	2			2														1	
Lomandra filiformis subsp. coriacea																																					
Lomandra longifolia	1	1		1	2	1	1	1	2	2		2	1	2		1	1		2	2	1	1	1	2		2			1		1		1	2	2	1	1
Lomandra multiflora subsp. multiflora								1																								1		1			
Lomandra spp.																																					
Lomatia arborescens						1			2												1			2		2		3							2		
Lotus corniculatus																					1																
Luzula flaccida	1		1	1	1	1	2	1		2		1		1	2	1	1	2	2	2		2	1	2			3		2			1	1	1	1	2	2
Luzula spp.																																					
Lysimachia arvensis																																					
Macrozamia concinna																																		1			
Macrozamia spp.																																					
Marsdenia rostrata													2																								
Medicago lupulina																																					
Melichrus urceolatus					1																	2												2		2	
Melicytus dentatus													2																5				2	2		1		1
Mentha diemenica																		1			1	1											1				1	2
Mentha satureioides																																					
Microlaena stipoides																																					
Microlaena stipoides var. stipoides	2	2	2	3	2	2	1	2		1	2	2	2	2		2	3	3	2		2	1	2	1	2	2	2	1	2	2	3	4	2		2	1	2
Microseris lanceolata	1																												1							
Microtis spp.																																					
Microtis unifolia																																					
Modiola caroliniana																																					
Monotoca scoparia																																					
Myriophyllum lophatum																																					
Myriophyllum pedunculatum															3																					
Myriophyllum variifolium																					1																
Myriophyllum verrucosum																																	2				
Myrsine howittiana													2																								
Notelaea microcarpa																																					
Notelaea microcarpa var. microcarpa							1																														
Olearia alpicola												1									1		1						1						1		
Olearia elliptica												1																			1	3	1	1		1	2
Olearia spp.																																					
Ophioglossum lusitanicum																																			1		
Oplismenus imbecillis													2																			1					
Oreomyrrhis eriopoda																	2					2							2							
Oxalis chnoodes			1		1			1										1						1												
Oxalis perennans																																					
Panicum effusum																																					
Paronychia brasiliana																																					
Paspalidium gracile																																1					
Pellaea falcata												1	1														2			1		1	1	1		
Persicaria decipiens																																					
Petrorhagia dubia																					1																
Petrorhagia nanteuilii																															1						
Phyllanthus virgatus																																					
Phytolacca octandra																														1							
Picris angustifolia					1				1	1		2	1			1		1		1	1	1	1		1	1			2		1	1	1	1	1		1
Picris angustifolia subsp. angustifolia																																					
Picris spp.																																					
Pimelea curviflora																														1					1		
Pimelea curviflora var. divergens																																					
Pimelea curviflora var. sericea																																					
Pimelea glauca																																					
Pimelea ligustrina																					1					1						1		2		
Pimelea micrantha						2																														
Pimelea stricta																															1			1			
Pimelea strigosa																																					
Pittosporum undulatum													4																			2					1
Plantago debilis												1	1										1				1			1			2	2			2		1
Plantago hispida																																					
Plantago varia																									2								2			
Plectranthus parviflorus													1																		1	1				
Poa bulbosa																																					
Poa labillardierei var. labillardierei	4		3	2	3			3		3				3		2	2		3	4	3	2	2	2		2			4	1	1	2	1		2	2	3
Poa sieberiana		4	2			5	4		5	5		2	1	4				2	1				2	4	4		2	1			3					2			
Poa sieberiana var. cyanophylla																																					
Poa sieberiana var. sieberiana																																					
Polycarpon tetraphyllum																															1	1					
Polygala japonica						1			1										1															1			1
Polymeria longifolia																																					
Polyscias sambucifolia								1														1	2							2							
Polystichum fallax												1	1																				1		2		
Polystichum proliferum			1																							1		3									
Poranthera microphylla	1	1			1		2			1				1								2								1						2	1
Potamogeton tricarinatus																					2																
Pratia purpurascens																																					
Pratia spp.																																					
Prostanthera lasianthos													2																								
Prunella vulgaris																					1														1		
Pteridium esculentum	3	4	2	3	3	3	3	2		2	5			2		2		2	2	2	1		3	3		2	1	1	2	3			1		1		1
Pteris tremula													2																	1		1				
Pterostylis coccina		1						3	1				2			1			1		1	1	1		1								1	2	
Pterostylis decurva												1																										
Pterostylis laxa																																1					
Pterostylis obtusa													1																								
Pterostylis sp. B																	1					1											1			1
Pterostylis spp.																																					
Pultenaea cuneata																						2															
Pultenaea polifolia																											2										
Pultenaea retusa																																		2			
Pultenaea setulosa																																		1	1		
Pultenaea spp.																																					
Ranunculus amphitrichus																																	2				
Ranunculus inundatus																					2																
Ranunculus lappaceus	2	1	2	1	2	2	2	2	1			1	1	2		1	1	1	1	2		1	2	2		1			2	2		1			1	1	2
Ranunculus spp.																																					
Rhodanthe anthemoides																																			2		1
Rhodanthe diffusa																																					
Rosa rubiginosa																									1										1		
Rubus parvifolius												1	2	1			1	1			2		1			2					1	2		2		2
Rubus ulmifolius																					1											2				

| Species | Family | Exotic | Growth Form | BUN001 | BUN002 | BUN003 | BUN005 | BUN006 | BUN007 | COBB5556 | EC_B_006 | EC_B_015 | EC_B_042 | EC_C_002 | EC_C_003 | EC_C_005 | EC_C_022 | EC_C_023 | EC_C_031 | EC_C_033 | EC_C_038 | EC_C_040 | EC_C_047 | EC_C_089 | GED81069 | GED81070 | JVM005 | JVM006 | JVM007 | JVM009 | JVM010 | JVM011 | JVM012 | JVM013 | JVM014 | JVM015 | JVM016 | JVM017 | JVM018 | JVM019 | JVM078 | JVM082 | JVM085 | JVM089 | JVM092 | JVM093 | JVM094 | JVM095 | JVM096 | JVM097 | JVM099 | JVM101 | JVM102 | JVM103 | JVM104 | JVM105 | JVM106 | JVM107 | JVM108 | JVM109 | JVM110 | JVM111 | JVM112 | JVM113 | JVM114 | JVM115 | JVM117 | JVM119 | OL2-3 | OL3-3 | OL4-3 | RL1-3 | RL2-3 | RL3-3 | RL4-3 | UL1-3 | UL2-3 | UL3-3 | UL4-2 | WAR002 | WAR003 | WAR004 | WAR005 | WAR006 | WAR007 | WAR008 | WAR009 | WAR010 | WAR011 | WAR012 | WAR013 | WAR014 | WAR016 | WAR017 | WAR018 | WAR020 | WAR021 | WAR022 | WAR026 | WAR027 | WAR028 | WAR029 | WAR030 | WAR031 | WAR032 |
|---|---|---

Appendix B Plant Community Type Subtypes

PCTID	PCT Name	Dominants	Hectares
0	Cleared		1.5
		BUILT	0.1
		DAM	0.2
		EX	1.3
84	River Oak - Rough-barked Apple - red gum - box riparian tall woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar Bioregion		110.2
		RO	13.1
		RO-RBA	32.8
		RO-RBA-SSB	43.3
		RO-RS-RBA	7.4
		RO-SSB-NB	7.2
		DNG	6.4
383	Apple Box - Rough-barked Apple terrace flats woodland of the southern Brigalow Belt South Bioregion		47.1
		AB-SSB	33.2
		AB-YB-RG	14.0
393	White Box shrubby woodland of the western Liverpool Range, Warrumbungle Range and south-west Pilliga forests, Brigalow Belt South Bioregion		1,565.7
		CB	14.4
		NB-WB	6.5
		RBA-WB	14.6
		DNG	31.2
		SSB	1.8
		SSB-WB	22.2
		WB	237.9
		WB-CB	31.2
		WB-MG-BS	2.9
		WB-NB	685.3
		WB-NB-CB	4.4
		WB-NB-RBA	256.1
		WB-NB-SSB	11.2
		WB-RBA	196.1
		WB-RBA-CB	22.0
		WB-RBA-SSB	9.9
		WB-SSB-NB	13.3
		WB-SSB-RBA	4.7

PCTID	PCT Name	Dominants	Hectares
420	Red Stringybark - Rough-barked Apple +/- Nortons Box open forest on hillslopes in the Warrumbungle NP - Coolah regions		32.3
		RS-NB	0.8
		RS-NB-RBA	8.6
		RS-WB-RBA	23.0
434	White Box grass shrub hill woodland on clay to loam soils on volcanic and sedimentary hills in the southern Brigalow Belt South Bioregion		196.9
		DNG	53.6
		WB	124.5
		WB-RBA	18.8
435	White Box - White Cypress Pine shrub grass hills woodland in the Brigalow Belt South Bioregion and Nandewar Bioregion		20.1
		DNG	13.5
		WB-WP	4.4
		WB-WP-RBA	2.2
446	Riparian tea tree - bottlebush - pennywort forbland / shrubland / wetland of montane creeks in the Brigalow Belt South Bioregion		304.0
		MG-BS-TT	61.5
		MG-TT	242.5
487	Sweet Pittosporum - Forest Oak - Rough-barked Apple depauparate gully rainforest on the Liverpool Range		6.1
		SSB-RBA-SP	6.1
488	Silvertop Stringybark - Yellow Box +/- Nortons Box grassy woodland on basalt hills mainly on northern aspects of the Liverpool Range, Brigalow Belt South Bioregion		597.8
		SSB-NB	203.6
		SSB-NB-RBA	85.3
		SSB-RBA-NB	286.5
		SSB-WB-NB	11.0
		SSB-WB-RBA	11.4
489	Long-leaved Box +/- Nortons Box - red gum grassy woodland on hills in the southern Brigalow Belt South Bioregion		438.0
		AB-MG	2.5
		CB	9.1
		NB	252.0
		NB-BG-SSB	1.7
		NB-RBA	17.3
		NB-RBA-SSB	5.9
		NB-SSB	93.9
		NB-SSB-RBA	6.7

PCTID	PCT Name	Dominants	Hectares
		NB-SSB-WB	10.0
		NB-WB	1.7
		RBA-NB	37.1
490	Silvertop Stringybark - Forest Ribbon Gum very tall moist open forest on basalt plateau on the Liverpool Range, Brigalow Belt South Bioregion		5,262.1
		MG-SSB	12.4
		SG-MG	2.7
		SG-MG-RG	12.3
		DNG	8.3
		SG-RG-MG	44.9
		SSB	960.5
		SSB-MG	502.2
		SSB-MG-RBA	5.8
		SSB-MG-RG	244.3
		SSB-MG-SW	0.5
		SSB-RBA	14.9
		SSB-RG	2,813.1
		SSB-RG-AB	3.5
		SSB-RG-MG	364.3
		SSB-RG-RBA	77.2
		SSB-RG-SG	97.0
		SSB-RG-SW	13.8
		SSB-SG	54.7
		SSB-SG-MG	2.0
		SSB-SG-RG	12.6
		SSB-SW	12.8
		SW	2.4
491	Forest Ribbon Gum - Silvertop Stringybark - Mountain Gum tall open forest on basalt on the Liverpool Range, mainly Brigalow Belt South Bioregion		558.7
		RG	77.7
		RG-MG	121.2
		RG-MG-SSB	4.7
		RG-DNG	14.0
		RG-SSB	341.0
492	Silvertop Stringybark - Yellow Box - Apple Box - Rough-barked Apple shrub grass open forest mainly on southern slopes of the Liverpool Range, Brigalow Belt South Bioregion		2,957.3
		AB-MG-SSB	22.7

PCTID	PCT Name	Dominants	Hectares
		AB-RBA	6.2
		AB-SSB-MG	7.7
		AB-YB-SSB	3.7
		CB	0.9
		MG-SSB-AB	33.2
		MG-SSB-RG	12.9
		RBA-SSB	22.0
		DNG	5.0
		SSB	56.6
		SSB-AB	41.8
		SSB-AB-RBA	50.1
		SSB-AB-RG	29.1
		SSB-AB-YB	15.1
		SSB-MG	5.8
		SSB-MG-AB	13.4
		SSB-RBA	1,485.0
		SSB-RBA-AB	172.5
		SSB-RBA-AB-YB	41.3
		SSB-RBA-CB	33.4
		SSB-RBA-MG	86.6
		SSB-RBA-WB	7.0
		SSB-RBA-YB	259.6
		SSB-RG-MG	7.4
		SSB-WB	7.7
		SSB-YB	17.4
		SSB-YB-AB	349.3
		SSB-YB-RBA	107.1
		YB-AB-SSB	57.0
493	Forest Oak - Rough-barked Apple - Silvertop Stringybark shrub grass open forest on protected slopes of the Liverpool Range		121.7
		RBA	33.3
		RBA-SSB	88.4
494	Snow Gum - Mountain Gum - Silver Wattle tall open forest of the Liverpool Range, Brigalow Belt South Bioregion		2,357.6
		MG	25.6
		MG-BS	60.5
		MG-SG	76.8

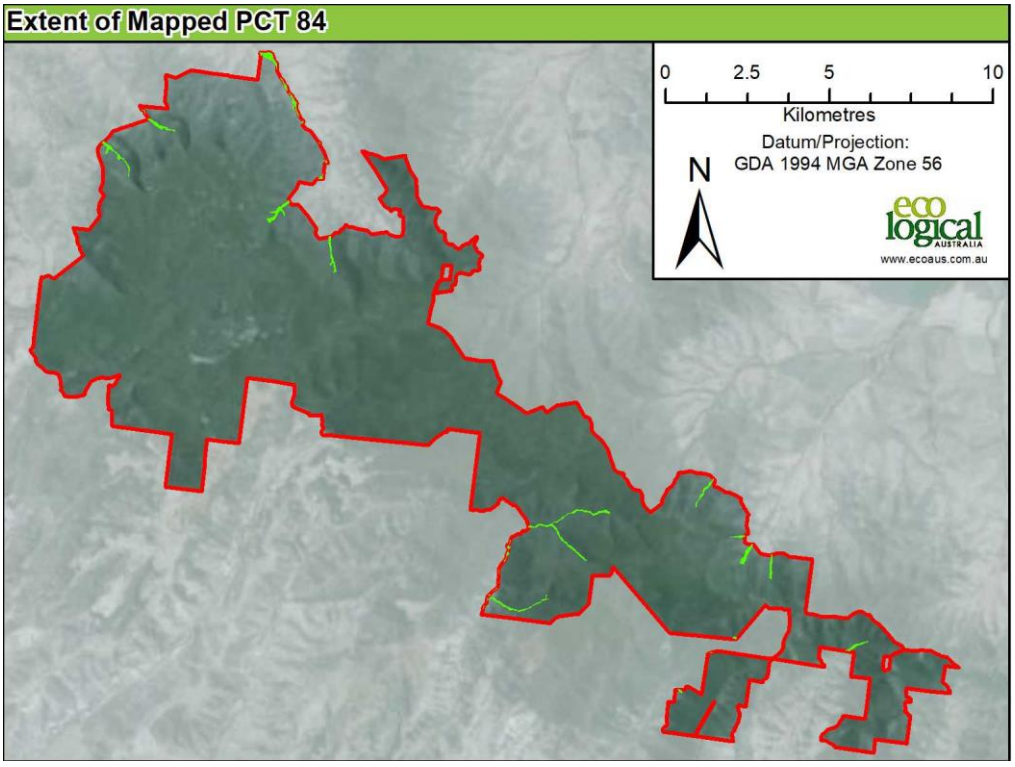
PCTID	PCT Name	Dominants	Hectares
		MG-SSB-SW	9.1
		MG-TT	63.1
		SG	4.9
		SG-MG	1,597.4
		SG-MG-BS	30.9
		SG-MG-RG	213.1
		SG-MG-SSB	18.0
		SG-MG-SW	9.0
		SG-RG	64.3
		SG-RG-MG	176.0
		SG-TL	8.9
495	Brittle Gum - Silvertop Stringybark grassy open forest of the Liverpool Range, Brigalow Belt South Bioregion		326.9
		BG	20.7
		BG-SSB	249.4
		BG-SSB-AB	44.2
		BG-SSB-NB	2.5
		CB	3.5
		SSB-BG	6.8
496	Yellow Box - White Box - Silvertop Stringybark - Blakely's Red Gum grass shrub woodland mainly on the Liverpool Range, Brigalow Belt South Bioregion		24.2
		WB-YB-SSB	24.2
497	Tea tree shrubland / sedgeland / forbland swamp wetland on the Liverpool Range, mainly Brigalow Belt South Bioregion		134.8
		HF	52.3
		TT	54.7
		TT-HF	27.8
498	Black Sallee plateau low woodland in the southern Brigalow Belt South Bioregion		161.2
		BS	43.9
		BS-MG	62.3
		BS-RG	0.8
		BS-SG	37.9
		HF	0.4
		SG-MG	16.0
499	Tree Violet - cough bush basalt scree slopes shrubland of the Liverpool Range - Wollemi region, Brigalow Belt South Bioregion and Sydney Basin Bioregion		64.0
			41.8
		BP-WAB	3.3

PCTID	PCT Name	Dominants	Hectares
		CB	9.3
		CB-TV	6.5
		SSB	0.2
		WAB	2.8
547	Wild Quince - Mock Olive - Rusty Fig - Iamboto - Sweet Pittosporum dry rainforest of rocky and scree areas of the Nandewar Bioregion and New England Tableland Bioregion		8.0
		TV-TL	8.0
569	Derived Snow Grass +/- Kangaroo Grass +/- Wild Sorghum tussock grassland of the NSW Northern Tablelands		78.5
		DNG	78.5
1551	Forest Ribbon Gum - Snow Gum - Snow Grass grassy open forest of the Liverpool Ranges and New England Tableland		869.0
		RG	58.1
		RG-MG	4.6
		RG-SG	572.9
		RG-SG-MG-TF	26.0
		RG-SG-SW	75.9
		DNG	5.4
		SG-RG	103.8
		SG-RG-MG	21.9
		SW	0.5
1693	Yellow Box - Rough-barked Apple grassy woodland of the upper Hunter and Liverpool Plains		20.2
		YB	20.2
Total			**16,263.8**

Appendix C Plant Community Type Profiles

ITEM	Data Source
PCT	State-wide data
Photo	This study
Vegetation Formation	State-wide data
Vegetation Class	State-wide data
Associated TEC Names	State-wide data
Vegetation Description	This study and State-wide data.
Fire regime	State-wide data
Upper Stratum Species	This study
Mid Stratum Species	This study
Ground Stratum Species	This study
Height class	State-wide data
Sites sampled	This study

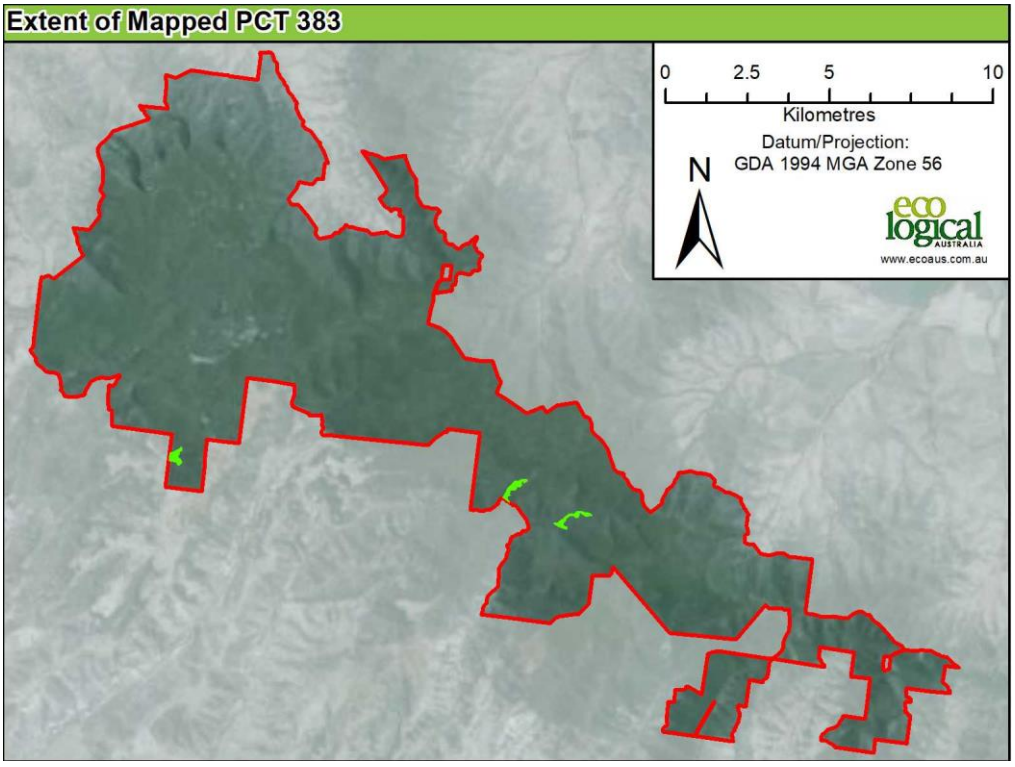
PCT	84 River Oak – Rough-barked Apple – red gum- box riparian tall woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar Bioregion



Vegetation Formation	Forested Wetlands
Vegetation Class	Eastern Riverine Forests

PCT	84 River Oak – Rough-barked Apple – red gum- box riparian tall woodland (wetland) of the Brigalow Belt South Bioregion and Nandewar Bioregion
Associated TEC Names	None
Vegetation Description	Tall woodland or open forest to 30 m high dominated by River Oak (*Casuarina cunninghamiana* subsp. *cunninghamiana*) often with Rough-barked Apple (*Angophora floribunda*), Mountain Gum (*Eucalyptus dalrympleana*), Silvertop Stringybark (*Eucalyptus laevopinea*), Blackwood (*Acacia melanoxylon*) and Apple Box (*Eucalyptus bridgesiana*). A sparse shrub layer may occur including *Cassinia laevis, Bursaria spinosa, Daviesia ulicifolia, Olearia elliptica, Hibbertia obtusifolia, Rubus parvifolius* and the vines such as *Eustrephus latifolius*, *Clematis* spp., *Glycine* spp., *Hardenbergia violacea* and *Smilax australis*. The ground cover can be dense or sparse and contains a rich flora of small shrubs, grasses, sedges and forbs. Grasses include *Microlaena stipoides* var. *stipoides*, *Echinopogon caespitosus, Echinopogon ovatus, Poa labillardierei* var. *labillardierei, Rytidosperma penicillatum, Austrostipa rudis, Poa sieberiana and Cynodon dactylon*. The graminoid *Lomandra longifolia* is common in some locations. Rushes and sedges include *Carex* spp., *Juncus continuus, Lepidosperma laterale* and *Schoenus* spp. Forbs include *Dichondra repens, Hydrocotyle laxiflora, Plantago debilis, Swainsona galegifolia, Viola betonicifolia and Acaena novae-zelandiae*. Weeds include *Rubus* spp., *Hypericum perforatum* and *Conyza* spp. Occurs on clay sand or sandy loam soils on riverine deposits on stream-banks in major drainage lines off the plateau.
Fire regime	Rarely burns. *Casuarina cunninghamiana* is susceptible to intense fire. Minimum 7 to maximum 30 with occasional intervals greater than 25 years desirable.
Trees	*Acacia melanoxylon, Angophora floribunda, Casuarina cunninghamiana* subsp. *cunninghamiana, Eucalyptus bridgesiana, Eucalyptus dalrympleana, Eucalyptus laevopinea*
Shrubs	*Bursaria spinosa, Cassinia* spp.
Grasses, forbs, ferns and others	*Acaena novae-zelandiae, Dichondra repens, Geranium solanderi* var. *solanderi, Hydrocotyle laxiflora, Cynodon dactylon* and *Microlaena stipoides.*
Height Class	7 - Range:12.01-20.00m (Tall)
Sites Sampled	1

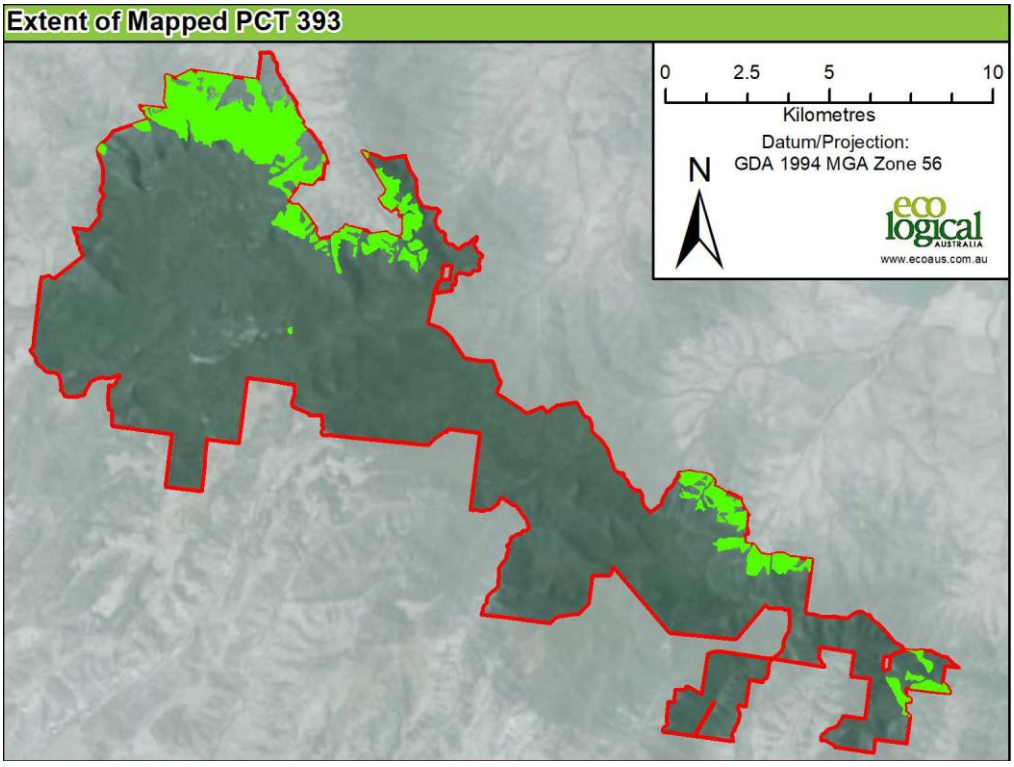
PCT	383 Apple Box - Rough-barked Apple terrace flats woodland of the southern Brigalow Belt South Bioregion



Vegetation Formation	Grassy Woodlands
Vegetation Class	Western Slopes Grassy Woodlands
Associated TEC Names	None

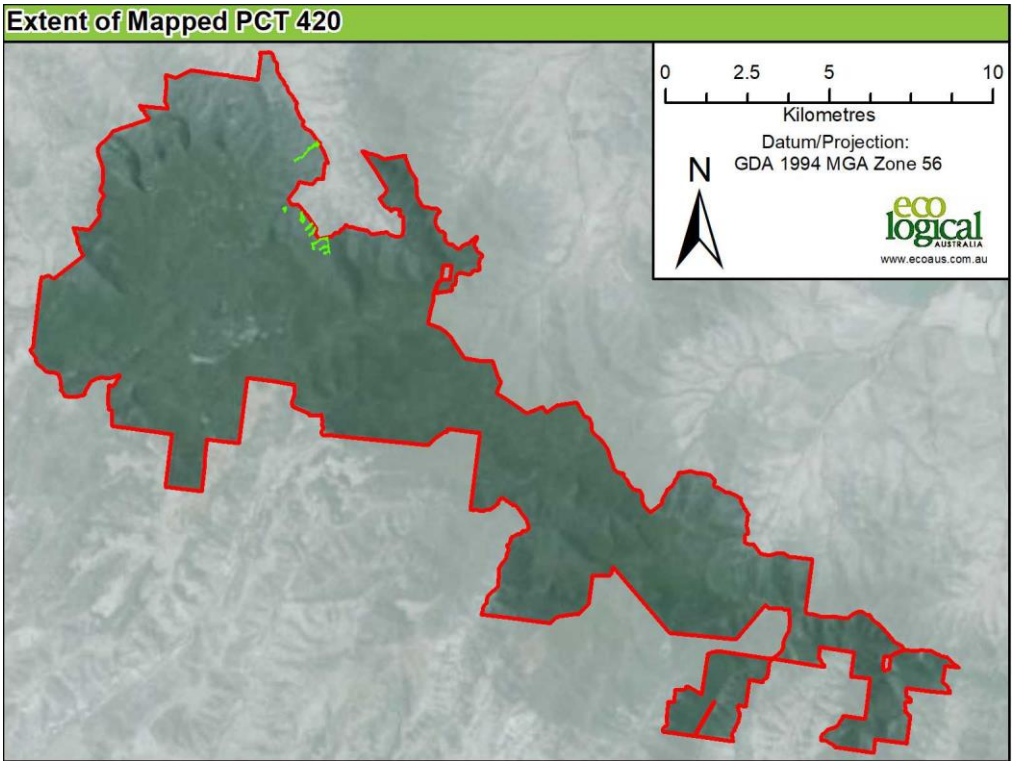
PCT	383 Apple Box - Rough-barked Apple terrace flats woodland of the southern Brigalow Belt South Bioregion
Vegetation Description	Tall woodland or open forest containing Apple Box (*Eucalyptus bridgesiana*) with Mountain Ribbon Gum (*Eucalyptus nobilis*), Silvertop Stringybark (*Eucalyptus laevopina*) and Mountain Gum (*Eucalyptus dalrympleana*). Shrubs are sparse and include *Acacia melanoxylon*, *Leptospermum* spp., *Exocarpos cupressiformis*, *Swainsonia galegifolia, Pimelea* spp., *Bursaria spinosa, Cassinia* spp. The ground cover is dense to mid-dense containing grasses, forbs and sedges. Grass species include *Microlaena stipoides, Poa sieberiana* and *Echinopogon ovatus*. Forb species include *Dichondra repens*. Occurs on clay loam soil derived from basalt or trachyte on terrace flats.
Fire regime	Fire is infrequent due to occurrence on protected, moist aspects and grassy ground cover. Minimum intervals of 10 years with maximums of 40 years or more. Occasional intervals greater than 20 years may be desirable.
Trees	*Eucalyptus bridgesiana, Eucalyptus nobilis, Eucalyptus laevopinea, Eucalyptus dalrympleana*
Shrubs	*Acacia melanoxylon, Leptospermum* spp*., Exocarpos cupressiformis, Swainsonia galegifolia, Pimelea* spp*., Bursaria spinosa, Cassinia* spp.,
Grasses, forbs, ferns and others	*Arthropodium milleflorum, Bursaria spinulosa, Dichondra repens, Einadia nutans, Hibbertia obtusifolia, Lomandra multiflora, Lomandra longifolia, Microlaena stipoides, Oxalis perennans, Poa sieberiana, Swainsona galegifolia*
Height Class	6 - Range:6.01-12.00m (Mid-high),7 - Range:12.01-20.00m (Tall)
Sites Sampled	1

PCT	393 White Box shrubby woodland of the western Liverpool Range, Warrumbungle Range and south-west Pilliga forests, Brigalow Belt South Bioregion

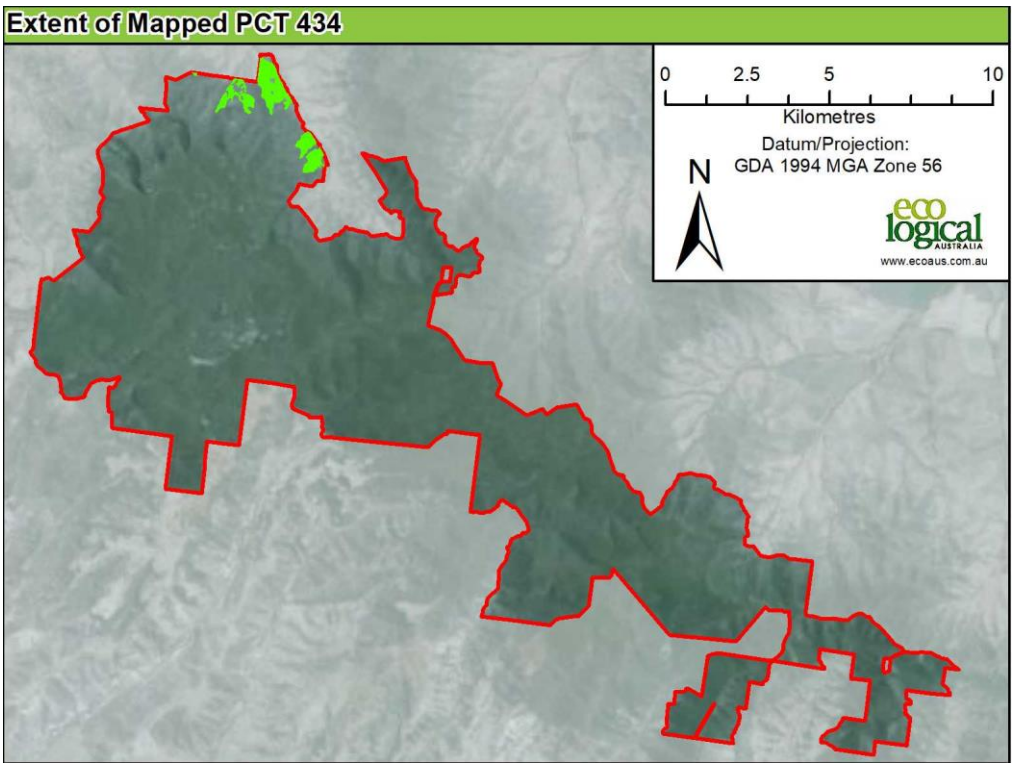


Vegetation Formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation Class	North-west Slopes Dry Sclerophyll Woodlands

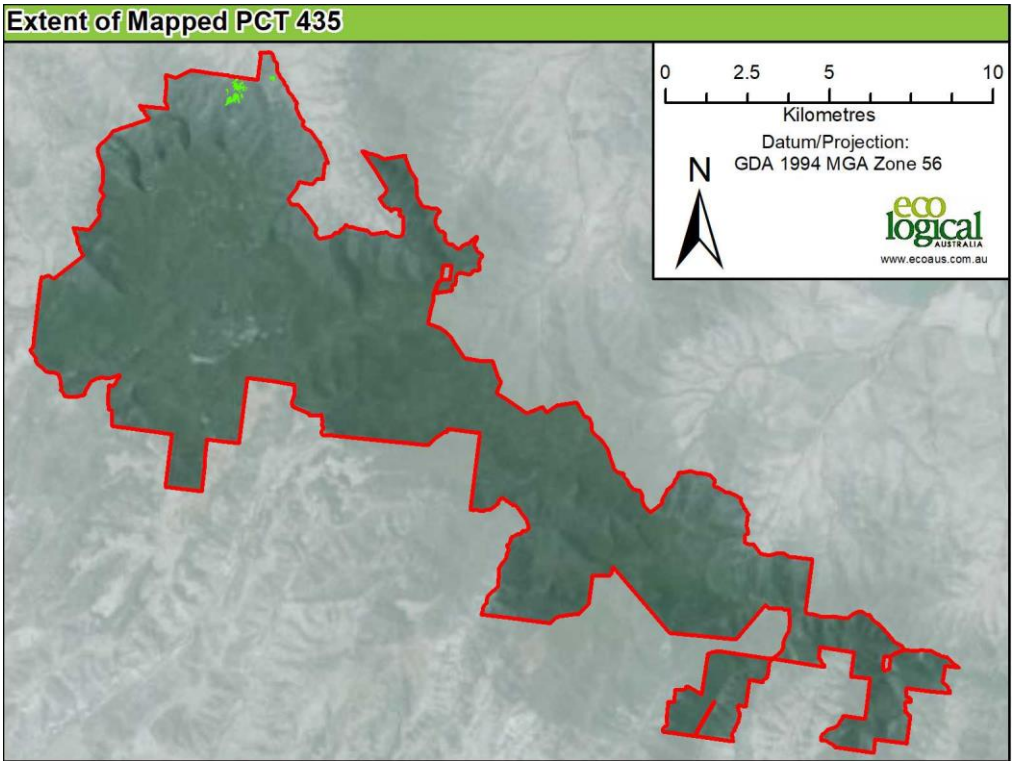
PCT	393 White Box shrubby woodland of the western Liverpool Range, Warrumbungle Range and south-west Pilliga forests, Brigalow Belt South Bioregion
Associated TEC Names	None
Vegetation Description	Tall to mid-high woodland or open forest dominated by White Box (*Eucalyptus albens*) and *Eucalyptus nortonii* (Nortons Box) sometimes with *Angophora floribunda, Eucalyptus laevopinea, Brachychiton populneus* and *Notelaea macrocarpa* and Callitris endlicheri. *Amyema* spp. may be present as well as the climber *Clematis microphylla*. The ground cover is mid-dense to sparse including grass species such as *Rytidosperma racemosum, Echinopogon ovatus, Themeda triandra, Bothriochloa macra, Cymbopogon refractus, Poa sieberiana and Sorghum leiocladum*. Forb species include *Daucus glochidiatus, Dichondra repens, Swainsona galegifolia, Acaena ovina, Bulbine bulbosa* and *Asperula conferta*. Occurs on loam to clay soils derived from volcanic basalt on hillslopes and hillcrests.
Fire regime	Hunter (2008) recommends maintaining an inter-fire period of 30-50 years with no two fires within 20 years. Minimum intervals of more than 5 years with maximums of 50 years or more. Occasional intervals greater than 25 years may be desirable.
Trees	*Angophora floribunda, Brachychiton populneus*, *Eucalyptus albens, Eucalyptus nortonii*, *Eucalyptus laevopinea, Notelaea microcarpa* var. *microcarpa*
Shrubs	*Acacia implexa, Bursaria spinosa, Cassinia* spp., Cassinia laevis, *Dodonaea viscosa, Hibbertia obtusifolia, Hovea lanceolata, Notelaea macrocarpa, Melichrus urceolatus, Olearia elliptica, Pimelea curviflora, Pimelea glauca, Pittosporum undulatum*
Grasses, forbs, ferns and others	*Acaena novae-zelandiae, Acaena ovina, Amyema* spp., *Aristida ramosa, Asperula conferta, Austrostipa* spp., *Bothriochloa macra, Bromus* spp., *Bulbine bulbosa, Cheilanthes* spp., *Chrysocephalum apiculatum, Clematis microphylla, Cymbonotus lawsonianus, Cymbopogon refractus, Daucus glochidiatus, Desmodium brachypodum, Dichopogon* spp., *Dichondra repens, Echinopogon ovatus, Geranium* spp., *Geranium solanderi, Hydrocotyle laxiflora, Lagenifera stipitata, Lomandra filiformis, Lomandra multiflora* subsp. *multiflora, Microlaena stipoides, Poa sieberiana, Pratia* spp., *Ranunculus lappaceus, Rytidosperma* spp., *Rytidosperma racemosum, Senecio lautus, Senecio quadridentatus, Sorghum leiocladum, Sporobolus* spp., *Stylidium graminifolium, Swainsona galegifolia, Themeda triandra, Veronica calycina, Vittadinia dissecta, Wurmbea dioica* subsp. *dioica*
Height Class	6 - Range:6.01-12.00m (Mid-high),7 - Range:12.01-20.00m (Tall)
Sites Sampled	2

PCT	420 Red Stringybark - Rough-barked Apple +/- Nortons Box open forest on hillslopes in the Warrumbungle NP - Coolah regions
(Photo)	
	
Vegetation Formation	Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation Class	Western Slopes Dry Sclerophyll Forests

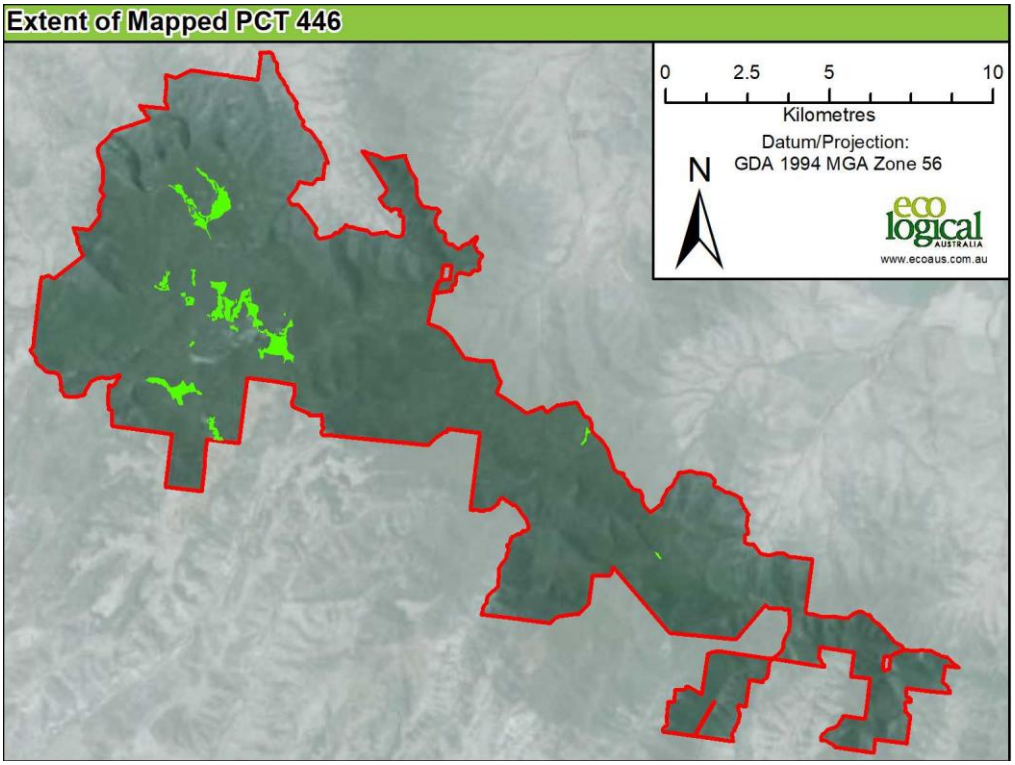
PCT	420 Red Stringybark - Rough-barked Apple +/- Nortons Box open forest on hillslopes in the Warrumbungle NP - Coolah regions
Associated TEC Names	None
Vegetation Description	Tall open forest dominated by Red Stringybark (*Eucalyptus macrorhyncha*) often with *Angophora floribunda*, Nortons Box (*Eucalyptus nortonii*) and White Box (*Eucalyptus albens*). The shrub layer is very sparse to mid-dense and includes *Olearia elliptica* subsp. *elliptica*, *Cassinia* spp., *Dodonaea viscosa* subsp. *angustifolia*. The ground cover is sparse under shrubs but mid-dense in the open. Grass species include *Aristida ramosa, Dichanthium sericeum* and *Bothriochloa macra*. Occurs on sandy loam to loamy clay soils derived from volcanic rocks and some sandstones on hills and mountains landform patterns
Fire regime	High altitude and cool climate inhibits regular wildfire. Subject to occasional wildlfire. Minimum intervals of 7years with maximums of 30 years or more. Occasional intervals greater than 25 years may be desirable.
Trees	*Eucalyptus macrorhyncha, Angophora floribunda, Eucalyptus nortonii* and *Eucalyptus albens*
Shrubs	*Olearia elliptica* subsp. *elliptica*, *Cassinia* spp., *Dodonaea viscosa* subsp. *angustifolia*
Grasses, forbs, ferns and others	*Aristida ramosa, Dichanthium sericeum* and *Bothriochloa macra*
Height Class	7 - Range:12.01-20.00m (Tall)
Sites Sampled	0

PCT	434 White Box grass shrub hill woodland on clay to loam soils on volcanic and sedimentary hills in the southern Brigalow Belt South Bioregion
(Photo)	
	
Vegetation Formation	Grassy Woodlands
Vegetation Class	Western Slopes Grassy Woodlands

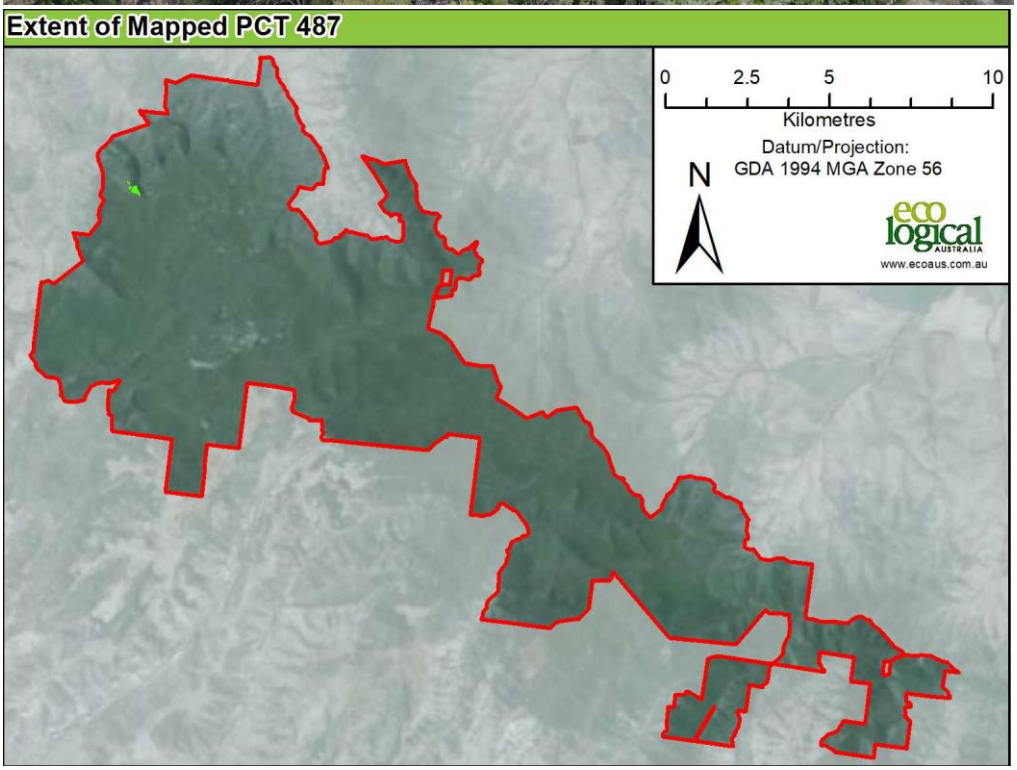
PCT	434 White Box grass shrub hill woodland on clay to loam soils on volcanic and sedimentary hills in the southern Brigalow Belt South Bioregion
Associated TEC Names	White Box Yellow Box Blakely's Red Gum Woodland (BC Act EEC), White Box-Yellow Box-Blakely's Red Gum Woodland and Derived Native Grassland (EPBC Act CEEC)
Vegetation Description	Tall to mid-high woodland to open woodland dominated by White Box (*Eucalyptus albens*). The shrub layer is very sparse to sparse and includes *Olearia elliptica*, *Notelaea microcarpa* var. *microcarpa*, *Dodonaea viscosa* and *Santalum lanceolatum*. The ground cover is dense to mid-dense and dominated by grasses and forbs. Grass species include *Aristida* spp., *Microlaena stipoides* var. *stipoides, Bothriochloa macra*, *Dichanthium sericeum* subsp. *sericeum* and *Elymus scaber* var. *scaber*. Occurs on red to chocolate clay to loam, often duplex, soils derived from basalt on footslopes in hill landform patterns.
Fire regime	Remnants rarely burns due to fragmentation and lack of ground cover. Originally may have been patch burnt by Aborigines. Minimum intervals of 10 years with maximums of 40 years or more. Occasional intervals greater than 20 years may be desirable.
Trees	*Eucalyptus albens*
Shrubs	*Olearia elliptica*, *Notelaea microcarpa* var. *microcarpa*, *Dodonaea viscosa* and *Santalum lanceolatum*
Grasses, forbs, ferns and others	*Aristida* spp., *Microlaena stipoides* var. *stipoides, Bothriochloa macra*, *Dichanthium sericeum* subsp. *sericeum* and *Elymus scaber* var. *scaber*
Height Class	6 - Range:6.01-12.00m (Mid-high),7 - Range:12.01-20.00m (Tall)
Sites Sampled	0

PCT	435 White Box - White Cypress Pine shrub grass hills woodland in the Brigalow Belt South Bioregion and Nandewar Bioregion
(Photo)	
	
Vegetation Formation	Dry Sclerophyll Forests (Shrub/grass sub-formation
Vegetation Class	North-west Slopes Dry Sclerophyll Woodlands

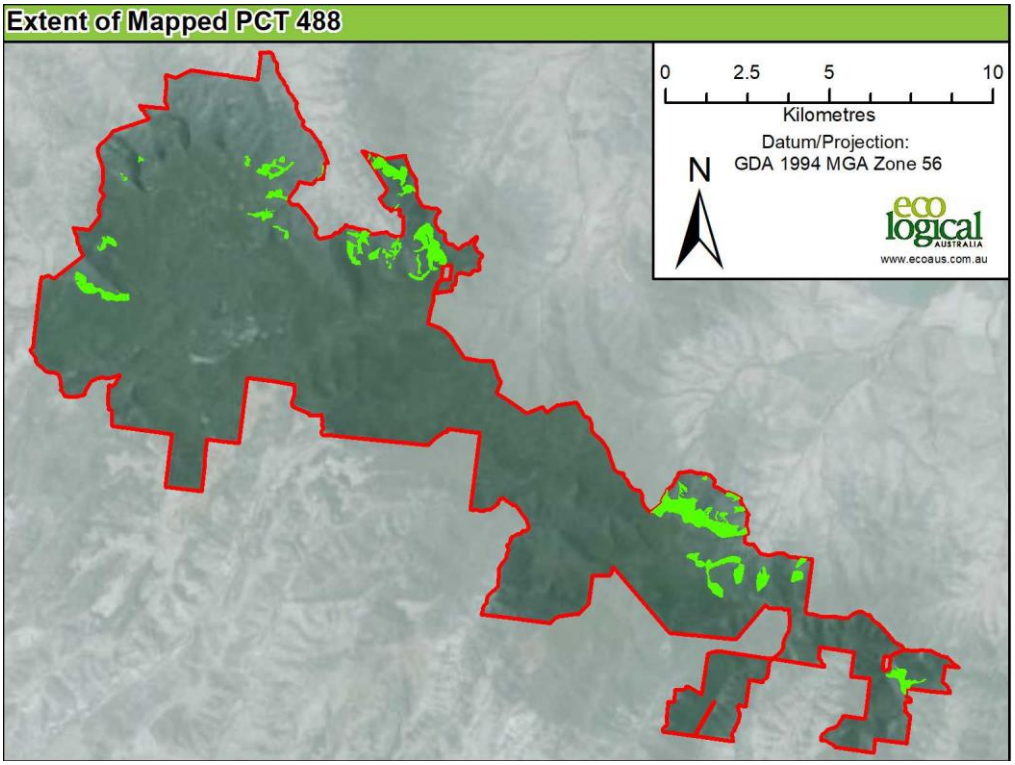
PCT	435 White Box - White Cypress Pine shrub grass hills woodland in the Brigalow Belt South Bioregion and Nandewar Bioregion
Associated TEC Names	None
Vegetation Description	Tall or mid-high woodland dominated White Cypress Pine (*Callitris glaucophylla*) and White Box (*Eucalyptus albens*). The shrub layer is sparse to dense depending on grazing. The ground cover is mid-dense and includes grass species such as *Rytidosperma* spp. and *Aristida* spp. Occurs on red to brown clay to loamy sand soils derived from metamorphic or sedimentary substrates often with a volcanic (basalt) influence on hillslopes in hill landscape patterns.
Fire regime	Remnants rarely burns due to fragmentation and lack of ground cover. Areas may have been patch burnt by Aborigines. Minimum intervals of more than 5 years with maximums of 50 years or more. Occasional intervals greater than 25 years may be desirable.
Trees	*Callitris glaucophylla* and *Eucalyptus albens*
Shrubs	None
Grasses, forbs, ferns and others	*Rytidosperma* spp. and *Aristida* spp.
Height Class	6 - Range:6.01-12.00m (Mid-high)
Sites Sampled	0

PCT	446 Riparian tea tree - bottlebush - pennywort forbland / shrubland / wetland of montane creeks in the Brigalow Belt South Bioregion
(Photo)	
	
Vegetation Formation	Heathlands
Vegetation Class	Northern Montane Heaths

PCT	446 Riparian tea tree - bottlebush - pennywort forbland / shrubland / wetland of montane creeks in the Brigalow Belt South Bioregion
Associated TEC Names	None
Vegetation Description	Tall woodland over a low open forbland - sedgeland - shrubland occurring along creeks and drainage depressions. The main ground cover forb species include *Acaena novae-zelandiae, Arthropodium milleflorum, Asperula conferta, Euchiton involucratus, Geranium potentilloides, Haloragis heterophylla, Hydrocotyle laxiflora, Hypericum gramineum, Ranunculus lappaceus, Viola betonicifolia* and *Wahlenbergia stricta.* Grass species include *Echinopogon ovatus, Lachnagrostis filiformis, Lomandra multiflora* subsp. *multiflora and Rytidosperma laeve*. Shrub species include *Leptospermum polygalifolium* subsp. *transmontanum* and *Leptospermum gregarium*. Trees are generally absent but the watercourse may be over-topped in wetter regions by *Eucalyptus dalrympleana* subsp. *heptantha* and *Eucalyptus stellulata*. Restricted to skeletal soils derived from basalt, breccia or other substrates in narrow riparian zones along upland creeks in mountain landform patterns.
Fire regime	Rarely burns. Minimum intervals of more than 7 years with maximums of 30 years or more. Occasional intervals greater than 20 years may be desirable.
Trees	*Eucalyptus dalrympleana* subsp. *heptantha* and *Eucalyptus stellulata*
Shrubs	*Leptospermum polygalifolium*
Grasses, forbs, ferns and others	*Acaena novae-zelandiae, Arthropodium milleflorum, Asperula conferta, Euchiton involucratus, Geranium potentilloides, Haloragis heterophylla, Hydrocotyle laxiflora, Hypericum gramineum, Ranunculus lappaceus, Viola betonicifolia, Wahlenbergia stricta, Echinopogon ovatus, Lachnagrostis filiformis, Lomandra multiflora* subsp. *multiflora, Rytidosperma laeve* and *Desmodium varians*
Height Class	5 - Range:3.01-6.00m (Low)
Sites Sampled	3

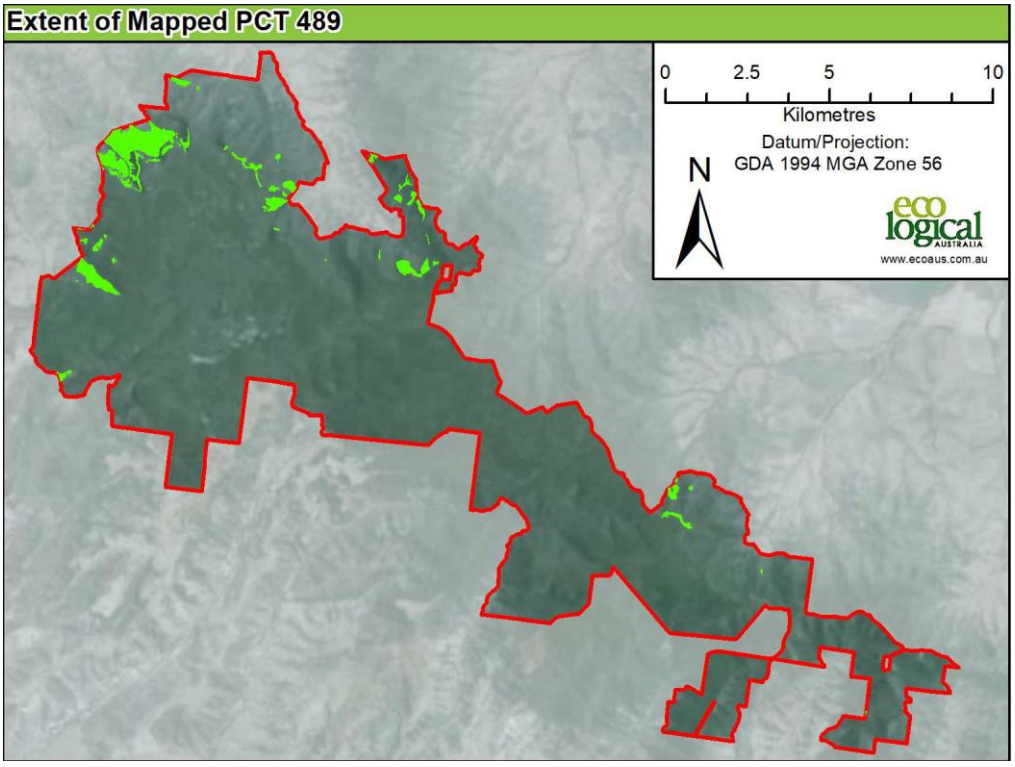
PCT	487 Sweet Pittosporum - Forest Oak - Rough-barked Apple depauparate gully rainforest on the Liverpool Range
(Photo)	
	
Vegetation Formation	Wet Sclerophyll Forests (Shrubby sub-formation)
Vegetation Class	North Coast Wet Sclerophyll Forests

PCT	487 Sweet Pittosporum - Forest Oak - Rough-barked Apple depauparate gully rainforest on the Liverpool Range
Associated TEC Names	None
Vegetation Description	Low to mid-high closed to open forest, riparian fern rainforest with a short tree canopy dominated by Sweet Pittosporum (Pittosporum undulatum), Forest Oak (*Allocasuarina torulosa*) and at higher altitudes Blackwood (*Acacia melanoxylon*). Rough-barked Apple (*Angophora floribunda*) is a common tall tree. The shrub layer is sparse in part due to lack of light and includes Tree Violet (*Melicytus dentatus*), *Sambucus gaudichaudiana* and *Notelaea microcarpa* with vines such as *Pandorea pandorana* subsp. *pandorana*. The ground cover is dominated by ferns including *Adiantum aethiopicum, Doodia aspera, Calochlaena dubia, Hypolepis glandulifera, Pteris tremula, Asplenium flabellifolium, Pellaea falcata, Polystichum proliferum* and *Adiantum formosum*. Forbs include *Urtica incisa, Austrocynoglossum latifolium, Dichondra repens, Geranium solanderi* var. *solanderi, Plectranthus parviflorus, Acaena ovina, Pratia purpurascens, Rumex brownii, Commelina cyanea, Solenogyne dominii and Galium propinquum*. Grasses include *Echinopogon ovatus, Microlaena stipoides* and *Poa labillardierei*. Occurs on shallow alluvial loam or gravel often derived from basalt in gullies on protected often south-facing steep hillslopes in mountains or hill landscapes between about 300 and 900 m altitude.
Fire regime	Minimum intervals of more than 25 years with maximums of 50 years or more. Low intensity fire only, avoid crown fires.
Trees	*Pittosporum undulatum*; *Angophora floribunda*; *Allocasuarina torulosa*; *Acacia melanoxylon*; *Eucalyptus bridgesiana*; *Eucalyptus laevopinea*; *Eucalyptus nobilis*
Shrubs	*Melicytus dentatus; Pandorea pandorana subsp. pandorana; Eustrephus latifolius; Clematis glycinoides var. glycinoides; Lomatia arborescens; Sambucus gaudichaudiana; Clematis aristata; Notelaea microcarpa* var. *microcarpa; Breynia oblongifolia.*
Grasses, forbs, ferns and others	*Adiantum aethiopicum; Doodia aspera; Urtica incisa; Austrocynoglossum latifolium; Australina pusilla; Echinopogon ovatus; Hypolepis glandulifera; Calochlaena dubia; Pteris tremula; Asplenium flabellifolium; Elymus scaber* var. *scaber; Geranium solanderi* var. *solanderi; Plectranthus parviflorus; Acaena ovina; Microlaena stipoides var. stipoides; Poa sieberiana; Solanum aviculare; Adiantum formosum; Pellaea falcata; Sigesbeckia orientalis subsp. orientalis; Adiantum hispidulum; Glycine clandestina; Desmodium varians; Marsdenia australis; Daucus glochidiatus; Ammobium alatum; Pratia purpurascens; Rumex brownii; Commelina cyanea; Solenogyne dominii; Galium propinquum; Bothriochloa macra; Hydrocotyle laxiflora; Solanum opacum; Galium migrans; Cardamine paucijuga; Pteridium esculentum; Pellaea falcata; Polystichum proliferum; Hydrocotyle peduncularis*;
Height Class	5 - Range:3.01-6.00m (Low),6 - Range:6.01-12.00m (Mid-high)
Sites Sampled	0

PCT	488 Silvertop Stringybark - Yellow Box +/- Nortons Box grassy woodland on basalt hills mainly on northern aspects of the Liverpool Range, Brigalow Belt South Bioregion
(Photo)	
	
Vegetation Formation	Grassy Woodlands
Vegetation Class	New England Grassy Woodlands

PCT	488 Silvertop Stringybark - Yellow Box +/- Nortons Box grassy woodland on basalt hills mainly on northern aspects of the Liverpool Range, Brigalow Belt South Bioregion
Associated TEC Names	None
Vegetation Description	Tall or mid-high woodland to open woodland dominated by Silvertop Stringybark (*Eucalyptus laevopinea*) often with Norton's Box (*Eucalyptus nortonii*), and Rough-barked Apple (*Angophora floribunda*). The shrub layer is very sparse or absent and includes *Cassinia quinquefaria*, *Bursaria spinosa subsp. spinosa*, *Hibbertia obtusifolia* and *Olearia elliptica*. The ground cover is usually dense with a diversity of grasses and forbs. Grass species include *Lomandra longifolia, Poa sieberiana* and *Rytidosperma penicillatum.* Forb species include *Ajuga australis, Hydrocotyle laxiflora, Swainsona galegifolia* and *Viola betonicifolia*. The scrambler *Desmodium varians* is common. Occurs on black or dark brown clay loam and light clay soils derived from basalt on upper hillslopes in hill and mountain landform patterns.
Fire regime	Rarely burns due to fragmentation and lack of biomass. Patch burning of grassy ground cover may be appropriate in some areas. Minimum intervals of 10 years with maximums of 40 years or more. Occasional intervals greater than 20 years may be desirable.
Trees	*Eucalyptus nortonii*, *Eucalyptus laevopinea*, *Angophora floribunda*
Shrubs	*Hibbertia obtusifolia*
Grasses, forbs, ferns and others	*Pteridium esculentum, Ajuga australis, Hydrocotyle laxiflora, Swainsona galegifolia, Viola betonicifolia, Lomandra longifolia, Poa sieberiana, Rytidosperma penicillatum, Desmodium varians, Eustrephus latifolius*
Height Class	6 - Range:6.01-12.00m (Mid-high),7 - Range:12.01-20.00m (Tall)
Sites Sampled	2

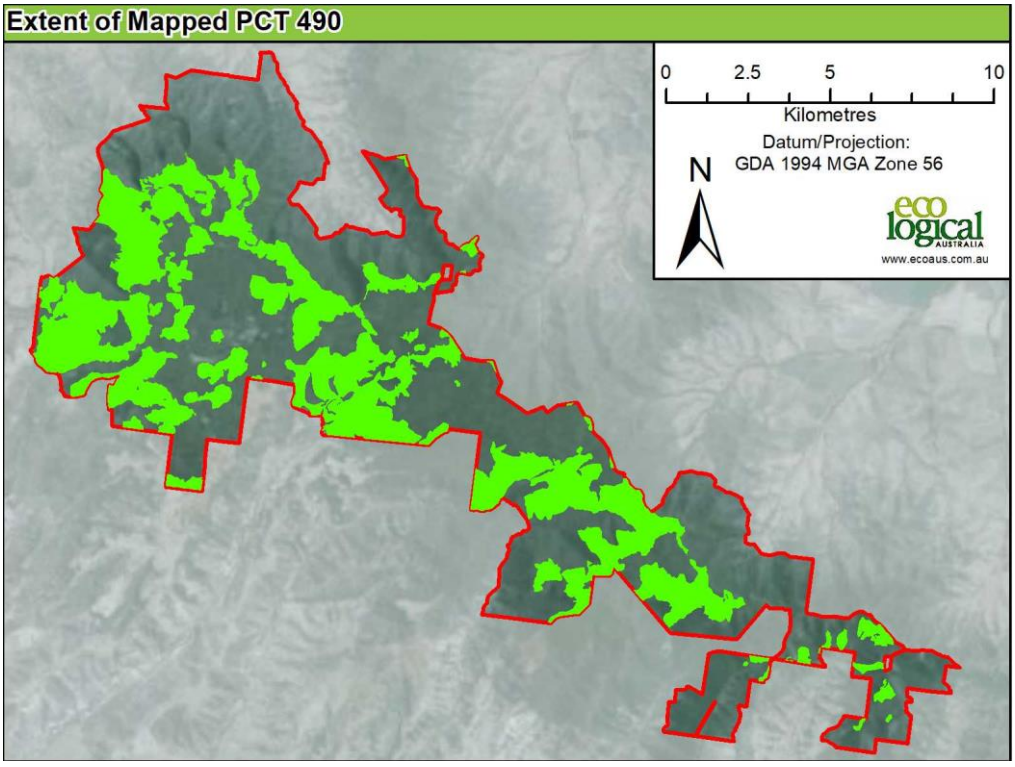
PCT	489 Long-leaved Box +/- Nortons Box - red gum grassy woodland on hills in the southern Brigalow Belt South Bioregion



Vegetation Formation	Grassy Woodlands
Vegetation Class	New England Grassy Woodlands

PCT	489 Long-leaved Box +/- Nortons Box - red gum grassy woodland on hills in the southern Brigalow Belt South Bioregion
Associated TEC Names	None
Vegetation Description	Mid-high woodland tree canopy dominated by Norton's Box (*Eucalyptus nortonii*) occasionally with Silvertop Stringybark (*Eucalyptus laevopinea*) and *Angophora floribunda*. Shrub species include *Cassinia quinquefaria*, *Olearia elliptica* and *Bursaria spinulosa*. Grasses include *Bothriochloa macra, Poa sieberiana, Aristida personata, Dichelachne micrantha and Echinopogon ovatus*. The ground ferns *Cheilanthes sieberi* and *C. distans* may be present. Forb species include *Crassula sieberiana, Swainsona galegifolia, Acaena novae-zelandiae* and *Arthropodium milleflorum*. The scramblers *Desmodium varians* and *Glycine clandestina* may be present. Occurs on loam soil derived from basalt on ridge tops and slopes.
Fire regime	Low shrub biomass and fragmentation implies fire is rare unless landholders burn paddocks. Minimum intervals of 10 years with maximums of 40 years or more. Occasional intervals greater than 20 years may be desirable.
Trees	*Angophora floribunda, Brachychiton populneus, Eucalyptus albens, Eucalyptus laevopinea, Eucalyptus nortonii*
Shrubs	*Bursaria spinosa, Cassinia quinquefaria, Hibbertia obtusifolia, Olearia elliptica*
Grasses, forbs, ferns and others	*Acaena novae-zelandiae, Ajuga australis, Aristida personata, Arthropodium milleflorum, Asperula conferta, Austrostipa rudis* subsp. *nervosa, Bothriochloa macra, Brachyscome dissectifolia, Cheilanthes distans, Cheilanthes sieberi subsp. sieberi, Clematis glycinoides, Crassula sieberiana, Desmodium varians, Dichelachne micrantha, Dichondra repens, Echinopogon ovatus, Einadia nutans, Euchiton involucratus, Euchiton japonicus, Eustrephus latifolius, Fimbristylis dichotoma, Geranium potentilloides, Glycine clandestina, Gonocarpus tetragynus, Gypsophila tubulosa, Haloragis heterophylla, Hydrocotyle laxiflora, Hypericum gramineum, Lomandra longifolia, Microlaena stipoides* var. *stipoides, Oxalis chnoodes, Paspalidium gracile, Pellaea falcata, Picris angustifolia, Plantago debilis, Poa sieberiana, Polymeria longifolia, Pratia purpurascens, Pteridium esculentum, Ranunculus lappaceus, Rumex brownii, Rytidosperma erianthum, Rytidosperma penicillatum, Senecio hispidulus, Sigesbeckia australiensis, Smilax australis, Solenogyne bellioides, Swainsona galegifolia, Triptilodiscus pygmaeus, Veronica calycina, Viola betonicifolia, Vittadinia cuneata* var. *hirsuta, Wahlenbergia stricta, Wahlenbergia stricta subsp. stricta*
Height Class	6 - Range:6.01-12.00m (Mid-high)
Sites Sampled	0

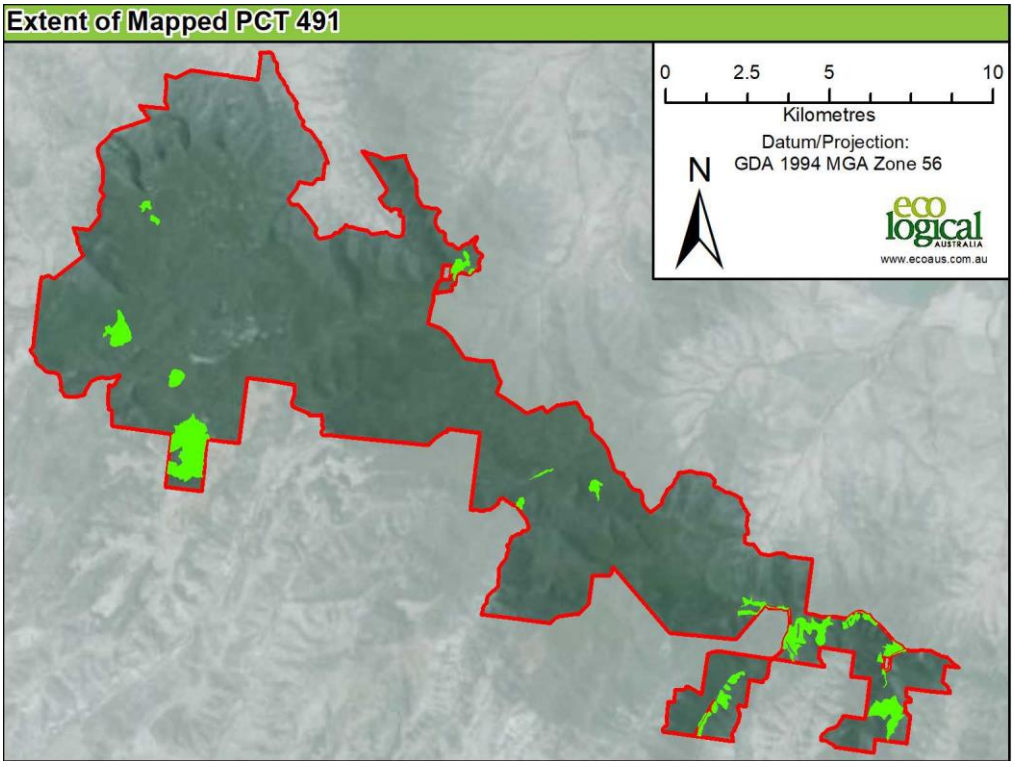
PCT	490 Silvertop Stringybark - Forest Ribbon Gum very tall moist open forest on basalt plateau on the Liverpool Range, Brigalow Belt South Bioregion



Vegetation Formation	Grassy Woodlands
Vegetation Class	New England Grassy Woodlands

PCT	490 Silvertop Stringybark - Forest Ribbon Gum very tall moist open forest on basalt plateau on the Liverpool Range, Brigalow Belt South Bioregion
Associated TEC Names	None
Vegetation Description	Very tall open forest to closed forest dominated by Silvertop Stringybark (*Eucalyptus laevopinea*) with Forest Ribbon Gum (*Eucalyptus nobilis*), Mountain Gum (*Eucalyptus dalrympleana*) and less commonly Snow Gum (*Eucalyptus pauciflora*) and Black Sallee (*Eucalyptus stellulata*). Blackwood (*Acacia melanoxylon*) is scattered through the forest. The shrub layer is sparse to very sparse with the most common species being Silver Wattle (*Acacia dealbata*). Other shrubs include *Hibbertia obtusifolia, Bursaria spinosa* subsp. *spinosa*, *Rubus parvifolius* and *Leucopogon lanceolatus*. Vines include *Eustrephus latifolius, Desmodium varians, Glycine clandestine* and *Smilax australis*. The ground cover is dense. Grass species include *Poa sieberiana*, *Poa labillardierei*, *Austrostipa rudis* and *Echinopogon ovatus*. The mat-rush *Lomandra longifolia* is often present along with the rush *Luzula flaccida*. Forb species include *Hydrocotyle laxiflora, Veronica calycina, Viola betonicifolia, Acaena novae-zelandiae, Ranunculus lappaceus, Dichondra repens, Ajuga australis, Asperula conferta* and *Senecio diaschides*. The scramblers *Eustrephus latifolius, Desmodium varians* and *Glycine clandestina* are abundant. Bracken Fern (*Pteridium esculentum*) may be dominant. Occurs on loam to clay loam soils derived from basalt in mountains or plateau landscapes mostly over 1000 m altitude.
Fire regime	Subject to low intensity management burning in Coolah Tops National Park. Intense wildfire is rare due to moisture content in soils and altitude. Minimum intervals of 10 years with maximums of 40 years or more. Occasional intervals greater than 20 years may be desirable.
Trees	*Acacia dealbata, Acacia melanoxylon, Eucalyptus dalrympleana, Eucalyptus laevopinea, Eucalyptus nobilis*
Shrubs	*Bursaria spinosa, Hibbertia obtusifolia, Leucopogon lanceolatus, Olearia alpicola, Polyscias sambucifolia, Rubus parvifolius*
Grasses, forbs, ferns and others	*Pteridium esculentum, Acaena novae-zelandiae, Ajuga australis, Asperula conferta, Dichondra repens, Hydrocotyle laxiflora, Ranunculus lappaceus, Senecio diaschides, Veronica calycina, Viola betonicifolia, Echinopogon ovatus, Lomandra longifolia, Poa sieberiana, Desmodium varians, Eustrephus latifolius*
Height Class	8 - Range:20.01-35.00m (Very tall)
Sites Sampled	38

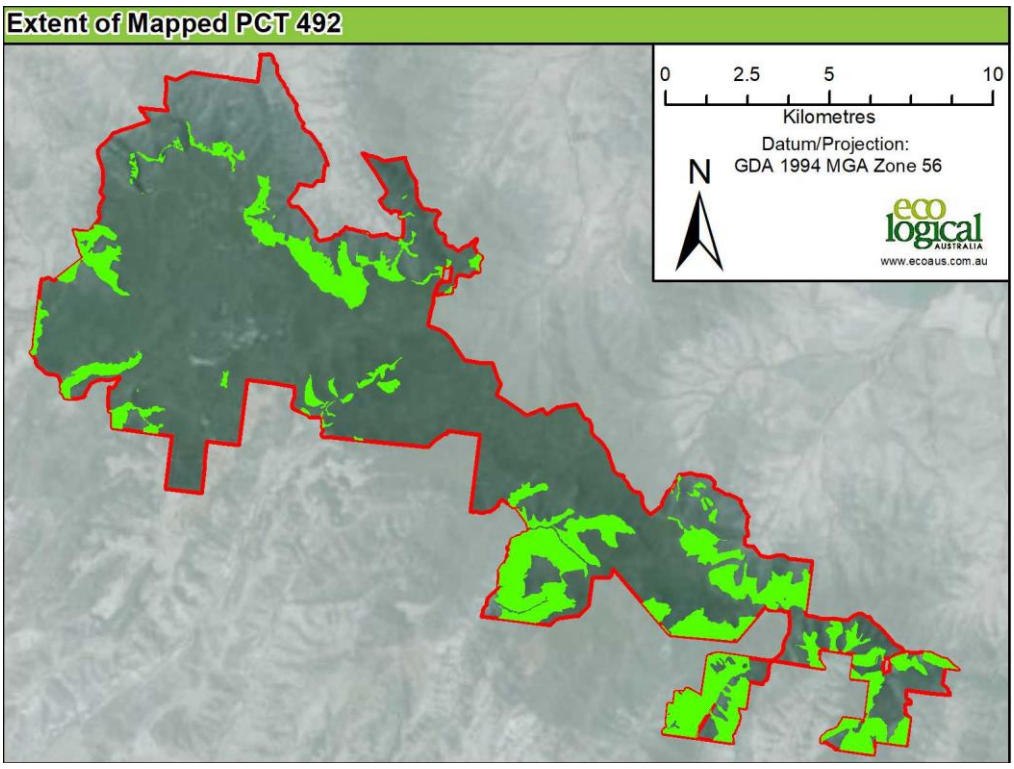
PCT	491 Forest Ribbon Gum - Silvertop Stringybark - Mountain Gum tall open forest on basalt on the Liverpool Range, mainly Brigalow Belt South Bioregion



Vegetation Formation	Grassy Woodlands
Vegetation Class	New England Grassy Woodlands

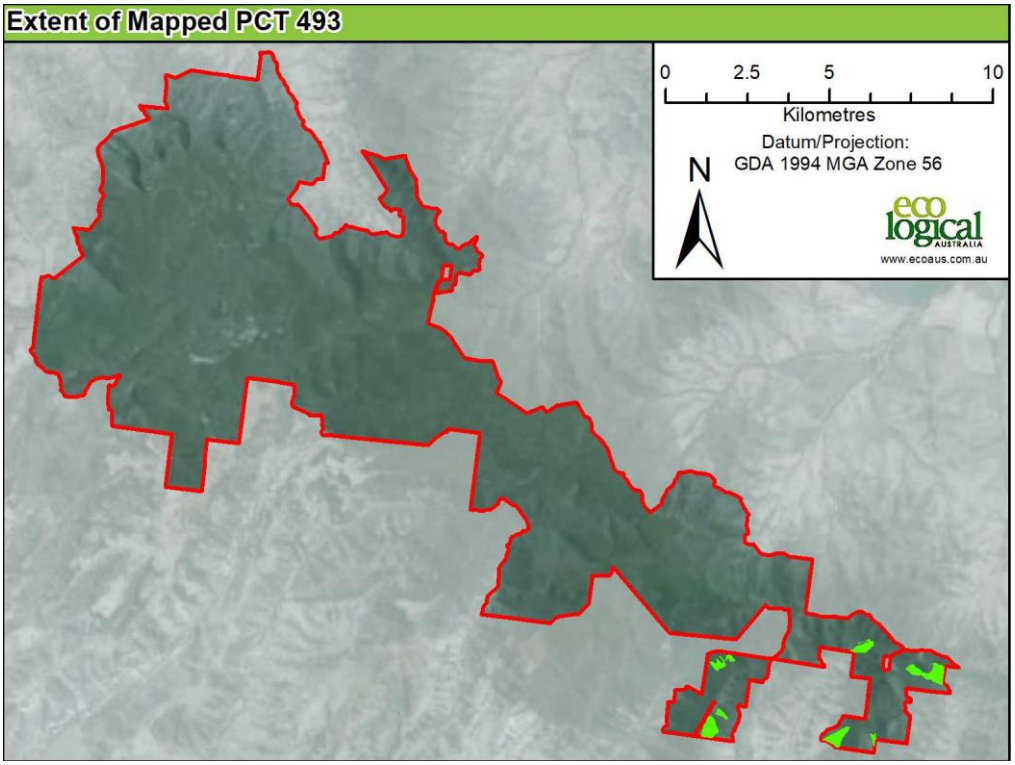
PCT	491 Forest Ribbon Gum - Silvertop Stringybark - Mountain Gum tall open forest on basalt on the Liverpool Range, mainly Brigalow Belt South Bioregion
Associated TEC Names	None
Vegetation Description	Tall to very tall open forest dominated by Forest Ribbon Gum (*Eucalyptus nobilis*) with Silvertop Stringybark (*Eucalyptus laevopinea*) and sometimes Mountain Gum (*Eucalyptus dalrympleana*) or Snow Gum (*Eucalyptus pauciflora*). The shrub layer is sparse and includes *Bursaria spinulosa, Hibbertia obtusifolia, Rubus parvifolius, Melicytus dentatus* and *Lomatia arborescens*. The ground cover mid-dense and dominated by grasses such as *Poa sieberiana, Echinopogon ovatus, Microlaena stipoides*. The mat-rush *Lomandra longifolia* or *Lomandra multiflora* is often present along with Bracken Fern (*Pteridium esculentum*). Forb species include *Hydrocotyle laxiflora, Acaena novae-zelandiae, Asperula conferta, Dichondra repens* and *Ranunculus lappaceus*. The scramblers *Desmodium varians, Eustrephus latifolius* and *Glycine clandestina* may be present. Occurs on loamy soil derived from basalt on hillslopes, hillcrests and flats.
Fire regime	Subject to low intensity management burning in Coolah Tops National Park. Intense wildfire is rare due to moisture content in the soil, lack of shrubs and cool temperatures with high altitude. Minimum intervals of 10 years with maximums of 40 years or more. Occasional intervals greater than 20 years may be desirable.
Trees	*Acacia dealbata, Acacia melanoxylon, Eucalyptus nobilis, Eucalyptus laevopinea, Eucalyptus dalrympleana, Eucalyptus pauciflora, Eucalyptus stellulata*
Shrubs	*Bursaria spinosa, Exocarpos cupressiformis, Daviesia genistifolia*, *Hibbertia obtusifolia*, *Leucopogon juniperinus*, *Lomatia arborescens, Olearia alpicola*, *Rubus parvifolius*, *Solanum aviculare*
Grasses, forbs, ferns and others	*Pteridium esculentum, Acaena novae-zelandiae, Arthropodium milleflorum, Asperula conferta, Brachyscome microcarpa, Cardamine paucijuga, Crassula sieberiana, Dichondra repens, Epilobium billardierianum* subsp. *cinereum, Euchiton japonicus, Hydrocotyle laxiflora, Oxalis chnoodes, Picris angustifolia, Ranunculus lappaceus, Viola betonicifolia, Wahlenbergia stricta* subsp. *stricta, Carex breviculmis, Echinopogon ovatus, Lomandra longifolia, Luzula flaccida, Microlaena stipoides* var. *stipoides, Poa labillardierei* var. *labillardierei, Rytidosperma laeve, Desmodium varians, Eustrephus latifolius, Glycine clandestina*
Height Class	7 - Range:12.01-20.00m (Tall)
Sites Sampled	3

PCT	492 Silvertop Stringybark - Yellow Box - Apple Box - Rough-barked Apple shrub grass open forest mainly on southern slopes of the Liverpool Range, Brigalow Belt South Bioregion



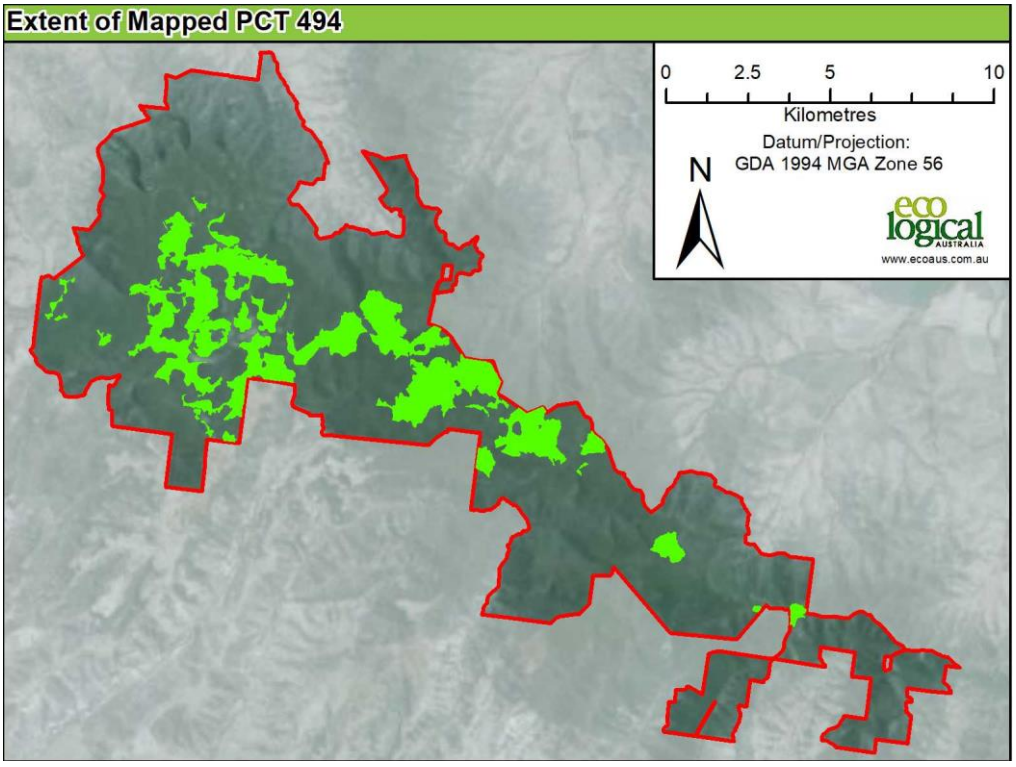
Vegetation Formation	Grassy Woodlands
Vegetation Class	New England Grassy Woodlands

PCT	492 Silvertop Stringybark - Yellow Box - Apple Box - Rough-barked Apple shrub grass open forest mainly on southern slopes of the Liverpool Range, Brigalow Belt South Bioregion
Associated TEC Names	None
Vegetation Description	Tall or mid-high open forest dominated by Silvertop Stringybark (*Eucalyptus laevopinea*), Yellow Box (*Eucalyptus melliodora*), Apple Box (*Eucalyptus bridgesiana*) and Rough-barked Apple (*Angophora floribunda*). The shrub layer is mid-dense where grazing is light or sparse in areas heavily grazed. Shrub species include *Hibbertia obtusifolia, Olearia elliptica, Bursaria spinosa* and *Cassinia quinquefaria*. Vines and scramblers include *Glycine clandestine, Eustrephus latifolius, Desmodium varians, Hardenbergia violacea* and *Clematis glycinoides*. The ground cover is sparse with grass species including *Poa sieberiana, Echinopogon ovatus, Lepidosperma laterale, Rytidosperma racemosum, Microlaena stipoides, Dichelachne micrantha* and the mat rush *Lomandra longifolia*. –Forb species include *Hydrocotyle laxiflora, Veronica calycina, Dichondra repens, Swainsona galegifolia, Viola betonicifolia, Asperula conferta, Acaena novae-zelandiae* and *Plantago debilis*. The scramblers *Glycine clandestine*, *Eustrephus latifolius* and *Desmodium varians* may be common. Occurs on loam to clay-loam soils derived from basalt mainly on the steep southern slopes.
Fire regime	The abundance of shrub species suggests this forest is not frequently burnt and may burn with occasional wildfires every few decades. Minimum intervals of 10 years with maximums of 40 years or more. Occasional intervals greater than 20 years may be desirable.. However, the long absence of fire may explain an apparent increase of Pittosporum undulatum in some localities.
Trees	*Acacia melanoxylon, Eucalyptus bridgesiana, Eucalyptus melliodora, Angophora floribunda, Eucalyptus laevopinea*
Shrubs	*Cassinia laevis, Cassinia quinquefaria, Melichrus urceolatus, Bursaria spinosa, Hibbertia obtusifolia, Olearia elliptica, Rubus parvifolius*
Grasses, forbs, ferns and others	*Pellaea falcata, Adiantum aethiopicum, Pteridium esculentum, Ajuga australis, Acaena novae-zelandiae, Arthropodium milleflorum, Asperula conferta, Dichondra repens, Hydrocotyle laxiflora, Picris angustifolia, Plantago debilis, Sigesbeckia orientalis* subsp. *orientalis, Swainsona galegifolia, Veronica calycina, Viola betonicifolia, Euchiton involucratus, Galium migrans, Geranium solanderi, Hypericum gramineum, Mentha diemenica, Ranunculus lappaceus, Rumex brownii, Senecio quadridentatus, Sigesbeckia australiensis, Urtica incisa, Echinopogon caespitosus, Dichelachne micrantha, Echinopogon ovatus, Lepidosperma laterale, Lomandra longifolia, Microlaena stipoides, Poa sieberiana, Lomandra multiflora* subsp. *multiflora, Microlaena stipoides* var. *stipoides, Poa labillardierei* var. *labillardierei, Rytidosperma racemosum* var. *racemosum, Hardenbergia violacea, Clematis aristata, Desmodium varians, Eustrephus latifolius, Glycine clandestina*
Height Class	7 - Range:12.01-20.00m (Tall)
Sites Sampled	23

PCT	493 Forest Oak - Rough-barked Apple - Silvertop Stringybark shrub grass open forest on protected slopes of the Liverpool Range
(Photo)	
	
Vegetation Formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation Class	New England Dry Sclerophyll Forests

PCT	493 Forest Oak - Rough-barked Apple - Silvertop Stringybark shrub grass open forest on protected slopes of the Liverpool Range
Associated TEC Names	None
Vegetation Description	Mid-high to tall open forest dominated by Forest Oak (*Allocasuarina torulosa*) with Silvertop Stringybark (*Eucalyptus laevopinea*) and Rough-barked Apple (*Angophora floribunda*). The shrub layer is sparse and includes shrubs such as *Cassinia* spp., *Melicytus dentatus*, *Olearia* spp., *Solanum aviculare*. The ground cover is mid-dense and includes *Adiantum aethiopicum, Acaena novae-zelandiae, Dichondra repens, Galium gaudichaudii, Geranium solanderi* var. *solanderi, Hydrocotyle laxiflora, Plectranthus parviflorus, Rumex* spp., *Senecio quadridentatus, Sigesbeckia orientalis* subsp. *orientalis, Solanum prinophyllum, Swainsona galegifolia, Veronica plebeian, Echinopogon caespitosus, Echinopogon* spp., *Microlaena stipoides, Oplismenus imbecillis, Poa sieberiana, Clematis aristate, Eustrephus latifolius, Glycine spp.* Occurs on clayey soils derived from basalt substrates on protected hillslopes or in gullies.
Fire regime	Occasionally burnt by wildfire. Minimum intervals of more than 5 years with maximums of 50 years or more. Occasional intervals greater than 25 years may be desirable.
Trees	*Allocasuarina torulosa, Angophora floribunda, Eucalyptus laevopinea*
Shrubs	*Cassinia* spp., *Melicytus dentatus*, *Olearia* spp., *Solanum aviculare*
Grasses, forbs, ferns and others	*Adiantum aethiopicum, Acaena novae-zelandiae, Dichondra repens, Galium gaudichaudii, Geranium solanderi* var. *solanderi, Hydrocotyle laxiflora, Plectranthus parviflorus, Rumex* spp., *Senecio quadridentatus, Sigesbeckia orientalis* subsp. *orientalis, Solanum prinophyllum, Swainsona galegifolia, Veronica plebeian, Echinopogon caespitosus, Echinopogon* spp., *Microlaena stipoides, Oplismenus imbecillis, Poa sieberiana, Clematis aristate, Eustrephus latifolius, Glycine spp.*
Height Class	6 - Range:6.01-12.00m (Mid-high)
Sites Sampled	1

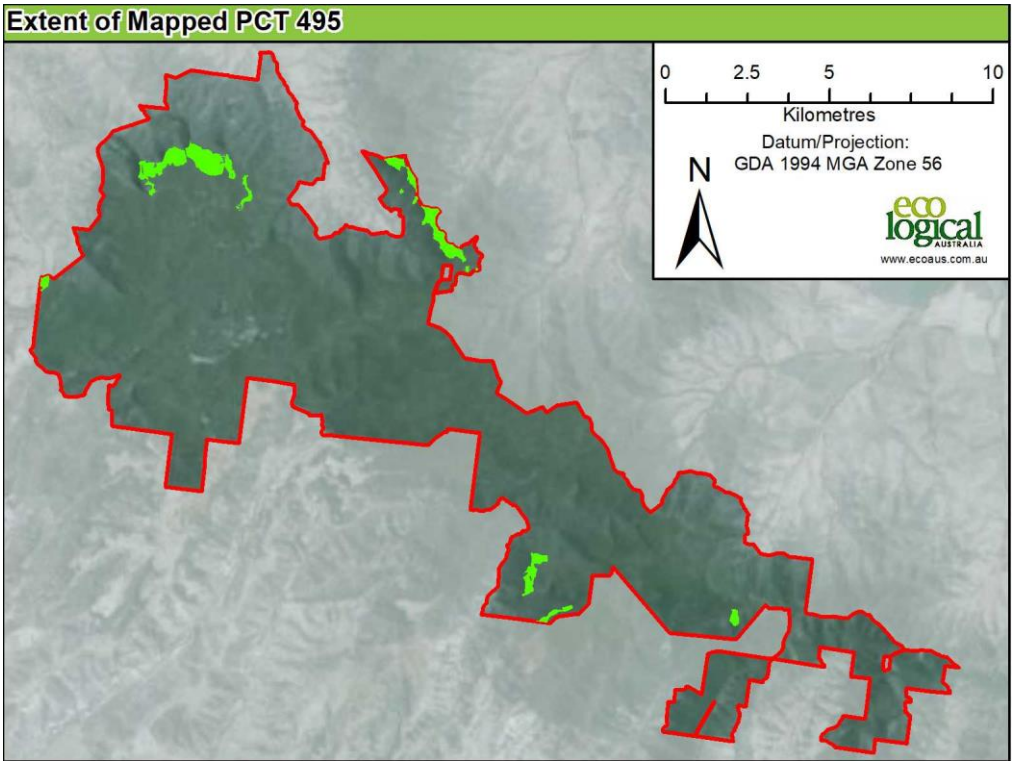
PCT	494 Snow Gum - Mountain Gum - Silver Wattle tall open forest of the Liverpool Range, Brigalow Belt South Bioregion



Vegetation Formation	Grassy Woodlands
Vegetation Class	New England Grassy Woodlands

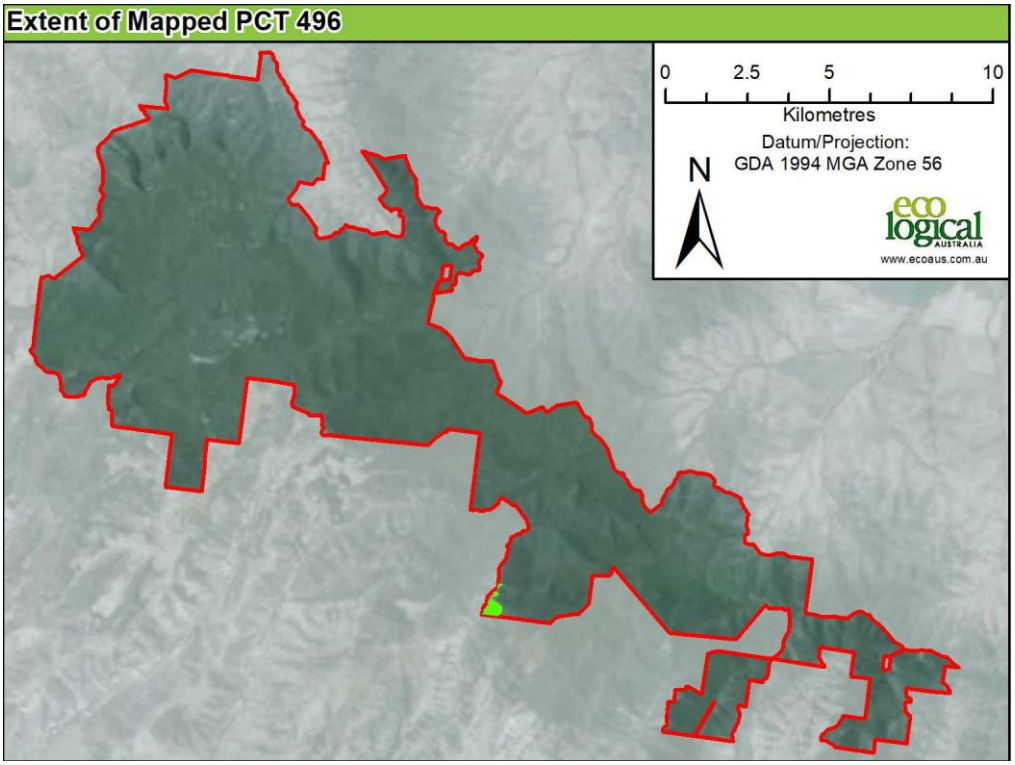
PCT	494 Snow Gum - Mountain Gum - Silver Wattle tall open forest of the Liverpool Range, Brigalow Belt South Bioregion
Associated TEC Names	None
Vegetation Description	Tall open forest dominated by Snow Gum (*Eucalyptus pauciflora*) often with Black Sallee (*Eucalyptus stellulata*), Mountain Ribbon Gum (*Eucalyptus nobilis*) and Mountain Gum (*Eucalyptus dalrympleana*). The tallest recorded Snow Gum in Australia occurs in Coolah Tops National Park in this community. The shrub layer is sparse to very sparse with the most common shrub usually Silver Wattle (*Acacia dealbata*). Other shrubs include *Hibbertia obtusifolia, Lomatia arborescens, Daviesia ulicifolia, Exocarpus cupressiformis, Leucopogon lanceolatus* and occasionally groves of tall grasstrees *Xanthorrhoea glauca* subsp. *glauca*. These grasstrees are some of the tallest in Australia and form their own community on scree slopes on the Liverpool Range. The ground cover is dense with grass species including P*oa labillardierei, Poa sieberiana, Echinopogon ovatus* and *Microlaena stipoides*. Forb species include *Ajuga australis, Asperula conferta, Brachyscome macrocarpa, Dichondra repens, Hydrocotyle laxiflora, Ranunculus lappaceus and Wahlenbergia stricta* subsp. *stricta*. Occurs on black to dark brown loamy to clayey soils derived from basalt on hillcrests, hillslopes and flats. Restricted to the highest altitudes.
Fire regime	Subject to low intensity management burning in Coolah Tops National Park. Intense wildfire is rare due to moisture content in soils and altitude. Minimum intervals of 10 years with maximums of 40 years or more. Occasional intervals greater than 20 years may be desirable.
Trees	*Acacia dealbata, Eucalyptus nobilis, Eucalyptus pauciflora, Eucalyptus stellulata, Eucalyptus dalrympleana*
Shrubs	*Bursaria spinulosa, Daviesia ulicifolia, Exocarpos cupressiformis, Hibbertia obtusifolia, Leucopogon lanceolatus, Lomatia arborescens, Pimelea micrantha, Rubus parvifolius*
Grasses, forbs, ferns and others	*Pteridium esculentum, Acaena novae-zelandiae, Ajuga australis, Arthropodium milleflorum, Asperula conferta, Brachyscome macrocarpa, Dichondra repens, Epilobium billardierianum subsp. cinereum, Gonocarpus tetragynus, Hydrocotyle laxiflora, Hypericum gramineum, Ranunculus lappaceus, Senecio diaschides, Veronica calycina, Viola betonicifolia, Wahlenbergia stricta, Wahlenbergia stricta* subsp. *stricta, Carex breviculmis, Echinopogon ovatus, Lomandra longifolia, Luzula flaccida, Microlaena stipoides* var. *stipoides, Poa sieberiana, Rytidosperma leave, Desmodium varians, Glycine clandestina.*
Height Class	7 - Range:12.01-20.00m (Tall)
Sites Sampled	11

PCT	495 Brittle Gum - Silvertop Stringybark grassy open forest of the Liverpool Range, Brigalow Belt South Bioregion



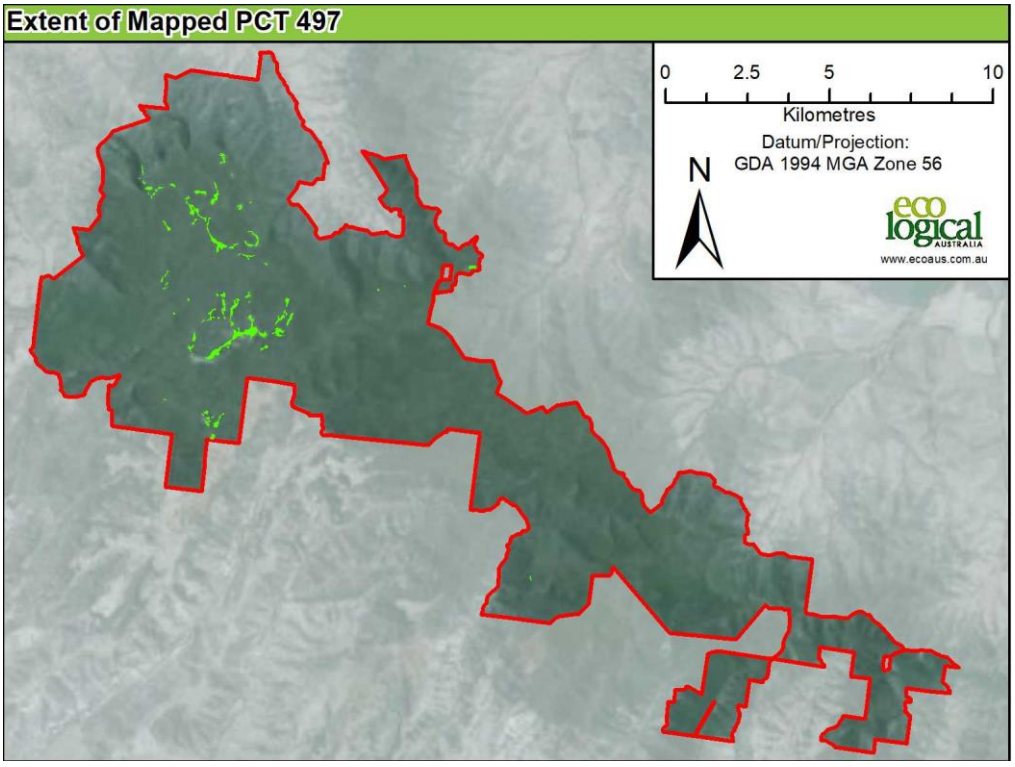
Vegetation Formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation Class	New England Dry Sclerophyll Forests

PCT	495 Brittle Gum - Silvertop Stringybark grassy open forest of the Liverpool Range, Brigalow Belt South Bioregion
Associated TEC Names	None
Vegetation Description	Mid-high to tall open forest dominated by Brittle Gum (*Eucalyptus praecox*) and Silvertop Stringybark (*Eucalyptus laevopinea*). The shrub layer is very sparse and includes Hibbertia obtusifolia, *Acrotriche serrulate, Bursaria spinosa, Cassinia quinquefaria, Hibbertia obtusifolia, Olearia elliptica*. The ground cover is sparse and contains grasses such *Dichelachne micrantha, Echinopogon ovatus, Microlaena stipoides* var. *stipoides, Rytidosperma leave* and *Rytidosperma racemosum* var. *racemosum.* The mat-rushes Lomandra longifolia and Lomandra filiformis are usually present. Forbs include *Acaena novae-zelandiae, Ajuga australis, Asperula conferta, Brachyscome macrocarpa, Dichondra repens, Epilobium billardierianum subsp. cinereum, Euchiton japonicus, Geranium solanderi, Gonocarpus tetragynus, Hydrocotyle laxiflora, Hypericum gramineum, Poranthera microphylla, Ranunculus lappaceus, Veronica calycina, Viola betonicifolia* and *Wahlenbergia stricta* subsp*. stricta.* Occurs on dark brown clay to loam soil on basalt hillcrests and upper steep hillslopes.
Fire regime	Subject to low intensity management burning in Coolah Tops National Park. Intense wildfire is rare due to moisture content in soils and altitude. Minimum intervals of more than 5 years with maximums of 50 years or more. Occasional intervals greater than 25 years may be desirable.
Trees	*Acacia melanoxylon, Eucalyptus laevopinea, Eucalyptus praecox*
Shrubs	*Acrotriche serrulate, Bursaria spinosa, Cassinia quinquefaria, Hibbertia obtusifolia, Olearia elliptica*
Grasses, forbs, ferns and others	*Acaena novae-zelandiae, Ajuga australis, Asperula conferta, Brachyscome macrocarpa, Dichondra repens, Epilobium billardierianum subsp. cinereum, Euchiton japonicus, Geranium solanderi, Gonocarpus tetragynus, Hydrocotyle laxiflora, Hypericum gramineum, Poranthera microphylla, Ranunculus lappaceus, Veronica calycina, Viola betonicifolia, Wahlenbergia stricta* subsp*. stricta, Dichelachne micrantha, Echinopogon ovatus, Lomandra filiformis, Lomandra longifolia, Luzula flaccida, Microlaena stipoides* var*. stipoides, Rytidosperma leave, Rytidosperma racemosum* var*. racemosum, Desmodium varians, Eustrephus latifolius*
Height Class	6 - Range:6.01-12.00m (Mid-high)
Sites Sampled	3

PCT	496 Yellow Box - White Box - Silvertop Stringybark - Blakely's Red Gum grass shrub woodland mainly on the Liverpool Range, Brigalow Belt South Bioregion
(Photo)	
	
Vegetation Formation	Grassy Woodlands
Vegetation Class	New England Grassy Woodlands

PCT	496 Yellow Box - White Box - Silvertop Stringybark - Blakely's Red Gum grass shrub woodland mainly on the Liverpool Range, Brigalow Belt South Bioregion
Associated TEC Names	White Box Yellow Box Blakely's Red Gum Woodland
Vegetation Description	Mid-high to tall woodland dominated by Silvertop Stringybark (*Eucalyptus laevopinea*) and Yellow Box (*Eucalyptus melliodora*). The shrub layer is mid-dense and includes *Cassinia laevis, Bursaria spinosa, Hibbertia obtusifolia and Olearia elliptica* subsp*. elliptica*. The ground cover is mid-dense with grass species including *Echinopogon caespitosus, Poa sieberiana, Rytidosperma penicillatum, Rytidosperma leave*. The mat-rushes *Lomandra multiflora* and *Lomandra longifolia* may be present. Forbs include *Acaena novae-zelandiae, Asperula conferta, Hydrocotyle laxiflora, Senecio quadridentatus, Dichondra repens, Geranium solanderi and Wahlenbergia stricta*. Occurs on dark brown to black light clay soils mostly derived from basalt.
Fire regime	Rarely burns from wildfire due to fragmentation, grazing and subsequent lack of ground cover. Minimum intervals of 10 years with maximums of 40 years or more. Occasional intervals greater than 20 years may be desirable.
Trees	*Eucalyptus laevopinea, Eucalyptus melliodora, Angophora floribunda*
Shrubs	*Bursaria spinosa, Hibbertia obtusifolia, Cassinia laevis, Olearia elliptica*
Grasses, forbs, ferns and others	*Acaena novae-zelandiae, Asperula conferta, Bothriochloa macra, Brunoniella australis, Carex inversa, Clematis glycinoides, Dichondra repens, Echinopogon caespitosus, Echinopogon ovatus, Einadia trigonos, Galium ciliare, Geranium solanderi, Glycine tabacina, Hydrocotyle laxiflora, Lachnagrostis filiformis, Lomandra filiformis, Mentha diemenica, Microlaena stipoides, Oxalis perennans, Phyllanthus virgatus, Pimelea curviflora var. sericea, Plantago debilis, Poa labillardierei var. labillardierei, Poa sieberiana, Rumex brownie, Rytidosperma leave, Rytidosperma penicillatum, Senecio diaschides, Senecio quadridentatus, Sigesbeckia orientalis subsp. orientalis, Swainsona galegifolia, Urtica incisa, Wahlenbergia stricta*
Height Class	6 - Range:6.01-12.00m (Mid-high)
Sites Sampled	1

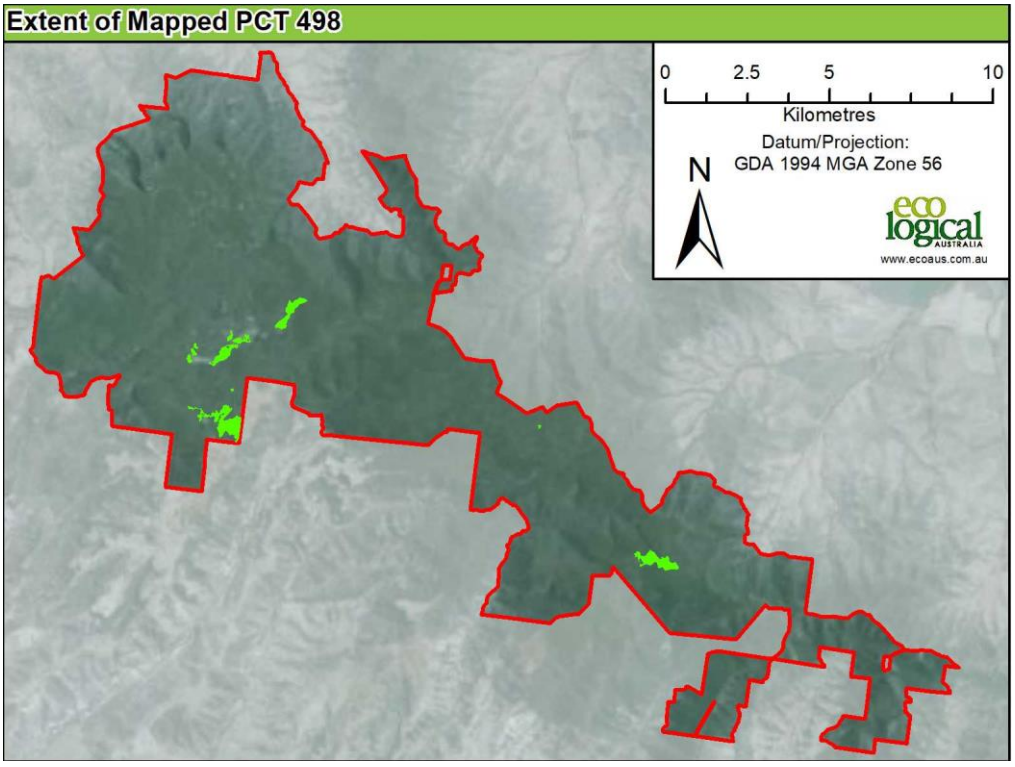
PCT	497 Tea tree shrubland / sedgeland / forbland swamp wetland on the Liverpool Range, mainly Brigalow Belt South Bioregion



Vegetation Formation	Freshwater Wetlands
Vegetation Class	Montane Bogs and Fens

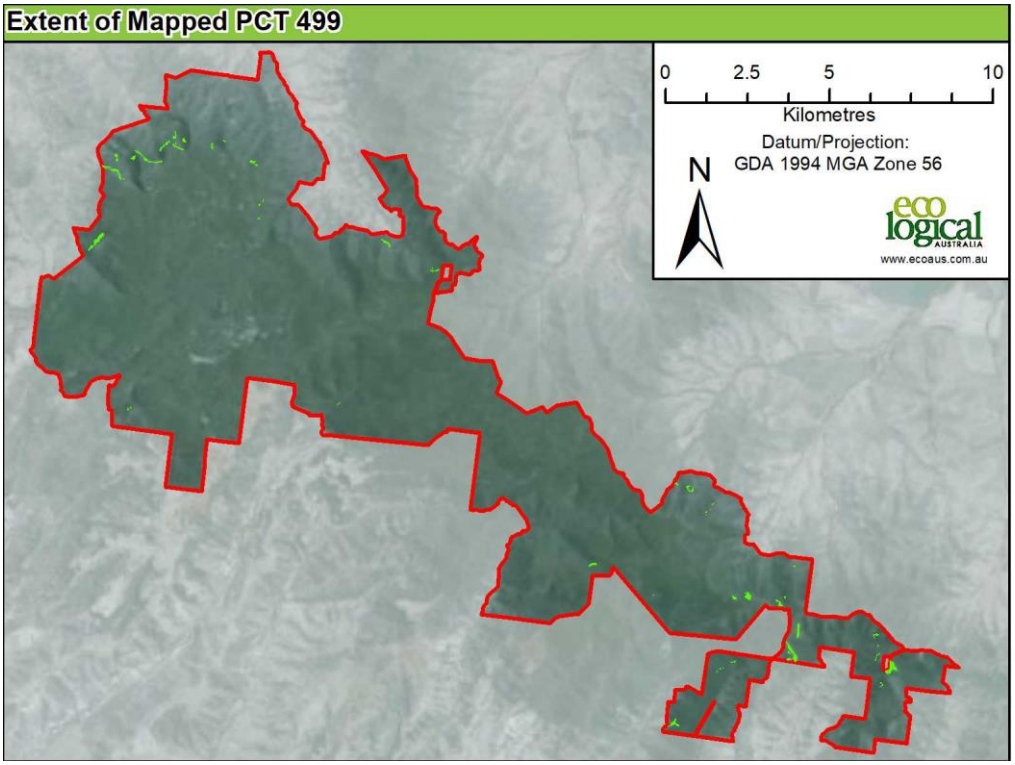
PCT	497 Tea tree shrubland / sedgeland / forbland swamp wetland on the Liverpool Range, mainly Brigalow Belt South Bioregion
Associated TEC Names	None, likely threatened and should be included in the *Upland Wetlands of the Drainage Divide of the New England Tableland Bioregion* TEC listing under the BC Act.
Vegetation Description	Tall shrubland over a low forbland or sedgeland wetland. Occasional trees include Mountain Gum (*Eucalyptus dalrympleana*) and Black Sallee (*Eucalyptus stellulata*). The main shrub species are *Leptospermum gregarium, Leptospermum polygalifolium* and *Hakea microcarpa*. The ground cover is dense and contains *Epilobium hirtigerum, Euchiton japonicus, Haloragis heterophylla, Hydrocotyle sibthorpioides, Hypericum japonicum, Isotoma fluviatilis subsp. borealis, Myriophyllum pedunculatum, Spiranthes australis, Stellaria angustifolia, Cyperus sanguinolentus, Cyperus sphaeroideus, Eleocharis dietrichiana, Juncus fockei* and *Schoenus apogon*. Occurs on organic clay loam peaty soils built up in swamps over basalt substrate in drainage depressions, soaks or impeded valley creeks.
Fire regime	Rarely burns due to the moisture content of the soil and swampy conditions. Minimum intervals of more than 6 years with maximums of 35 years or more. Occasional intervals greater than 30 years may be desirable. Despite the fire intervals, this community is not likely to require fire for management.
Trees	*Eucalyptus dalrympleana, Eucalyptus stellulata*
Shrubs	*Hakea microcarpa, Leptospermum gregarium, Leptospermum polygalifolium*
Grasses, forbs, ferns and others	*Epilobium hirtigerum, Euchiton japonicus, Haloragis heterophylla, Hydrocotyle sibthorpioides, Hypericum japonicum, Isotoma fluviatilis subsp. borealis, Myriophyllum pedunculatum, Spiranthes australis, Stellaria angustifolia, Cyperus sanguinolentus, Cyperus sphaeroideus, Eleocharis dietrichiana, Juncus fockei* and *Schoenus apogon.*
Height Class	2 - Range:0.26-0.50m (Low),4 - Range:1.01-3.00m (Tall)
Sites Sampled	2

PCT	498 Black Sallee plateau low woodland in the southern Brigalow Belt South Bioregion



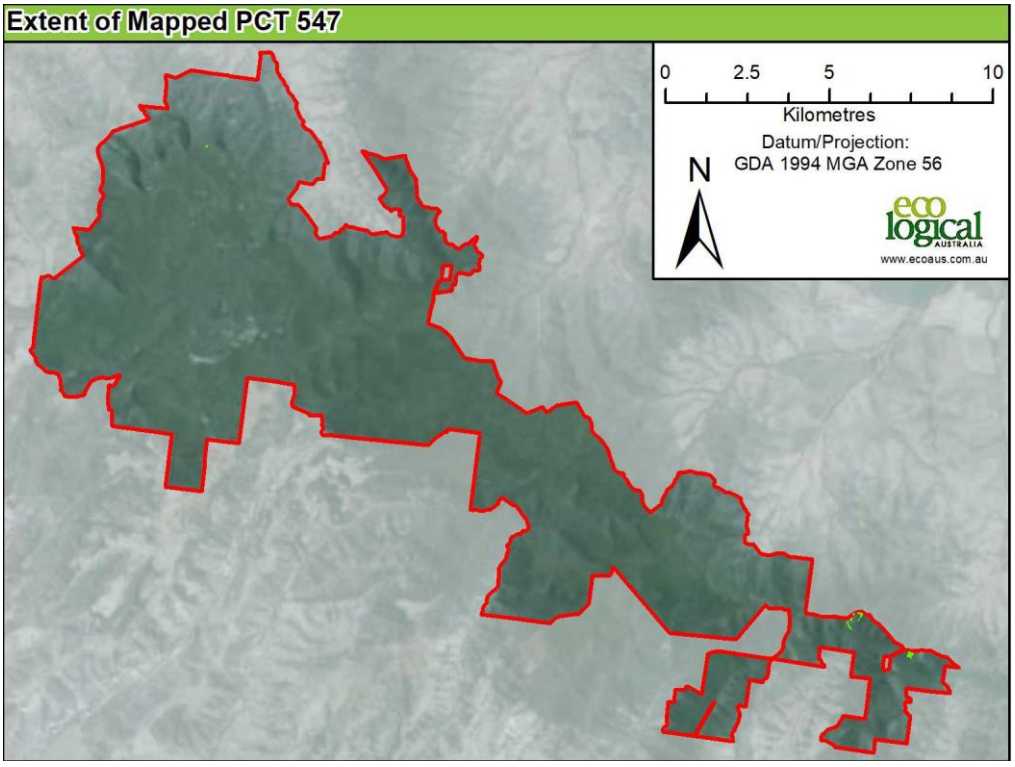
Vegetation Formation	Grassy Woodlands
Vegetation Class	New England Grassy Woodlands
Associated TEC Names	None

PCT	498 Black Sallee plateau low woodland in the southern Brigalow Belt South Bioregion
Vegetation Description	Low to mid-high woodland dominated by Black Sallee (*Eucalyptus stellulata*) sometimes with taller trees of Mountain Gum (*Eucalyptus dalrympleana*), Snow Gum (*Eucalyptus pauciflora*), Ribbon Gum (*Eucalyptus nobilis*) or Silvertop Stringybark (*Eucalyptus laevopinea*). The shrub layer is very sparse and includes Acacia dealbata, *Hakea macrocarpa* and *Leptospermum polygalifolium.* The ground cover is dense and dominated by grasses and forbs. Grasses include *Poa sieberiana* and *Rytidosperma penicillatum.* Forb species include *Acaena novae-zelandiae, Dichondra repens, Hydrocotyle sibthorpioides, Epilobium billardierianum, Isotoma fluviatilis* and *Mentha diemenica*. Occurs on organic loamy clay soils or peaty soils on the edges of swamps or valleys on high plateaux generally above 1000 m altitude.
Fire regime	Rarely burns. Minimum intervals of 10 years with maximums of 40 years or more. Occasional intervals greater than 20 years may be desirable.
Trees	*Acacia dealbata, Eucalyptus stellulata*
Shrubs	*Hakea macrocarpa, Leptospermum polygalifolium, Rubus parvifolius*
Grasses, forbs, ferns and others	*Acaena novae-zelandiae, Dichondra repens, Hydrocotyle sibthorpioides, Epilobium billardierianum, Isotoma fluviatilis, Mentha diemenica, Cyperus sphaeroideus, Eleocharis gracilis, Poa sieberiana, Rytidosperma penicillatum*
Height Class	5 - Range:3.01-6.00m (Low)
Sites Sampled	1

PCT	499 Tree Violet - cough bush basalt scree slopes shrubland of the Liverpool Range - Wollemi region, Brigalow Belt South Bioregion and Sydney Basin Bioregion
(Photo)	
	
Vegetation Formation	Heathlands
Vegetation Class	Northern Montane Heaths

PCT	499 Tree Violet - cough bush basalt scree slopes shrubland of the Liverpool Range - Wollemi region, Brigalow Belt South Bioregion and Sydney Basin Bioregion
Associated TEC Names	None
Vegetation Description	Tall open shrubland dominated by Tree Violet (*Melicytus dentatus*) with other shrubs including *Cassinia* spp., *Lomatia arborescens*, *Olearia elliptica, Notelaea microcarpa*. Overtopping trees include *Eucalyptus laevopinea, Eucalyptus dalrympleana* and *Eucalyptus nobilis*. The ground cover is very sparse and dominated by rock scree. Plant species include the snow grass *Poa sieberiana* and ferns such as *Pteridium esculentum.* Occurs skeletal or shallow brown loam soils on basalt scree on steep upper hillslopes in mountain landscapes of the Liverpool Range.
Fire regime	Rarely burns due to rocky ground. Minimum intervals of more than 7 years with maximums of 30 years or more. Occasional intervals greater than 20 years may be desirable. Despite the fire intervals, this community is not likely to require fire for management.
Trees	*Eucalyptus laevopinea, Eucalyptus dalrympleana* and *Eucalyptus nobilis*
Shrubs	*Melicytus dentatus*, *Cassinia* spp., *Lomatia arborescens*, *Olearia elliptica, Notelaea microcarpa*
Grasses, forbs, ferns and others	*Poa sieberiana*, *Pteridium esculentum*
Height Class	4 - Range:1.01-3.00m (Tall)
Sites Sampled	1

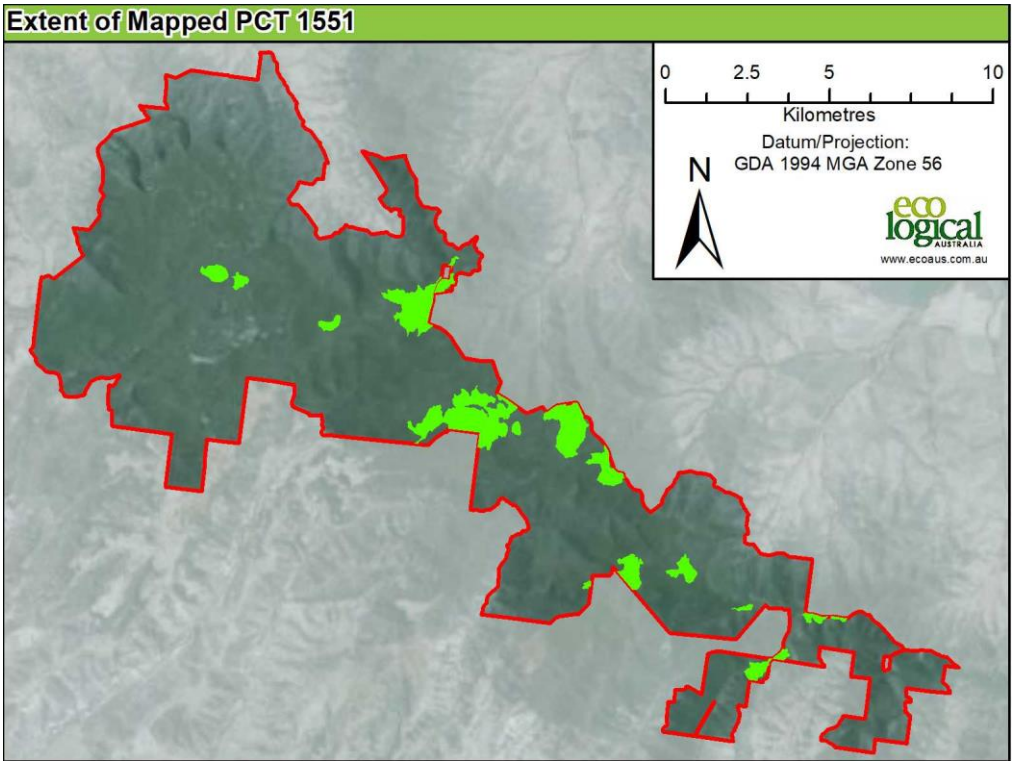
PCT	547 Wild Quince - Mock Olive - Rusty Fig - Iamboto - Sweet Pittosporum dry rainforest of rocky and scree areas of the Nandewar Bioregion and New England Tableland Bioregion



Vegetation Formation	Rainforests
Vegetation Class	Dry Rainforests

PCT	547 Wild Quince - Mock Olive - Rusty Fig - Iamboto - Sweet Pittosporum dry rainforest of rocky and scree areas of the Nandewar Bioregion and New England Tableland Bioregion
Associated TEC Names	None
Vegetation Description	Low to mid-high closed dry rainforest / vine thicket dominated by small trees and shrubs such as *Bursaria spinulosa, Lomatia arborescens, Melicytus dentatus* and *Acacia melanoxylon.* Emergent tall trees include Ribbon Gum (*Eucalyptus nobilis*). Vines include Smilax austrlis and Eustrephus latifolius. The ground layer is usually mid-dense and includes *Asplenium flabellifolium, Pellaea falcata, Polystichum proliferum, Pteridium esculentum, Australina pusilla, Cardamine paucijuga, Galium migrans, Hydrocotyle laxiflora, Hydrocotyle sibthorpioides, Plantago debilis, Solanum opacum, Urtica incisa, Echinopogon ovatus, Microlaena stipoides var. stipoides, Clematis aristata, Eustrephus latifolius* and *Smilax australis*, but in some places it is mainly covered with mossy rocks. Occurs on skeletal or shallow brown to black clayey loam soils derived from basic igneous parent material on steep rocky sites including in gorges or along creeks in mountain or hill landscapes
Fire regime	Rarely burnt. Would not withstand frequent fire as most of the characteristic rainforest species are not fire-adapted and are killed when burnt. Fire history may partly explain the pre-European distribution of this community. Kenny et al. (2003) recommend that fire should be avoided in all rainforest types.
Trees	*Eucalyptus nobilis*
Shrubs	*Bursaria spinulosa, Lomatia arborescens, Melicytus dentatus*, *Acacia melanoxylon*
Grasses, forbs, ferns and others	*Asplenium flabellifolium, Pellaea falcata, Polystichum proliferum, Pteridium esculentum, Australina pusilla, Cardamine paucijuga, Galium migrans, Hydrocotyle laxiflora, Hydrocotyle sibthorpioides, Plantago debilis, Solanum opacum, Urtica incisa, Echinopogon ovatus, Microlaena stipoides var. stipoides, Clematis aristata, Eustrephus latifolius*, *Smilax australis*
Height Class	5 - Range:3.01-6.00m (Low)
Sites Sampled	1

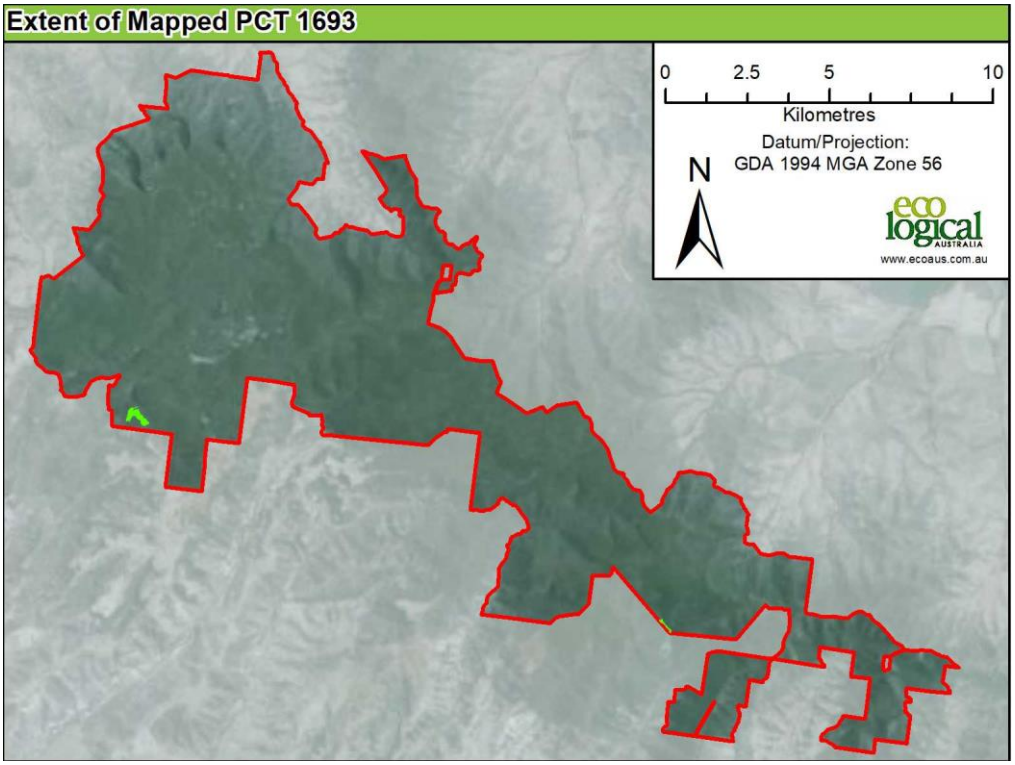
PCT	1551 Forest Ribbon Gum - Snow Gum - Snow Grass grassy open forest of the Liverpool Ranges and New England Tableland



Vegetation Formation	Wet Sclerophyll Forests (Grassy sub-formation)
Vegetation Class	Northern Tableland Wet Sclerophyll Forests

PCT	1551 Forest Ribbon Gum - Snow Gum - Snow Grass grassy open forest of the Liverpool Ranges and New England Tableland
Associated TEC Names	None
Vegetation Description	Open forests to woodlands with a canopy dominated by *Eucalyptus nobilis* with subdominant Snow Gum (*Eucalyptus pauciflora*). A sparse mid-storey of shrubs includes *Acacia dealbata* and *Hibbertia obtusifolia*., Climbers and scramblers are generally present including *Eustrephus latifolius*, *Glycine clandestina* and *Glycine tabacina*. The ground layer is predominately grassy with various graminoids including *Poa sieberiana*, forbs including *Hydrocotyle laxiflora*, *Plantago debilis* and *Dichondra repens*. The ferns *Pteridium esculentum* may be present. Occurs on clay loam – loam soils.
Fire regime	Minimum intervals of more than 10 years with maximums of 50 years or more. Low intensity fire only, avoid crown fires.
Trees	*Eucalyptus nobilis, Eucalyptus pauciflora, Eucalyptus stellulata*
Shrubs	*Acacia dealbata* and *Hibbertia obtusifolia*
Grasses, forbs, ferns and others	*Acaena novae-zelandiae, Ajuga australis, Arthropodium milleflorum, Asperula conferta, Brachyscome microcarpa, Cynoglossum australe, Dichelachne micrantha, Dichondra repens, Echinopogon ovatus, Eustrephus latifolius, Geranium potentilloides, Glycine clandestina, Glycine tabacina, Hydrocotyle laxiflora, Lomandra longifolia, Luzula flaccida, Poa labillardierei* var. *labillardierei, Poa sieberiana, Pteridium esculentum, Pterostylis coccina, Ranunculus lappaceus, Rytidosperma laeve, Rytidosperma racemosum var. racemosum, Senecio diaschides, Stellaria pungens, Swainsona galegifolia, Veronica calycina, Viola betonicifolia, Wahlenbergia stricta* subsp. *stricta*
Height Class	9 - Range:35.01-100.00m (Extremely tall),8 - Range:20.01-35.00m (Very tall),7 - Range:12.01-20.00m (Tall)
Sites Sampled	6

PCT	1693 Yellow Box - Rough-barked Apple grassy woodland of the upper Hunter and Liverpool Plains



Vegetation Formation	Grassy Woodlands
Vegetation Class	Western Slopes Grassy Woodlands
Associated TEC Names	White Box Yellow Box Blakely's Red Gum Woodland (BC Act EEC), White Box-Yellow Box-Blakely's Red Gum Woodland and Derived Native Grassland (EPBC Act CEEC)

PCT	1693 Yellow Box - Rough-barked Apple grassy woodland of the upper Hunter and Liverpool Plains
Vegetation Description	Open Forests to Woodlands with *Eucalyptus melliodora*. No consistent mid-stratum is recorded but may include *Olearia elliptica* and *Rubus parvifolius*. The ground stratum is typically grassy and includes *Acaena echinata, Acaena novae-zelandiae, Asperula conferta, Dichondra repens, Euchiton japonicus, Geranium solanderi, Gonocarpus tetragynus, Hydrocotyle laxiflora, Hypericum gramineum, Mentha diemenica, Ranunculus lappaceus, Swainsona galegifolia, Veronica calycina, Viola betonicifolia, Echinopogon ovatus, Luzula flaccida, Microlaena stipoides var. stipoides, Poa labillardierei var. labillardierei* and *Schoenus apogon*. It is found on a range of bedrocks but is most frequently found on unconsolidated sediments.
Fire regime	Minimum intervals of 10 years with maximums of 40 years or more. Occasional intervals greater than 20 years may be desirable.
Trees	*Eucalyptus melliodora*
Shrubs	*Olearia elliptica* and *Rubus parvifolius*
Grasses, forbs, ferns and others	*Acaena echinata, Acaena novae-zelandiae, Asperula conferta, Dichondra repens, Euchiton japonicus, Geranium solanderi, Gonocarpus tetragynus, Hydrocotyle laxiflora, Hypericum gramineum, Mentha diemenica, Ranunculus lappaceus, Swainsona galegifolia, Veronica calycina, Viola betonicifolia, Echinopogon ovatus, Luzula flaccida, Microlaena stipoides var. stipoides, Poa labillardierei var. labillardierei, Schoenus apogon*
Height Class	8 - Range:20.01-35.00m (Very tall),7 - Range:12.01-20.00m (Tall),6 - Range:6.01-12.00m (Mid-high),5 - Range:3.01-6.00m (Low)
Sites Sampled	1

Appendix D Flora species list

Species	Family	Exotic	Growth Form	ROTAP
Acacia dealbata	Fabaceae (Mimosoideae)		Tree (TG)	
Acacia filicifolia	Fabaceae (Mimosoideae)		Shrub (SG)	
Acacia implexa	Fabaceae (Mimosoideae)		Shrub (SG)	
Acacia melanoxylon	Fabaceae (Mimosoideae)		Tree (TG)	
Acacia neriifolia	Fabaceae (Mimosoideae)		Shrub (SG)	
Acacia paradoxa	Fabaceae (Mimosoideae)		Shrub (SG)	
Acacia salicina	Fabaceae (Mimosoideae)		Tree (TG)	
Acaena echinata	Rosaceae		Forb (FG)	
Acaena novae-zelandiae	Rosaceae		Forb (FG)	
Acaena ovina	Rosaceae		Forb (FG)	
Acianthus fornicatus	Orchidaceae		Forb (FG)	
Acianthus sp.	Orchidaceae		Forb (FG)	
Acrothamnus hookeri	Ericaceae		Shrub (SG)	
Acrotriche serrulata	Ericaceae		Shrub (SG)	
Adiantum aethiopicum	Adiantaceae		Fern (EG)	
Adiantum formosum	Adiantaceae		Fern (EG)	
Agrostis venusta	Poaceae		Grass & grasslike (GG)	
Ajuga australis	Lamiaceae		Forb (FG)	
Allocasuarina torulosa	Casuarinaceae		Tree (TG)	
Ammobium alatum	Asteraceae		Forb (FG)	
Amyema congener subsp. *congener*	Loranthaceae		Other (OG)	
Amyema miquelii	Loranthaceae		Other (OG)	
Amyema pendula	Loranthaceae		Other (OG)	
Amyema sp.	Loranthaceae		Other (OG)	
Anagallis sp.	Primulaceae	*		
Angophora floribunda	Myrtaceae		Tree (TG)	
Anthosachne scabra				
Anthoxanthum odoratum	Poaceae	*		
Arenaria serpyllifolia	Caryophyllaceae	*		
Aristida personata	Poaceae		Grass & grasslike (GG)	
Aristida ramosa	Poaceae		Grass & grasslike (GG)	
Arthropodium milleflorum	Anthericaceae		Forb (FG)	
Arthropodium minus	Anthericaceae		Forb (FG)	
Arthropodium sp. B	Anthericaceae		Forb (FG)	
Arthropodium sp.	Anthericaceae		Forb (FG)	
Asperula conferta	Rubiaceae		Forb (FG)	
Asperula gunnii	Rubiaceae		Forb (FG)	
Asplenium flabellifolium	Aspleniaceae		Fern (EG)	
Asplenium trichomanes	Aspleniaceae		Fern (EG)	
Australina pusilla	Urticaceae		Forb (FG)	

Species	Family	Exotic	Growth Form	ROTAP
Austrostipa aristiglumis	Poaceae		Grass & grasslike (GG)	
Austrostipa rudis	Poaceae		Grass & grasslike (GG)	
Austrostipa rudis subsp. *nervosa*	Poaceae		Grass & grasslike (GG)	
Austrostipa sp.	Poaceae		Grass & grasslike (GG)	
Berula erecta	Apiaceae	*		
Bidens pilosa	Asteraceae	*		
Bidens subalternans	Asteraceae	*		
Billardiera scandens	Pittosporaceae		Other (OG)	
Blechnum minus	Blechnaceae		Fern (EG)	
Blechnum neohollandicum				
Blechnum nudum	Blechnaceae		Fern (EG)	
Blechnum spinulosum				
Bothriochloa macra	Poaceae		Grass & grasslike (GG)	
Botrychium australe	Ophioglossaceae		Fern (EG)	
Brachychiton populneus	Malvaceae		Tree (TG)	
Brachyloma daphnoides	Ericaceae		Shrub (SG)	
Brachyscome dissectifolia	Asteraceae		Forb (FG)	
Brachyscome microcarpa	Asteraceae		Forb (FG)	
Brachyscome procumbens	Asteraceae		Forb (FG)	
Brachyscome stuartii	Asteraceae		Forb (FG)	
Bromus racemosus	Poaceae	*		
Bromus sp.	Poaceae	*	Grass & grasslike (GG)	
Brunoniella australis	Acanthaceae		Forb (FG)	
Bulbine bulbosa	Asphodelaceae		Forb (FG)	
Bulbostylis densa	Cyperaceae		Grass & grasslike (GG)	
Bursaria spinosa	Pittosporaceae		Shrub (SG)	
Bursaria spinosa subsp. *spinosa*	Pittosporaceae		Shrub (SG)	
Caesia calliantha	Anthericaceae		Forb (FG)	
Callistemon pallidus	Myrtaceae		Shrub (SG)	
Callistemon sieberi	Myrtaceae		Shrub (SG)	
Callitris endlicheri	Cupressaceae		Tree (TG)	
Calochilus sp.	Orchidaceae		Forb (FG)	
Calochlaena dubia	Dicksoniaceae		Other (OG)	
Cardamine astoniae	Brassicaceae		Forb (FG)	
Cardamine paucijuga	Brassicaceae		Forb (FG)	
Carex appressa	Cyperaceae		Grass & grasslike (GG)	
Carex breviculmis	Cyperaceae		Grass & grasslike (GG)	
Carex chlorantha	Cyperaceae		Grass & grasslike (GG)	

Species	Family	Exotic	Growth Form	ROTAP
Carex declinata	Cyperaceae		Grass & grasslike (GG)	
Carex fascicularis	Cyperaceae		Grass & grasslike (GG)	
Carex incomitata	Cyperaceae		Grass & grasslike (GG)	
Carex inversa	Cyperaceae		Grass & grasslike (GG)	
Carex sp.	Cyperaceae		Grass & grasslike (GG)	
Cassia sp.	Fabaceae (Caesalpinioideae)		Tree (TG)	
Cassinia compacta	Asteraceae		Shrub (SG)	
Cassinia laevis	Asteraceae		Shrub (SG)	
Cassinia quinquefaria	Asteraceae		Shrub (SG)	
Cassinia sp.	Asteraceae		Shrub (SG)	
Casuarina cunninghamiana subsp. *cunninghamiana*	Casuarinaceae		Tree (TG)	
Centaurium erythraea	Gentianaceae	*		
Cerastium balearicum	Caryophyllaceae	*		
Cerastium vulgare	Caryophyllaceae	*		
Cheilanthes distans	Pteridaceae		Fern (EG)	
Cheilanthes sieberi	Pteridaceae		Fern (EG)	
Cheilanthes sieberi subsp. *sieberi*	Pteridaceae		Fern (EG)	
Cheilanthes sp.	Pteridaceae		Fern (EG)	
Chenopodium album	Chenopodiaceae	*		
Chiloglottis sp.	Orchidaceae		Forb (FG)	
Chiloglottis trilabra	Orchidaceae		Forb (FG)	
Chrysocephalum apiculatum	Asteraceae		Forb (FG)	
Cirsium vulgare	Asteraceae	*		
Clematis aristata	Ranunculaceae		Other (OG)	
Clematis glycinoides	Ranunculaceae		Other (OG)	
Clematis microphylla	Ranunculaceae		Other (OG)	
Conium maculatum	Apiaceae	*		
Convolvulus erubescens	Convolvulaceae		Other (OG)	
Conyza bonariensis	Asteraceae	*		
Conyza sp.	Asteraceae	*		
Conyza sumatrensis	Asteraceae	*		
Coprosma quadrifida	Rubiaceae		Shrub (SG)	
Correa reflexa var. *reflexa*	Rutaceae		Shrub (SG)	
Corybas fimbriatus	Orchidaceae		Forb (FG)	
Crassula peduncularis	Crassulaceae		Forb (FG)	
Crassula sieberiana	Crassulaceae		Forb (FG)	
Cymbonotus lawsonianus	Asteraceae		Forb (FG)	
Cymbonotus preissianus	Asteraceae		Forb (FG)	
Cymbonotus sp.	Asteraceae		Forb (FG)	

Species	Family	Exotic	Growth Form	ROTAP
Cymbopogon refractus	Poaceae		Grass & grasslike (GG)	
Cynodon dactylon	Poaceae		Grass & grasslike (GG)	
Cynoglossum australe	Boraginaceae		Forb (FG)	
Cyperus brevifolius	Cyperaceae	*		
Cyperus lhotskyanus	Cyperaceae		Grass & grasslike (GG)	
Cyperus lucidus	Cyperaceae		Grass & grasslike (GG)	
Species	Family	Exotic	Growth Form	
Cyperus sanguinolentus	Cyperaceae		Grass & grasslike (GG)	
Cyperus sphaeroideus	Cyperaceae		Grass & grasslike (GG)	
Dactylis glomerata	Poaceae	*		
Daucus glochidiatus	Apiaceae		Forb (FG)	
Daviesia genistifolia	Fabaceae (Faboideae)		Shrub (SG)	
Daviesia ulicifolia	Fabaceae (Faboideae)		Shrub (SG)	
Dawsonia polytrichoides	Dawsoniaceae			
Desmodium brachypodum	Fabaceae (Faboideae)		Forb (FG)	
Desmodium gunnii	Fabaceae (Faboideae)		Forb (FG)	
Desmodium varians	Fabaceae (Faboideae)		Other (OG)	
Dianella caerulea	Phormiaceae		Forb (FG)	
Dianella longifolia	Phormiaceae		Forb (FG)	
Dianella revoluta	Phormiaceae		Forb (FG)	
Dianella sp.	Phormiaceae		Forb (FG)	
Dichelachne crinita	Poaceae		Grass & grasslike (GG)	
Dichelachne inaequiglumis	Poaceae		Grass & grasslike (GG)	
Dichelachne micrantha	Poaceae		Grass & grasslike (GG)	
Dichelachne rara	Poaceae		Grass & grasslike (GG)	
Dichondra repens	Convolvulaceae		Forb (FG)	
Dichondra sp. *A*	Convolvulaceae		Forb (FG)	
Dichopogon sp.	Anthericaceae		Forb (FG)	
Dipodium roseum	Orchidaceae		Forb (FG)	
Dipodium sp.	Orchidaceae		Forb (FG)	
Discaria pubescens	Rhamnaceae		Shrub (SG)	3RCa
Dodonaea viscosa subsp. *angustissima*	Sapindaceae		Shrub (SG)	
Drosera peltata	Droseraceae		Forb (FG)	
Dysphania pumilio	Chenopodiaceae		Forb (FG)	
Echinopogon caespitosus	Poaceae		Grass & grasslike (GG)	
Echinopogon ovatus	Poaceae		Grass & grasslike (GG)	

Species	Family	Exotic	Growth Form	ROTAP
Echinopogon sp.	Poaceae		Grass & grasslike (GG)	
Einadia hastata	Chenopodiaceae		Forb (FG)	
Einadia nutans	Chenopodiaceae		Forb (FG)	
Einadia nutans subsp. *nutans*	Chenopodiaceae		Forb (FG)	
Einadia trigonos	Chenopodiaceae		Forb (FG)	
Einadia trigonos subsp. *leiocarpa*	Chenopodiaceae		Forb (FG)	
Eleocharis dietrichiana	Cyperaceae		Grass & grasslike (GG)	
Eleocharis gracilis	Cyperaceae		Grass & grasslike (GG)	
Epilobium billardierianum	Onagraceae		Forb (FG)	
Epilobium billardierianum subsp. *cinereum*	Onagraceae		Forb (FG)	
Epilobium billardierianum subsp. *hydrophilum*	Onagraceae		Forb (FG)	
Epilobium hirtigerum	Onagraceae		Forb (FG)	
Epilobium sp.	Onagraceae		Forb (FG)	
Eragrostis benthamii	Poaceae		Grass & grasslike (GG)	
Erodium cicutarium	Geraniaceae	*		
Eucalyptus albens	Myrtaceae		Tree (TG)	
Eucalyptus blakelyi	Myrtaceae		Tree (TG)	
Eucalyptus bridgesiana	Myrtaceae		Tree (TG)	
Eucalyptus dalrympleana	Myrtaceae		Tree (TG)	
Eucalyptus dalrympleana subsp. *heptantha*	Myrtaceae		Tree (TG)	
Eucalyptus goniocalyx	Myrtaceae		Tree (TG)	
Eucalyptus laevopinea	Myrtaceae		Tree (TG)	
Eucalyptus melliodora	Myrtaceae		Tree (TG)	
Eucalyptus moluccana	Myrtaceae		Tree (TG)	
Eucalyptus nobilis	Myrtaceae		Tree (TG)	
Eucalyptus nortonii	Myrtaceae		Tree (TG)	
Eucalyptus pauciflora	Myrtaceae		Tree (TG)	
Eucalyptus praecox	Myrtaceae		Tree (TG)	
Eucalyptus rossii	Myrtaceae		Tree (TG)	
Eucalyptus saligna	Myrtaceae		Tree (TG)	
Eucalyptus sp.	Myrtaceae		Tree (TG)	
Eucalyptus stellulata	Myrtaceae		Tree (TG)	
Euchiton involucratus	Asteraceae		Forb (FG)	
Euchiton japonicus	Asteraceae	*	Forb (FG)	
Euchiton sphaericus	Asteraceae		Forb (FG)	
Euchiton sp.	Asteraceae		Forb (FG)	
Eustrephus latifolius	Luzuriagaceae		Other (OG)	
Exocarpos cupressiformis	Santalaceae		Shrub (SG)	
Festuca asperula	Poaceae		Grass & grasslike (GG)	

Species	Family	Exotic	Growth Form	ROTAP
Fimbristylis dichotoma	Cyperaceae		Grass & grasslike (GG)	
Galium ciliare	Rubiaceae		Forb (FG)	
Galium gaudichaudii	Rubiaceae		Forb (FG)	
Galium migrans	Rubiaceae		Forb (FG)	
Galium propinquum	Rubiaceae		Forb (FG)	
Geranium homeanum	Geraniaceae		Forb (FG)	
Geranium potentilloides	Geraniaceae		Forb (FG)	
Geranium potentilloides var. *potentilloides*	Geraniaceae		Forb (FG)	
Geranium retrorsum	Geraniaceae		Forb (FG)	
Geranium solanderi	Geraniaceae		Forb (FG)	
Geranium solanderi var. *grande*	Geraniaceae		Forb (FG)	
Geranium solanderi var. *solanderi*	Geraniaceae		Forb (FG)	
Geranium sp.	Geraniaceae	*	Forb (FG)	
Geum urbanum	Rosaceae		Forb (FG)	
Glossostigma diandrum	Scrophulariaceae		Forb (FG)	
Glyceria latispicea	Poaceae		Grass & grasslike (GG)	
Glycine clandestina	Fabaceae (Faboideae)		Other (OG)	
Glycine latifolia	Fabaceae (Faboideae)		Other (OG)	
Glycine sp.	Fabaceae (Faboideae)		Other (OG)	
Glycine tabacina	Fabaceae (Faboideae)		Other (OG)	
Gonocarpus elatus	Haloragaceae		Forb (FG)	
Gonocarpus humilis	Haloragaceae		Forb (FG)	
Gonocarpus micranthus	Haloragaceae		Forb (FG)	
Gonocarpus sp.	Haloragaceae		Forb (FG)	
Gonocarpus tetragynus	Haloragaceae		Forb (FG)	
Gratiola peruviana	Scrophulariaceae		Forb (FG)	
Gymnostachys anceps	Araceae		Forb (FG)	
Gypsophila tubulosa	Caryophyllaceae		Forb (FG)	
Hackelia latifolia				
Hakea microcarpa	Proteaceae		Shrub (SG)	
Haloragis heterophylla	Haloragaceae		Forb (FG)	
Hardenbergia violacea	Fabaceae (Faboideae)		Other (OG)	
Hibbertia obtusifolia	Dilleniaceae		Shrub (SG)	
Hovea lanceolata	Fabaceae (Faboideae)		Shrub (SG)	
Hydrocotyle laxiflora	Apiaceae		Forb (FG)	
Hydrocotyle sibthorpioides	Apiaceae		Forb (FG)	
Hydrocotyle tripartita	Apiaceae		Forb (FG)	
Hypericum gramineum	Clusiaceae		Forb (FG)	
Hypericum japonicum	Clusiaceae		Forb (FG)	
Hypericum perforatum	Clusiaceae	*		
Hypochaeris radicata	Asteraceae	*		
Hypolepis glandulifera	Dennstaedtiaceae		Fern (EG)	
Hypoxis hygrometrica	Hypoxidaceae		Forb (FG)	

Species	Family	Exotic	Growth Form	ROTAP
Imperata cylindrica	Poaceae		Grass & grasslike (GG)	
Indigofera australis	Fabaceae (Faboideae)		Shrub (SG)	
Isolepis australiensis	Cyperaceae		Grass & grasslike (GG)	
Isolepis cernua	Cyperaceae		Grass & grasslike (GG)	
Isolepis inundata	Cyperaceae		Grass & grasslike (GG)	
Isolepis multicaulis	Cyperaceae		Grass & grasslike (GG)	
Isotoma fluviatilis	Lobeliaceae		Forb (FG)	
Isotoma fluviatilis subsp. *borealis*	Lobeliaceae		Forb (FG)	
Jacksonia scoparia	Fabaceae (Faboideae)		Shrub (SG)	
Juncus alexandri subsp. *melanobasis*	Juncaceae		Grass & grasslike (GG)	
Juncus bufonius	Juncaceae	*		
Juncus continuus	Juncaceae		Grass & grasslike (GG)	
Species	Family	Exotic	Growth Form	
Juncus fockei	Juncaceae		Grass & grasslike (GG)	
Juncus sandwithii	Juncaceae		Grass & grasslike (GG)	
Juncus sp.	Juncaceae		Grass & grasslike (GG)	
Juncus subsecundus	Juncaceae		Grass & grasslike (GG)	
Juncus vaginatus	Juncaceae		Grass & grasslike (GG)	
Lachnagrostis aemula	Poaceae		Grass & grasslike (GG)	
Lachnagrostis filiformis	Poaceae		Grass & grasslike (GG)	
Lactuca serriola	Asteraceae	*		
Lagenifera stipitata	Asteraceae		Forb (FG)	
Lemna trisulca	Lemnaceae		Forb (FG)	
Lepidosperma laterale	Cyperaceae		Grass & grasslike (GG)	
Leptospermum gregarium	Myrtaceae		Shrub (SG)	
Leptospermum polygalifolium	Myrtaceae		Shrub (SG)	
Leptospermum polygalifolium subsp. *montanum*	Myrtaceae		Shrub (SG)	
Lespedeza juncea subsp. *sericea*	Fabaceae (Faboideae)		Forb (FG)	
Leucopogon juniperinus	Ericaceae		Shrub (SG)	
Leucopogon lanceolatus	Ericaceae		Shrub (SG)	
Libertia paniculata	Iridaceae		Forb (FG)	
Lilaeopsis polyantha	Apiaceae		Forb (FG)	
Lomandra filiformis	Lomandraceae		Grass & grasslike (GG)	

Species	Family	Exotic	Growth Form	ROTAP
Lomandra filiformis subsp. *coriacea*	Lomandraceae		Grass & grasslike (GG)	
Lomandra longifolia	Lomandraceae		Grass & grasslike (GG)	
Lomandra multiflora subsp. *multiflora*	Lomandraceae		Grass & grasslike (GG)	
Lomandra sp.	Lomandraceae		Grass & grasslike (GG)	
Lomatia arborescens	Proteaceae		Shrub (SG)	
Lotus corniculatus	Fabaceae (Faboideae)	*		
Luzula flaccida	Juncaceae		Grass & grasslike (GG)	
Luzula sp.	Juncaceae		Grass & grasslike (GG)	
Lysimachia arvensis	Primulaceae			
Macrozamia concinna	Zamiaceae		Other (OG)	
Macrozamia sp.	Zamiaceae		Other (OG)	
Marsdenia rostrata	Apocynaceae		Other (OG)	
Medicago lupulina	Fabaceae (Faboideae)	*		
Melichrus urceolatus	Ericaceae		Shrub (SG)	
Melicytus dentatus	Violaceae		Shrub (SG)	
Mentha diemenica	Lamiaceae		Forb (FG)	
Mentha satureioides	Lamiaceae		Forb (FG)	
Microlaena stipoides	Poaceae		Grass & grasslike (GG)	
Microlaena stipoides var. *stipoides*	Poaceae		Grass & grasslike (GG)	
Microseris lanceolata	Asteraceae		Forb (FG)	
Microtis sp.	Orchidaceae		Forb (FG)	
Microtis unifolia	Orchidaceae		Forb (FG)	
Modiola caroliniana	Malvaceae	*		
Monotoca scoparia	Ericaceae		Shrub (SG)	
Myriophyllum lophatum	Haloragaceae		Forb (FG)	
Myriophyllum pedunculatum	Haloragaceae		Forb (FG)	
Myriophyllum variifolium	Haloragaceae		Forb (FG)	
Myriophyllum verrucosum	Haloragaceae		Forb (FG)	
Myrsine howittiana	Primulaceae		Shrub (SG)	
Notelaea microcarpa	Oleaceae		Tree (TG)	
Notelaea microcarpa var. *microcarpa*	Oleaceae		Tree (TG)	
Olearia alpicola	Asteraceae		Shrub (SG)	
Olearia elliptica	Asteraceae		Shrub (SG)	
Olearia sp.	Asteraceae		Shrub (SG)	
Ophioglossum lusitanicum	Ophioglossaceae		Fern (EG)	
Oplismenus imbecillis	Poaceae		Grass & grasslike (GG)	
Oreomyrrhis eriopoda	Apiaceae		Forb (FG)	
Oxalis chnoodes	Oxalidaceae		Forb (FG)	
Oxalis perennans	Oxalidaceae		Forb (FG)	

Species	Family	Exotic	Growth Form	ROTAP
Panicum effusum	Poaceae		Grass & grasslike (GG)	
Paronychia brasiliana	Caryophyllaceae	*		
Paspalidium gracile	Poaceae		Grass & grasslike (GG)	
Pellaea falcata	Adiantaceae		Fern (EG)	
Persicaria decipiens	Polygonaceae		Forb (FG)	
Petrorhagia dubia	Caryophyllaceae	*		
Petrorhagia nanteuilii	Caryophyllaceae	*		
Phyllanthus virgatus	Phyllanthaceae		Forb (FG)	
Phytolacca octandra	Phytolaccaceae	*		
Picris angustifolia	Asteraceae		Forb (FG)	
Picris angustifolia subsp. *angustifolia*	Asteraceae		Forb (FG)	
Picris sp.	Asteraceae		Forb (FG)	
Pimelea curviflora	Thymelaeaceae		Shrub (SG)	
Pimelea curviflora var. *divergens*	Thymelaeaceae		Forb (FG)	
Pimelea curviflora var. *sericea*	Thymelaeaceae		Forb (FG)	
Pimelea glauca	Thymelaeaceae		Shrub (SG)	
Pimelea ligustrina	Thymelaeaceae		Shrub (SG)	
Pimelea micrantha	Thymelaeaceae		Shrub (SG)	
Pimelea stricta	Thymelaeaceae		Shrub (SG)	
Pimelea strigosa	Thymelaeaceae		Shrub (SG)	
Pittosporum undulatum	Pittosporaceae		Shrub (SG)	
Plantago debilis	Plantaginaceae		Forb (FG)	
Plantago hispida	Plantaginaceae		Forb (FG)	
Plantago varia	Plantaginaceae		Forb (FG)	
Plectranthus parviflorus	Lamiaceae		Forb (FG)	
Poa bulbosa	Poaceae	*		
Poa labillardierei var. *labillardierei*	Poaceae		Grass & grasslike (GG)	
Poa sieberiana	Poaceae		Grass & grasslike (GG)	
Poa sieberiana var. *cyanophylla*	Poaceae		Grass & grasslike (GG)	
Poa sieberiana var. *sieberiana*	Poaceae		Grass & grasslike (GG)	
Polycarpon tetraphyllum	Caryophyllaceae	*		
Polygala japonica	Polygalaceae		Forb (FG)	
Polymeria longifolia	Convolvulaceae		Forb (FG)	
Polyscias sambucifolia	Araliaceae		Shrub (SG)	
Polystichum fallax	Dryopteridaceae		Fern (EG)	
Polystichum proliferum	Dryopteridaceae		Fern (EG)	
Poranthera microphylla	Phyllanthaceae		Forb (FG)	
Potamogeton tricarinatus	Potamogetonaceae		Forb (FG)	
Pratia purpurascens	Lobeliaceae		Forb (FG)	
Pratia sp.	Lobeliaceae		Forb (FG)	
Prostanthera lasianthos	Lamiaceae		Shrub (SG)	

Species	Family	Exotic	Growth Form	ROTAP
Prunella vulgaris	Lamiaceae	*		
Pteridium esculentum	Dennstaedtiaceae		Fern (EG)	
Pteris tremula	Pteridaceae		Fern (EG)	
Pterostylis coccina	Orchidaceae		Forb (FG)	
Pterostylis decurva	Orchidaceae		Forb (FG)	
Pterostylis laxa	Orchidaceae		Forb (FG)	
Pterostylis obtusa	Orchidaceae		Forb (FG)	
Pterostylis sp. *B*	Orchidaceae		Forb (FG)	
Pterostylis sp.	Orchidaceae		Forb (FG)	
Pultenaea cuneata	Fabaceae (Faboideae)		Shrub (SG)	
Pultenaea polifolia	Fabaceae (Faboideae)		Shrub (SG)	
Pultenaea retusa	Fabaceae (Faboideae)		Shrub (SG)	
Pultenaea setulosa	Fabaceae (Faboideae)		Shrub (SG)	
Pultenaea sp.	Fabaceae (Faboideae)		Shrub (SG)	
Ranunculus amphitrichus	Ranunculaceae		Forb (FG)	
Ranunculus inundatus	Ranunculaceae		Forb (FG)	
Ranunculus lappaceus	Ranunculaceae		Forb (FG)	
Ranunculus sp.	Ranunculaceae		Forb (FG)	
Rhodanthe anthemoides	Asteraceae		Forb (FG)	
Rhodanthe diffusa	Asteraceae		Forb (FG)	
Rosa rubiginosa	Rosaceae	*		
Rubus parvifolius	Rosaceae		Shrub (SG)	
Rubus ulmifolius	Rosaceae	*		
Species	Family	Exotic	Growth Form	
Rumex brownii	Polygonaceae		Forb (FG)	
Rumex crispus	Polygonaceae	*		
Rumex sp.	Polygonaceae	*	Forb (FG)	
Rytidosperma erianthum	Poaceae		Grass & grasslike (GG)	
Rytidosperma laeve	Poaceae		Grass & grasslike (GG)	
Rytidosperma nudiflorum	Poaceae		Grass & grasslike (GG)	
Rytidosperma penicillatum	Poaceae		Grass & grasslike (GG)	
Rytidosperma pilosum	Poaceae		Grass & grasslike (GG)	
Rytidosperma racemosum	Poaceae		Grass & grasslike (GG)	
Rytidosperma racemosum var. *racemosum*	Poaceae		Grass & grasslike (GG)	
Rytidosperma sp.	Poaceae		Grass & grasslike (GG)	
Salvia verbenaca	Lamiaceae	*		
Sambucus gaudichaudiana	Adoxaceae		Shrub (SG)	
Schoenus apogon	Cyperaceae		Grass & grasslike (GG)	

Species	Family	Exotic	Growth Form	ROTAP
Schoenus sp.	Cyperaceae		Grass & grasslike (GG)	
Scleranthus biflorus	Caryophyllaceae		Forb (FG)	
Scutellaria humilis	Lamiaceae		Forb (FG)	
Scutellaria mollis	Lamiaceae		Forb (FG)	
Senecio bathurstianus	Asteraceae		Forb (FG)	
Senecio biserratus	Asteraceae		Forb (FG)	
Senecio diaschides	Asteraceae		Forb (FG)	
Senecio hispidulus	Asteraceae		Forb (FG)	
Senecio lautus	Asteraceae		Forb (FG)	
Senecio linearifolius	Asteraceae		Forb (FG)	
Senecio madagascariensis	Asteraceae	*		
Senecio pinnatifolius var. *pinnatifolius*	Asteraceae		Forb (FG)	
Senecio prenanthoides	Asteraceae		Forb (FG)	
Senecio quadridentatus	Asteraceae		Forb (FG)	
Senecio sp.	Asteraceae	*	Forb (FG)	
Sigesbeckia australiensis	Asteraceae		Forb (FG)	
Sigesbeckia orientalis subsp. *orientalis*	Asteraceae		Forb (FG)	
Smilax australis	Smilacaceae		Other (OG)	
Solanum aviculare	Solanaceae		Shrub (SG)	
Solanum chenopodioides	Solanaceae	*		
Solanum nigrum	Solanaceae	*		
Solanum opacum	Solanaceae		Forb (FG)	
Solanum prinophyllum	Solanaceae		Forb (FG)	
Solanum pseudocapsicum	Solanaceae	*		
Solanum pungetium	Solanaceae		Forb (FG)	
Solanum sp.	Solanaceae	*	Forb (FG)	
Solenogyne bellioides	Asteraceae		Forb (FG)	
Solenogyne dominii	Asteraceae		Forb (FG)	
Solenogyne gunnii	Asteraceae		Forb (FG)	
Sonchus asper	Asteraceae	*		
Sonchus oleraceus	Asteraceae	*		
Sorghum leiocladum	Poaceae		Grass & grasslike (GG)	
Spiranthes australis	Orchidaceae		Forb (FG)	
Sporobolus sp.	Poaceae	*	Grass & grasslike (GG)	
Stellaria angustifolia	Caryophyllaceae		Forb (FG)	
Stellaria flaccida	Caryophyllaceae		Forb (FG)	
Stellaria media	Caryophyllaceae	*		
Stellaria pungens	Caryophyllaceae		Forb (FG)	
Stylidium graminifolium	Stylidiaceae		Forb (FG)	
Swainsona galegifolia	Fabaceae (Faboideae)		Forb (FG)	
Taraxacum officinale	Asteraceae	*		
Themeda triandra	Poaceae		Grass & grasslike (GG)	

Species	Family	Exotic	Growth Form	ROTAP
Trachymene incisa subsp. *incisa*	Apiaceae		Forb (FG)	
Tricoryne elatior	Anthericaceae		Forb (FG)	
Trifolium arvense	Fabaceae (Faboideae)	*		
Trifolium campestre	Fabaceae (Faboideae)	*		
Trifolium glomeratum	Fabaceae (Faboideae)	*		
Trifolium repens	Fabaceae (Faboideae)	*		
Trifolium sp.	Fabaceae (Faboideae)	*		
Trifolium subterraneum	Fabaceae (Faboideae)	*		
Triptilodiscus pygmaeus	Asteraceae		Forb (FG)	
Unknown	Unknown Flora			
Urtica incisa	Urticaceae		Forb (FG)	
Urtica urens	Urticaceae	*		
Verbascum virgatum	Scrophulariaceae	*		
Verbena bonariensis	Verbenaceae	*		
Verbena officinalis	Verbenaceae	*		
Verbena rigida var. *rigida*	Verbenaceae	*		
Veronica calycina	Plantaginaceae		Forb (FG)	
Veronica derwentiana	Plantaginaceae		Forb (FG)	
Veronica gracilis	Plantaginaceae		Forb (FG)	
Veronica hederifolia	Plantaginaceae	*		
Veronica plebeia	Plantaginaceae		Forb (FG)	
Vicia sativa subsp. *sativa*	Fabaceae (Faboideae)	*		
Viola betonicifolia	Violaceae		Forb (FG)	
Viola hederacea	Violaceae		Forb (FG)	
Vittadinia cuneata var. *cuneata*	Asteraceae		Forb (FG)	
Vittadinia cuneata var. *hirsuta*	Asteraceae		Forb (FG)	
Vittadinia dissecta	Asteraceae		Forb (FG)	
Vittadinia tenuissima	Asteraceae		Forb (FG)	
Wahlenbergia gracilenta	Campanulaceae		Forb (FG)	
Wahlenbergia littoricola	Campanulaceae		Forb (FG)	
Wahlenbergia luteola	Campanulaceae		Forb (FG)	
Wahlenbergia planiflora	Campanulaceae		Forb (FG)	
Wahlenbergia planiflora subsp. *planiflora*	Campanulaceae		Forb (FG)	
Wahlenbergia sp.	Campanulaceae		Forb (FG)	
Wahlenbergia stricta	Campanulaceae		Forb (FG)	
Wahlenbergia stricta subsp. *stricta*	Campanulaceae		Forb (FG)	
Wurmbea dioica subsp. *dioica*	Colchicaceae		Forb (FG)	
Xerochrysum bracteatum	Asteraceae		Forb (FG)	
Zehneria cunninghamii	Cucurbitaceae		Other (OG)	

ecological AUSTRALIA
A TETRA TECH COMPANY

1300 646 131
www.ecoaus.com.au