



Background Report

Blue Tier Reserve



www.tasland.org.au

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Front Image: Myrtle rainforest on Blue Tier Reserve - Andy Townsend

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Acknowledgements

The Blue Tier Reserve is owned by the Tasmanian Land Conservancy TLC and managed for its conservation values. The Reserve was purchased after a successful fundraising campaign which commenced in 2012 and achieved its target about one year later. The campaign attracted significant support, drawing donations from many businesses and private individuals. We sincerely thank everyone for their generosity which has resulted in the permanent protection of this special area.

The TLC also acknowledges those who have contributed their time and expertise towards monitoring, management and promoting this reserve. In particular Professor Jamie Kirkpatrick and Jane Keble-Williams, plus many volunteers especially Sarah Lloyd and Genevieve Gates who have supported on-ground research and monitoring of the area since its acquisition.

The success of this campaign was aided by the beautiful imagery collected by photographers Andy Townsend and Chris Crerar.

The TLC acknowledges the data provided by Land Information System Tasmania (*theList*) and the DPIPWE Natural Values Atlas used in compiling maps and tables in this document.

Sincere thanks to everyone.

Acronyms and Abbreviations

DPIPWE	Tasmanian Government's Department of Primary Industries, Parks, Water and Environment
EPBC Act	Australian <i>Environment Protection and Biodiversity Conservation Act 1999</i>
FPA	Forest Practices Authority
IBRA	Interim Biogeographic Regionalisation for Australia. A planning framework for the systematic development of a comprehensive, adequate and representative ' <u>CAR</u> ' National Reserve System.
IUCN	International Union for Conservation of Nature
NRM	Natural Resource Management
NVA	Natural Values Atlas database, DPIPWE
PWS	Parks and Wildlife Service, Tasmania
TLC	Tasmanian Land Conservancy
TSP Act	Tasmania's <i>Threatened Species Protection Act 1995</i>
UTAS	University of Tasmania

Introduction

The Tasmanian Land Conservancy

The Tasmanian Land Conservancy (TLC) is a non-profit, non-political, private organisation that works towards achieving sustainability and biodiversity conservation in Tasmania.

TLC's 2050 vision is for *Tasmania to be a global leader in nature conservation and sustainability* and its mission:

In partnership with other organisations, communities, individuals and governments, the TLC will:

- 1 *Take a lead role in building a landscape scale approach to conservation including a world-class system of reserves complemented by sustainable development.*
- 2 *Demonstrate excellence in management for biodiversity conservation.*
- 3 *Contribute to Tasmania becoming a centre for knowledge and expertise for nature conservation and planning.*
- 4 *Develop and implement innovative mechanisms for achieving sustainability and biodiversity conservation.*
- 5 *Provide opportunities and mechanisms for communities and individuals to achieve conservation.*
- 6 *Demonstrate organisational leadership through exceptional governance, a positive working environment and financial sustainability.*

Location and Access

The Blue Tier Reserve is 30 km by road from St Helens on the East Coast of Tasmania. The route is via the Tasman Highway, then Lottah and Poimena Roads.

It cannot be accessed directly by road, but the closest parking point is the Three Notches Track, which comes off Poimena Rd from Lottah. Walking access only to the Reserve is through scrub and rainforest (see Figure 1). At the time writing, this route was still not legal, nor marked in any useful fashion, although processes are in place to gain both legal and practical access. Entry by the general public is discouraged because of the difficult and uncertain nature of this access.

Bioregional Values and Reserve Status

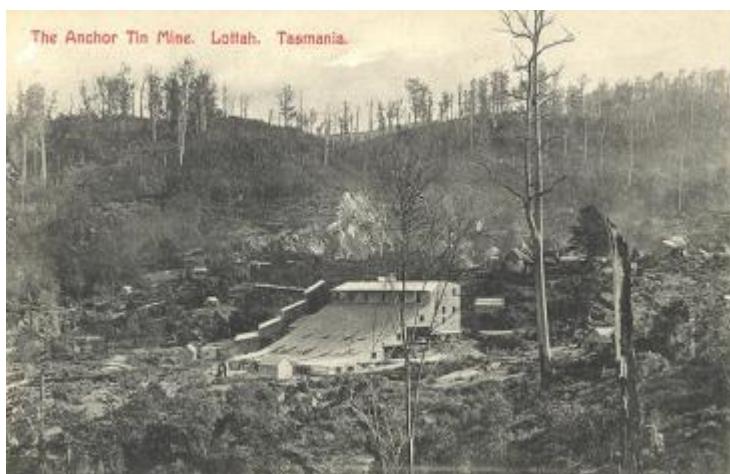
The Blue Tier as a landscape feature is a sub-alpine granite plateau rising over 600m in north-east Tasmania. It is flanked to the west by the Weldborough valley, to the south by the Pyengana valley and its foothills fall away north to Pioneer, Mt Cameron and eventually to the great northern plains, and to the east to Binalong Bay. It forms some of the headwaters of the Ringarooma (Weld and Winifred Rivers), the Great Musselroe, Ansons and the George (Ransom and Groom) Rivers.

This granite massif dominates the surrounding country and has a great influence on the weather, as it blocks all easterly air flows, creating a high rainfall area.

Landscape Context

The Blue Tier Reserve itself is an 81.5 ha block surrounded on three sides by the Blue Tier Regional Reserve and on the fourth by land managed by Forestry Tasmania that has the status of 'Potential Future Production Forest' (see Figure 1). The northeast corner of the property abuts another privately owned parcel that at the time of writing was being developed as a house site following clearfell some years prior.

The surrounding landscape is generally a mixture of more or less pristine areas unaffected by human activity, but with some areas having been heavily impacted by alluvial tin mining in the late 1800s and 1900s. A pulse of sand originating in some of these alluvial mines is still making its way down the Georges River to Georges Bay¹. Timber cutting and fire were used to uncover areas prospective of tin and the ore was dug and processed by hand and mechanised 'stampers'.



The lower slopes and gullies of the Blue Tier plateau were glacial refugia during the last glacial maximum.

¹ Bird, J. F. (2000) *The Impact of Mining Waste on the Rivers Draining into Georges Bay, Northeast Tasmania*. in Brizga. S. and Finlayson B. Eds (2000) *River Management: The Australian Experience*. Wiley and Sons, Sydney

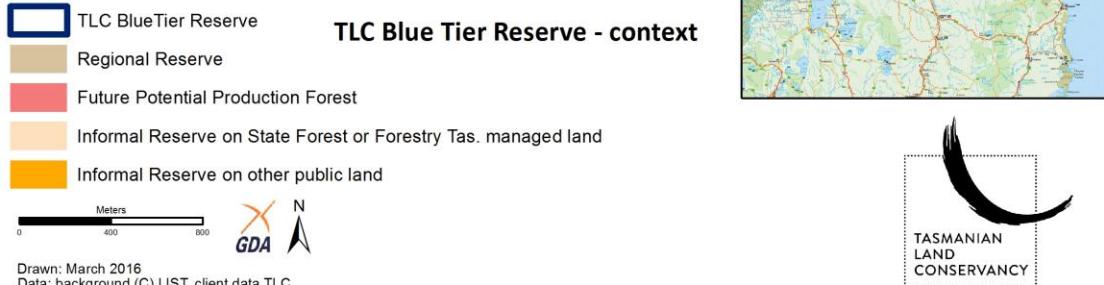
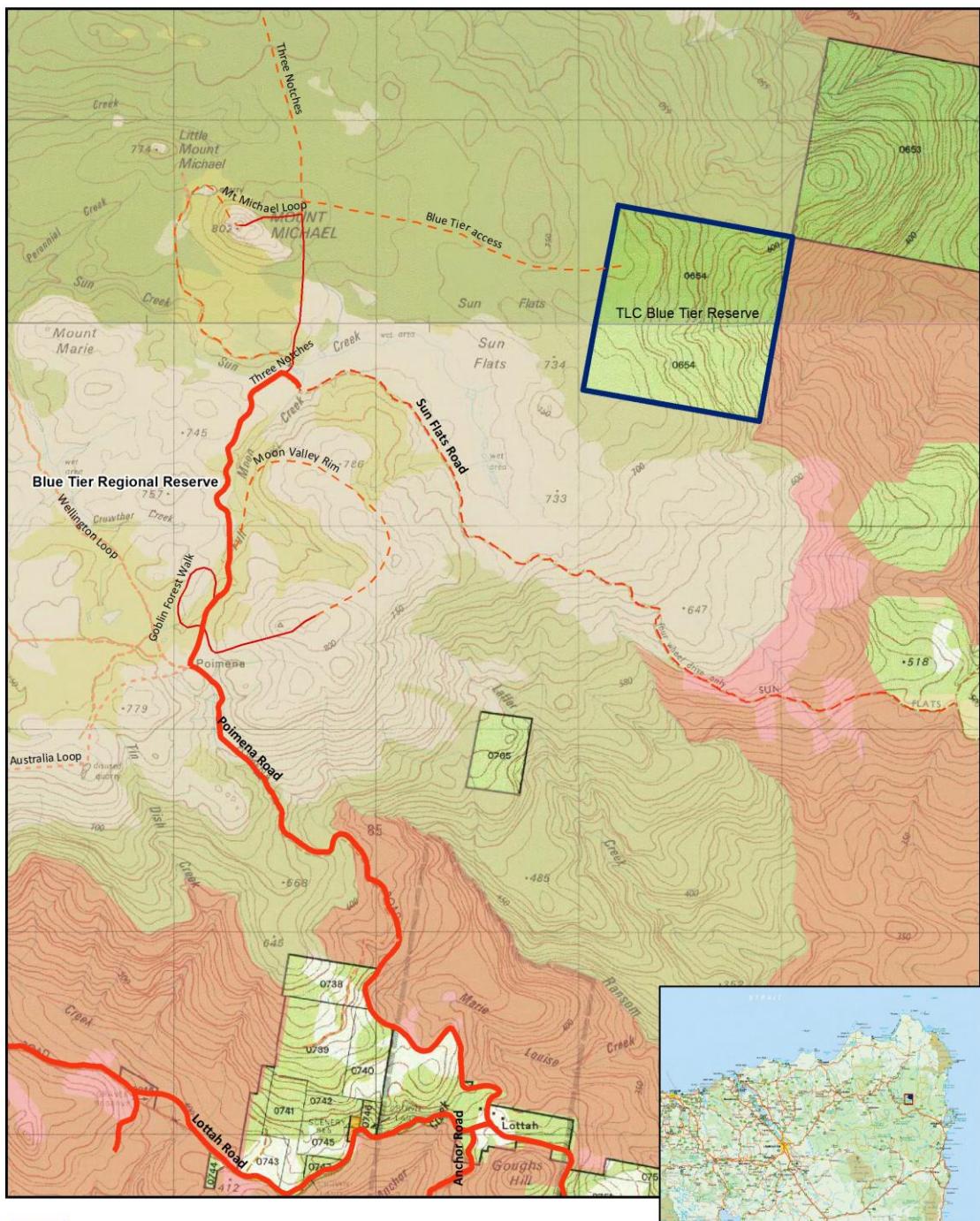


Figure 1 Access and location of the Blue Tier Reserve

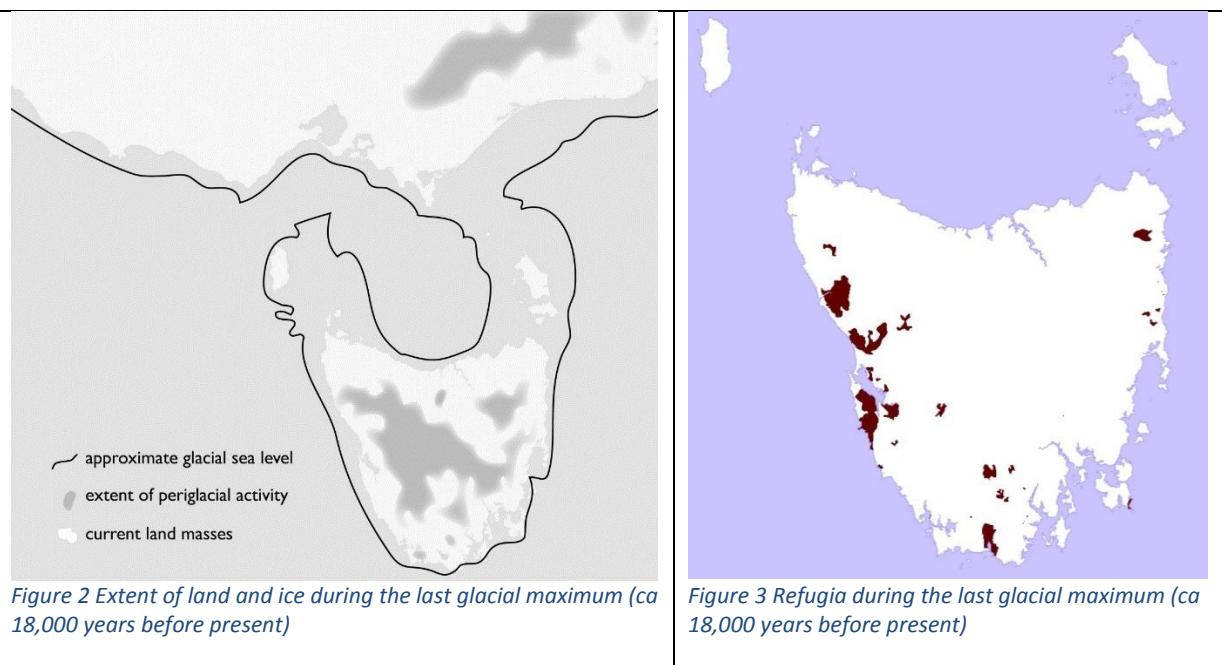
Biogeographic distinctiveness

Within the ecological context of the surrounding landscape the Blue Tier is highly distinct. It is a relatively small island of rainforest, Gondwanan in origin, surrounded by eucalypt forest of a more modern Australian origin. These ecosystems are very different in terms of not only their species composition, but also their dynamics. This Gondwanan heritage stretches back 35 million years to the peak of the spread and diversity of the rainforests².

Blue Tier Glacial refuge

Some 18,000 years ago, Tasmania was a huge southern peninsula of Australia extending into the Southern Ocean. The Thylacine and the Tasmanian devil were shared across this southern continental landscape and Aboriginal bands moved freely across the Bassian Plain. Although temperatures were only 5-6 degrees colder than now, this meant that sea levels were well over 100m lower than today³.

Across much the central plateau, glaciers were grinding down places like Skullbone Plains. The Midlands were grassy and quite arid and this habitat extended north across the rumpled hills of the Bassian Plain to what is currently Gippsland.



² Hill, R. S., Macphail, M. K. and Jordan, G. J., 1999; Tertiary history and origins of the flora and vegetation, in Reid, J. B., Hill, R. S., Brown, M. J. and M., H. (Eds.) Vegetation of Tasmania, Australian Biological Resources Study, Hobart, pp. 39-63.

³ Kirkpatrick, J. B. and Fowler, M., 1998; Locating likely glacial forest refugia in Tasmania using palynological and ecological information to test alternative climatic models, Biological Conservation 85: 182.

It was in this setting that the now iconic temperate rainforests of Tasmania were at their nadir: ice and cold forced the treeline lower and generally droughty conditions banned these moisture loving habitats into deep sheltered valleys.

Areas such as these were relatively common on Tasmania's west coast, but only a few tiny refugia existed on the east (Figure 3). One such area was that around Blue Tier. Here both moisture and temperature remained high enough to support the rainforest species' requirements. The rainforest communities retreated from their former expanse as the cold intensified and huddled into the only places where they could survive.

These refugia were on south-eastern and south facing slopes in deep gullies where soils were deep enough to retain adequate moisture for the rainforest species. It is possible that such conditions were also produced where the easterly moisture bearing winds ascended the mountains and formed regular banks of fog to produce cloud forests.

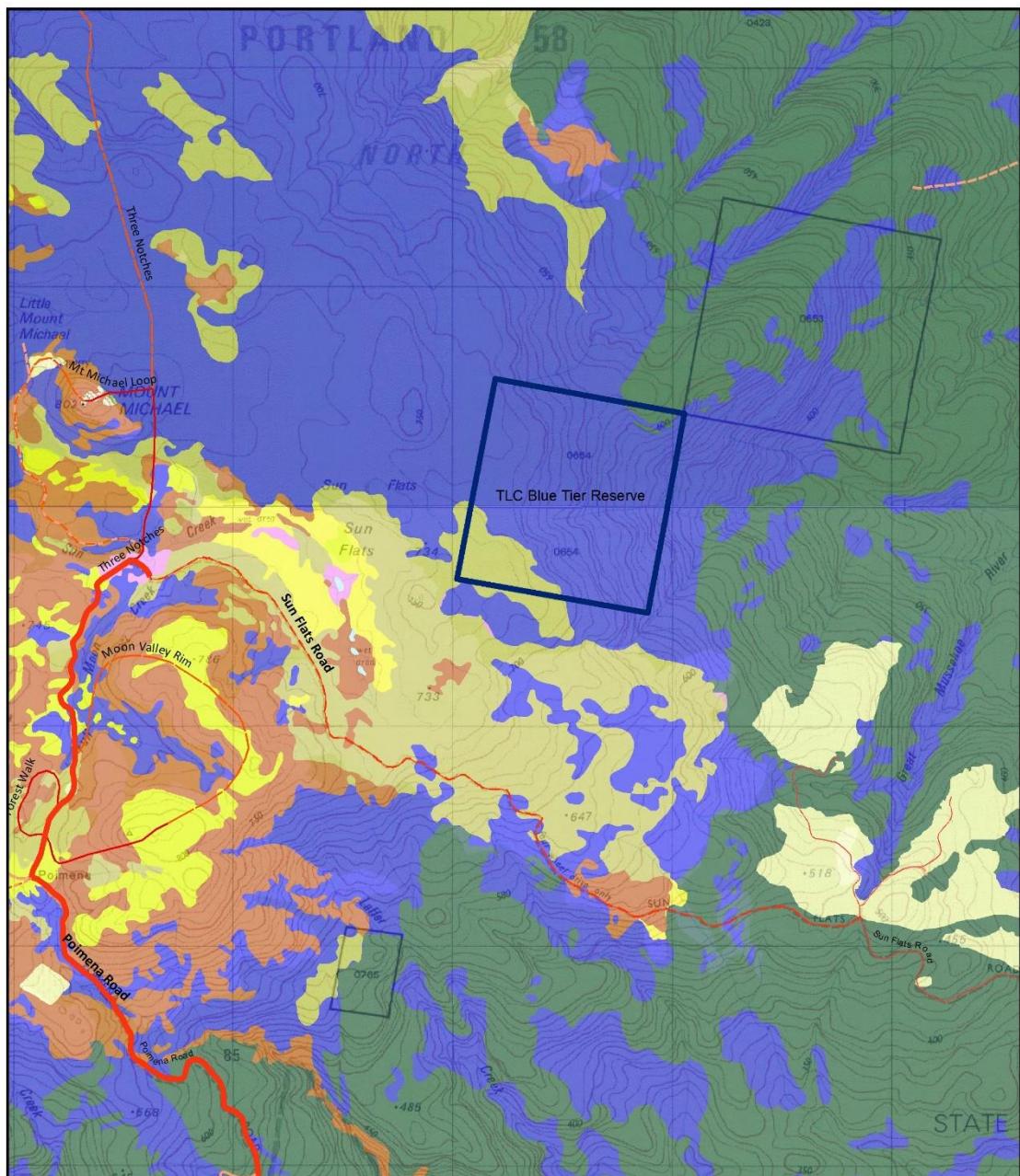
As the climate gradually warmed over the ensuing 6,000 years, from these tiny restricted areas, rainforest trees including the Myrtle beech (*Nothofagus cunninghamii*) and possibly the Swamp gum (*Eucalyptus regnans*) threw their seeds out into the warming and moist soils and gradually crept up the higher slopes and valleys. This is how the forests managed to survive the last huge swing of climate change in the past.

Blue Tier thus formed the nucleus for these species to recolonise the local landscape. The extensive rainforests of the northeast would not exist today if this critical refuge did not provide shelter for some rainforest species, as their ability to colonise new ground is severely limited by the throw of their seeds – mere hundreds of metres.

From these refugia, and given 18,000 years, much of the surrounding landscape has now climaxed as temperate rainforest. Where drainage, past land use or elevation has prevented this succession, hardy scrubs occur, often dominated by *Leptospermum* and *Olearia* spp. Patches of buttongrass moorland and sub-alpine heathlands also occur in drainage hollows on the plateau.

At lower elevation, and more typically in the larger region, tall wet eucalypt forest occurs, often with rainforest understorey.

Extensive conversion of these forests to plantation has occurred in the last twenty years in the surrounding landscape.



TLC Blue Tier Reserve - access and local tracks



Figure 4 Vegetation of the Blue Tier area (TASVEG 3.0)

Reserve Status

The Reserve is covenanted under the Tasmanian Nature Conservation Act 2002. This restrictive covenant means that the primary purpose of the land is for nature conservation.

IUCN Protected Area Management Category

Blue Tier reserve meets the objectives of the IUCN Category Ia: Strict Nature Reserve⁴, which are described as “protected areas that are strictly set aside to protect biodiversity and also possibly geological/geomorphological features, where human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation values. Such protected areas can serve as indispensable reference areas for scientific research and monitoring.

Primary objective of IUCN Category Ia

To conserve regionally, nationally or globally outstanding ecosystems, species (occurrences or aggregations) and/or geodiversity features: these attributes will have been formed mostly or entirely by non-human forces and will be degraded or destroyed when subjected to all but very light human impact.

Other objectives of IUCN Category Ia

- To preserve ecosystems, species and geodiversity features in a state as undisturbed by recent human activity as possible;
- To secure examples of the natural environment for scientific studies, environmental monitoring and education, including baseline areas from which all avoidable access is excluded;
- To minimize disturbance through careful planning and implementation of research and other approved activities;
- To conserve cultural and spiritual values associated with nature.

Distinguishing features of such a Protected Area are generally to:

- Have a largely complete set of expected native species in ecologically significant densities or be capable of returning them to such densities through natural processes or time-limited interventions;
- Have a full set of expected native ecosystems, largely intact with intact ecological processes, or processes capable of being restored with minimal management intervention;
- Be free of significant direct intervention by modern humans that would compromise the specified conservation objectives for the area, which usually implies limiting access by people and excluding settlement;
- Not require substantial and on-going intervention to achieve its conservation objectives;
- Be surrounded when feasible by land uses that contribute to the achievement of the area's specified conservation objectives;
- Be suitable as a baseline monitoring site for monitoring the relative impact of human activities;

⁴ <https://www.iucn.org/theme/protected-areas/about/protected-area-categories/category-ia-strict-nature-reserve> Accessed 21 Dec 2016

- Be managed for relatively low visitation by humans;
- Be capable of being managed to ensure minimal disturbance (especially relevant to marine environments).

Natural Values

Blue Tier Reserve's highest point is about 735m ASL and is a gently sloping part of Sun Flats, but most of the Reserve plunges quite steeply to the east with the lowest elevation being 520 m ASL.

Climate

Climate at the Blue Tier is cool maritime, but edging to sub-alpine on the plateau. Data from nearby Poimena shows maximum average temperatures ranging from the early twenties in summer to the low teens in winter. Minimum average temperatures range from the mid-teens to around 5 degrees in winter. Rainfall is fairly even throughout the year and totals around 1800mm. Snow is rare. The Blue Tier plateau is quite exposed to winds from all directions, but within the Reserve the forest floor micro-climate is moderated by the forest itself.

Geology and geomorphology

The geology of the area is dominated by Devonian granite – the Blue Tier batholith – which is comprised of a numbers of plutons, locally, the Poimena pluton⁵. These plutons intruded into the Mathinna beds some 370 million years ago and are responsible for the extensive mineralisation evidenced by extensive tin mining in the general area.

These resistant granites weathered slowly over the millennia to leave the Blue Tier massif with its steep sided gullies that provided refugial shelter to the vegetation much later in geologic history.

Soils developed from granite are typically poor in nutrients, but very well drained. In this area of high and even rainfall, the development of rainforests with their high capacity to store and recycle nutrients in the organic fraction means that the vegetation developed can be quite lush.

Vegetation Communities

On the edge of Sun Flats (Figure 6), the forest is dominated by the relatively low growing tea-trees, but as the drainage improved on the edge of the Flats, Myrtle beech starts to dominant and on the northern edge of the Reserve, where isolation is higher, mountain ash starts to dominant over the rainforest (Table 1). The reserve has no weeds.

⁵ Groves, D.I.; Cocker, J.D.; Jennings, D.J. 1977. The Blue Tier Batholith. Bull. Geol. Surv. Tasm. 55.

Table 1 Vegetation communities on Blue Tier

TasVeg Community	Area (ha)
Leptospermum forest	9.0
Rainforest	70.9
Wet Eucalyptus regnans forest	1.5
	81.5

Rainforest (TASVEG communities RMU and RML)

The Reserve is dominated by old-growth rainforest (Table 1, Figure 5 and Figure 6). These rainforests are exceptionally old with many large, mature trees with hollows that provide critical habitat for a variety of forest-dependent fauna. The dominant over storey is Myrtle beech (*Nothofagus cunninghamii*) but the floristic diversity is higher than is typical of myrtle rainforest. Other sub-dominant species include Celery-top (*Phyllocladus aspleniifolius*) and Sassafras (*Atherosperma moschatum*) and in areas, tea-tree (*Leptospermum lanigerum*).

Typically, the understorey is quite open, with the ground littered with rotting logs, bryophytes (mosses and liverworts), a huge array of fungi and invertebrates plus emergent and epiphytic ferns.

The diversity of fungi and bryophytes is quite exceptional. Hundreds of species of lichens, mosses, liverworts (Table 8), fungi (Table 7) and ferns (Table 9) occur on the property. These species are relatively poorly known, yet are a very significant element of rainforest biodiversity and ecosystem function.

Rainforest are fire sensitive, but usually not fire prone, except in times of severe fire weather preceded by very dry conditions. These are fire-scar evidence of past fires in the rainforest.

Leptospermum forest (TASVEG NLE)

Dominated by *L. lanigerum*, these forests fringe Sun Flats and again have typically open understorey, although the density of stems may make access through them quite difficult. They grade into the rainforests and share many plant species with them.

Wet E. regnans forest (TASVEG WRE)

This wet, tall forest community again represents a transitional assemblage from the rainforest. Occurring on the more north-facing aspect of the Reserve, it is generally a taller forest and due to the presence of oily eucalypt leaves, can be more fire prone.

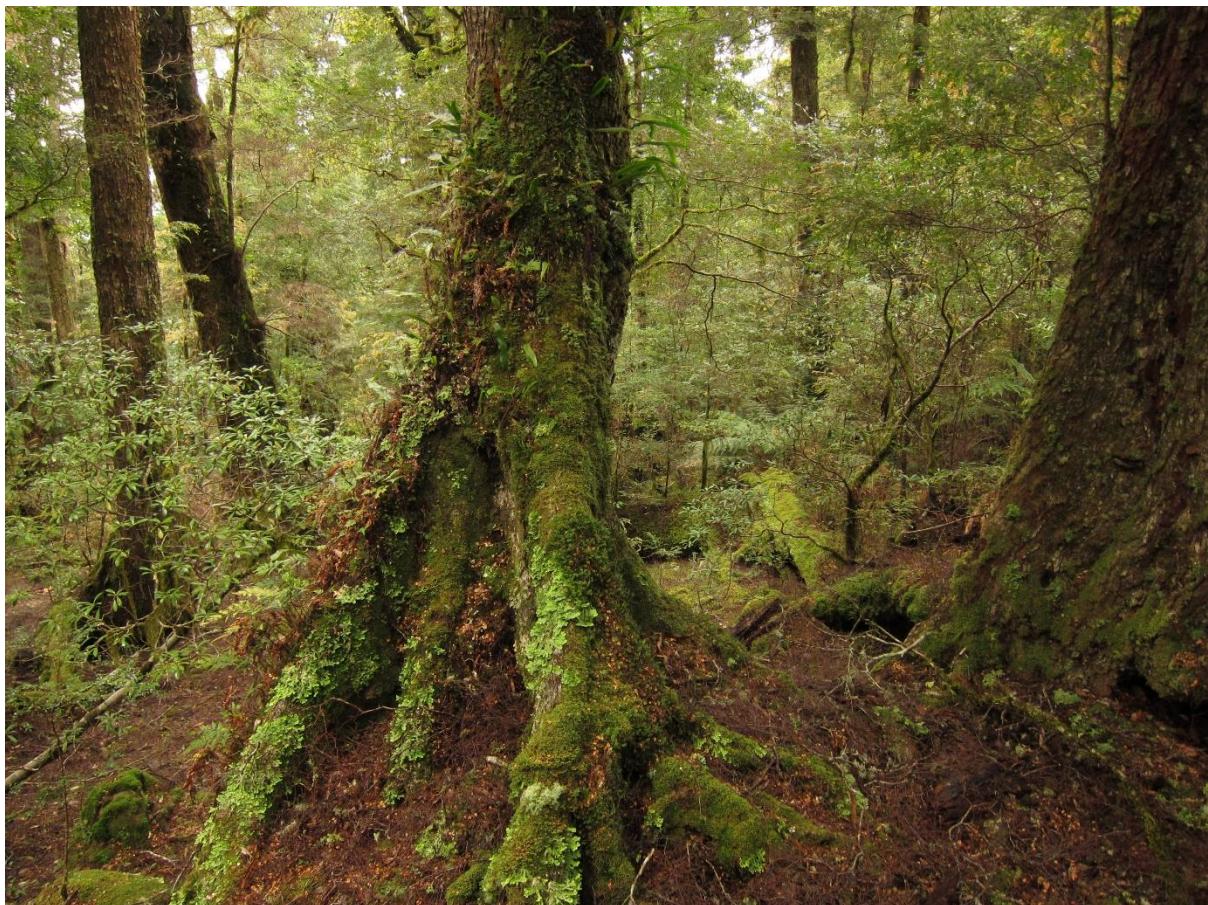


Figure 5 Typical rainforest in the Blue Tier Reserve

Flora of Significance

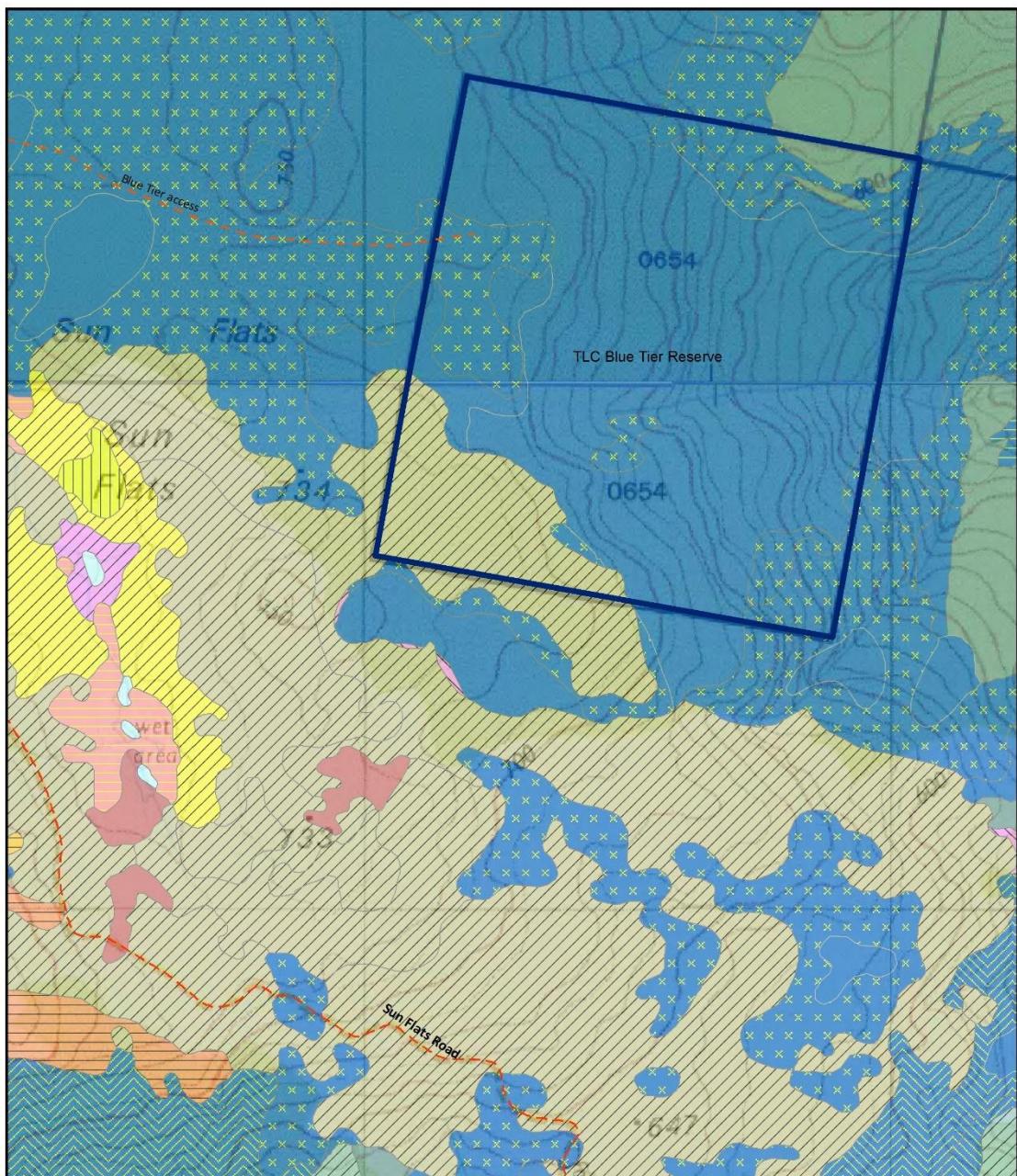
Rainforest are known more for their bryophyte than vascular plant richness, and these rainforests, although relatively diverse, are not exceptions to the rule. No threatened flora species have been found on the Reserve, although a Natural Values Report does find flora values within 5 km of the boundaries (Table 2). The Appendix contains a detailed species list.

Table 2 Threatened flora found within 5 km of the Blue Tier Reserve

Species	Common Name	SS	NS	Bio
<i>Bunodophoron notatum</i>		e		t
<i>Corunastylis nuda</i>	tiny midge-orchid	r		n
<i>Deyeuxia minor</i>	small bentgrass	r		n
<i>Hierochloe rariflora</i>	cane holygrass	r		n
<i>Hovea corrückiae</i>	glossy purplepea	r		n
<i>Hypolepis muelleri</i>	harsh groundfern	r		n
<i>Plantago debilis</i>	shade plantain	r		n
<i>Scleranthus brockiei</i>	mountain knawel	r		n
<i>Senecio squarrosus</i>	leafy fireweed	r		n

SS = State listed TSPA – Tasmanian Threatened Species Protection Act 1995

NS = Nationally listed - EPBCA – Commonwealth Environment Protection and Biodiversity Conservation Act 1999



TLC Blue Tier Reserve - vegetation

 TLC BlueTier Reserve	 Highland low rainforest and scrub	 Eastern alpine vegetation (undifferentiated)
 Eucalyptus regnans forest	 Leptospermum forest	 Buttongrass moorland with emergent shrubs
 Eucalyptus obliqua forest over rainforest	 Subalpine heathland	 Sphagnum peatland
 Nothofagus rainforest undifferentiated	 Melaleuca squamea heathland	 Highland Poa grassland
 Rainforest fernland	 Leptospermum scrub	 Water, sea
 Nothofagus - Leptospermum short rainforest	 Eastern alpine sedgeland	

Meters
0 160 320



Drawn: March 2016
Data: background (C) LIST, client data TLC



Figure 6 Vegetation communities of the Blue Tier Reserve (TASVEG 3.0)

Fauna of Significance

A variety of forest-dependent threatened fauna occur in the Blue Tier region, including several species of invertebrates that are endemic to the area. The Blue Tier property contains suitable habitat for the spotted-tailed quoll (*Dasyurus maculatus*). Photo monitoring has recorded the eastern quoll (*Dasyurus viverrinus*) on the property. The Appendix contains a detailed species list.

A survey trip led by Research Associate Jane Keble-Williams and attended by volunteers found evidence of 24 Simson's stag beetles (*Hoplogonus simsoni*) on the property, although only one was alive. This beetle taxon is one of a number of endemic large flightless beetles in the *Hoplogonus* genus that inhabit the greater north-eastern relict Gondwana rainforest island, each occupying their own a distinct area⁶. These beetles are very restricted in their dispersal ability and are entirely dependent on the homogenous and buffered microclimate afforded by the rainforest and wet forest: their food, habitat and shelter are all rotting logs on the damp forest floor.

Table 3 Threatened fauna found on or near (within 5 km) the Blue Tier Reserve

Species	Status under TSPA	Status under EPBCA	Type and date of record	Comments
Fauna:				
Simson's stag beetle (<i>Hoplogonus simsoni</i>)	v	VU	Recorded on property in 2013	Decaying vegetation provides excellent habitat.
White goshawk (<i>Accipiter novaehollandiae</i>)	e	-	NVA record <5km	Suitable nesting and foraging habitat
Wedge-tailed eagle (<i>Aquila audax</i> subsp. <i>fleayi</i>)	e	EN	NVA record <5km	Potential nesting habitat in area of eucalypt forest
Hydrobiid Snail (Terry's Creek) (<i>Beddomeia tasmanica</i>)	r	-	NVA record <5km	Potential habitat in small streams
Spotted-tailed quoll (<i>Dasyurus maculatus</i>)	r	VU	NVA record <5km	Suitable habitat – hotspot for the species
Giant velvet worm (<i>Tasmanipatus barretti</i>)	r	-	NVA record <5km	Suitable habitat – endemic to northeast highlands
Masked owl (<i>Tyto novaehollandiae</i>)	e	VU	NVA record <5km	Suitable nesting habitat

TSPA – Tasmanian Threatened Species Protection Act 1995

EPBCA – Commonwealth Environment Protection and Biodiversity Conservation Act 1999

⁶ Jane Keble-Williams (2013) A Survey of Threatened Stag Beetles on the Tasmanian Land Conservancy Blue Tier and West Pyengana Reserves in North East Tasmania, TLC, Hobart Tasmania

Management Plan

The management plan developed for the Blue Tier Reserve is outlined in the vision, targets and strategies shown below and is contained in a separate document (Blue Tier Reserve Management Plan, TLC 2017). The TLC uses an adaptive management framework to generate the management plan, to record monitoring of progress towards goals and objectives and to generate annual work plans based on the results of previous implementation and monitoring. This plan is available on the TLC web site (www.tasland.org).

Blue Tier Reserve Management overview

VISION	Manage Blue Tier Reserve for its rainforest values to benefit the community and the surrounding environment, now and in the future.
CONSERVATION TARGETS	GOALS The 2016 condition of the rainforest vegetation communities is maintained or enhanced
SOCIAL TARGETS	GOALS People's connection to nature is maintained or enhanced
STRATEGIES	OBJECTIVES Build Resilience to Climate Change Fire management Potential threats People's connection to nature Good Neighbour policy
KEY ACTIONS	MONITORING ACTIVITIES Work with fire agencies to develop a regional fire management plan Standard long term ecological vegetation and fauna monitoring Neighbours contacted regularly and management issues discussed

Appendix - Species lists

These species lists were compiled by Sarah Lloyd of the Central North Field Naturalists for the Blue Tier area. Not all of these species are necessarily found on the Blue Tier Reserve. Sarah sought advice and identification from a range of experts in their field and compiled this list for the ‘Friends of the Blue Tier’ (<https://www.bluetier.org/>). Expert consulted included Genevieve Gates and David Ratowsky (Fungi), Kevin Bonham (land snails), Gintaras Kantvilas (lichen).

Of note is the long list of the lower ‘plants’: fungi, lichens, liverworts and mosses. The rainforests are particularly rich in these organisms that recycle and store water, carbon and nutrients.

Table 4 Mammals and reptiles of the general Blue Tier area

MAMMALS	REPTILES
Common Brushtail Possum	Blotched Bluetongue
Common Ringtail Possum	Lowland Copperhead
Common Wombat	Metallic Skink
Eastern barred Bandicoot	She-oak Skink (e)
Red necked Wallaby	Tasmanian Tree Skink (e)
Short-beaked Echidna	White-lipped snake
Southern Brown Bandicoot	
Spotted-tail Quoll	FROGS
Sugar Glider	Brown Tree Frog
Swamp Rat	Common Froget
Tasmanian Devil	Southern Banjo Frog
Tasmanian Pademelon	Tasmanian Froglet (e)

Table 5 Birds of the general Blue Tier area

BIRDS	
Non Passerines	Strong-billed Honeyeater (e)
Grey Goshawk	Black-headed Honeyeater (e)
Collared Sparrowhawk	New Holland Honeyeater
Wedge-tailed Eagle	Crescent Honeyeater
Tasmanian Native-hen (e)	Eastern Spinebill
Masked Lapwing	Scarlet Robin
Brush Bronzewing	Flame Robin
Yellow-tailed Black-Cockatoo	Pink Robin
Green Rosella (e)	Golden Whistler
Pallid Cuckoo	Grey Shrike-thrush
Fan-tailed Cuckoo	Grey Fantail

Shining Bronze-Cuckoo	Black-faced Cuckoo-shrike
Southern Boobook	Dusky Woodswallow
Laughing Kookaburra (i)	Grey Butcherbird
Passerines	Black Currawong (e)
Superb Fairy-wren	Grey Currawong
Spotted Pardalote	Forest Raven
Striated Pardalote	Beautiful Firetail
Tasmanian Scrubwren (e)	European Goldfinch (i)
Scrubtit (e)	Welcome Swallow
Tasmanian Thornbill (e)	Silvereye
Yellow Wattlebird (e)	Bassian Thrush
Little Wattlebird	Common Blackbird (i)
Yellow-throated Honeyeater (e)	Common Starling (i)

Table 6 Other fauna of the general Blue Tier area

Velvet worm	Snails
<i>Tasmanipatus barrette</i> (e)	<i>Anoglypta launcestonensis</i> (e)
Arachnids (spiders and mites)	<i>Caryodes dufresnii</i> (e)
<i>Acarina</i> sp.	<i>Cystopelta petterdi</i>
<i>Eriophora transmarina</i>	<i>Dentherona subrugosa</i> (e)
<i>Lycosa</i> sp.	<i>Elsothera ricei</i> (e)
Scorpion	<i>Helicarion cuvieri</i> (e)
Crustaceans	<i>Paralaoma cf. halli</i>
<i>Amphipod</i> sp.	<i>Pasmaditta</i> sp. "Blue Tier" (e)
<i>Astacopsis frankliniae</i>	<i>Pernagera</i> sp. "Hollybank" (e)
<i>Engaeus leptorhynchus</i>	<i>Pernagera officeri</i>
	<i>Prolesophanta</i> sp/ "Strzelecki"
	<i>Stenacapha hamiltoni</i> (e)
	<i>Thryasona diemenensis</i> (e)
	<i>Trocholaoma parvissima</i>
	<i>Victaphanta lampra</i> (e)
Insects	
<u>Mayflies</u>	<u>Flies</u>
<i>Austrophleboides</i> sp.	<i>Chironomid</i> sp.
<i>Baetid</i> sp.	<i>Simulidae</i> sp.
<i>Tasmanophlebia</i> sp.	<u>Butterflies</u>
<u>Dragonflies</u>	Macleay's Swallowtail
<i>Archipetalia</i> sp.	<u>Ants</u>
<u>Stoneflies</u>	<i>Myrmecia</i> spp.
<i>Austroperlidae</i> sp.	<u>Bugs</u>
<i>Gripopterygidae</i> sp.	<i>Schedotrioza</i> sp.
<i>Notonemouridae</i> sp.	

<u>Beetles</u>	
<i>Psephenidae sp.</i>	
<i>Elmidae sp.</i>	
<i>Hoplogonus simsoni (e)</i>	
<i>Hoplogonus bornemisszai (e)</i>	

Table 7 Fungi of the general Blue Tier area

Fungi	
<i>Amanita muscaria</i>	<i>Hypholoma brunneum</i>
<i>Amanita sp. (aff. ananiceps)</i>	<i>Hypholoma fasciculare</i>
<i>Amauroderma rude</i>	<i>Hypholoma fasciculare var. armeniacum</i>
<i>Anthracophyllum archeri</i>	<i>Hypoxylon bovei</i>
<i>Aseroe rubra</i>	<i>Junghuhnia rhinocephala</i>
<i>Armillaria novaezelandiae</i>	<i>Laccaria nothofagii</i>
<i>Aurantiporus pulcherrimus</i>	<i>Laetiporus portentosus</i>
<i>Austropaxillus muelleri</i>	<i>Lentinellus pulvinulus</i>
<i>Bisporella citrina</i>	<i>Leotia lubrica</i>
<i>Calocera guepinoides</i>	<i>Lycoperdon pyriforme</i>
<i>Calostoma fuscum</i>	<i>Marasmiellus affixus</i>
<i>Calostoma rodwayi</i>	<i>Marasmius sp</i>
<i>Cheimonophyllum candidissimum</i>	<i>Melanotus hepatochrous</i>
<i>Chlorociboria aeruginascens</i>	<i>Mycena cyctidiosa</i>
<i>Claudopus sp.</i>	<i>Mycena epipterygia</i>
<i>Clavaria amoena</i>	<i>Mycena interrupta</i>
<i>Clavaria miniata</i>	<i>Mycena kurramulla</i>
<i>Clavaria zollingeri</i>	<i>Mycena lividorubra</i>
<i>Clitocybe "grey-brown"</i>	<i>Mycena mulawaestris</i>
<i>Collybia eucalyptorum</i>	<i>Mycena nargan</i>
<i>Coltricia cinnamomea</i>	<i>Mycena sanguinolenta</i>
<i>Cortinarius rotundisporus</i>	<i>Mycena toyerlaricola</i>
<i>Crepidotus applanatus</i>	<i>Mycena viscidocruenta</i>
<i>Crepidotus stromaticus</i>	<i>Omphalina chromacea</i>
<i>Crepidotus variabilis</i>	<i>Panellus longinquis</i>
<i>Cyttaria gunnii</i>	<i>Panellus stipticus</i>
<i>Cystoderma amianthinum</i>	<i>Pholiota malicola</i>
<i>Dermocybe "blood red"</i>	<i>Pholiota squarrosipes</i>
<i>Descolea recedens</i>	<i>Pholiota viscofumosa</i>
<i>Entoloma aromaticum</i>	<i>Plectania campylospora</i>
<i>Entoloma porphyrescens</i>	<i>Pluteus atromarginatus</i>
<i>Entoloma readiae</i>	<i>Polyporus melanopus</i>
<i>Flammulina velutipes</i>	<i>Postia caesia</i>
<i>Fomes hemitephrus</i>	<i>Postia pelliculosa var. "black-yellow"</i>

<i>Galerina "scurfy"</i>	<i>Psathyrella echinata</i>
<i>Galerina patagonica</i>	<i>Psilocybe brunneoalbescens</i>
<i>Ganoderma applanatum</i>	<i>Ramaria ochraceosalmonicolor</i>
<i>Geoglossum cookeanum</i>	<i>Rhodocollybia butyracea</i>
<i>Gloeoporus taxicola</i>	<i>Rozites metallica</i>
<i>Gymnopilus junonius</i>	<i>Russula "red cap, yellow gills"</i>
<i>Gymnopus "brown frilly"</i>	<i>Russula albonigra</i>
<i>Heterotextus peziziformis</i>	<i>Russula compacta</i>
<i>Hygrocybe aff. coccinea</i>	<i>Ryvardenia campyla</i>
<i>Hygrocybe astatogala</i>	<i>Ryvardenia cretacea</i>
<i>Hygrocybe aurantiopallens</i>	<i>Stereum ostrea</i>
<i>Hygrocybe chromolimonea</i>	<i>Tremella fuciformis</i>
<i>Hygrocybe firma</i>	<i>Tephrocybe "yellowy"</i>
<i>Hygrocybe graminicolor</i>	<i>Vibrissa dura</i>
<i>Hygrocybe lewellinae</i>	<i>Xylaria castorea</i>
<i>Hygrocybe mavis</i>	
<i>Hygrocybe pseudograminicolor</i>	
<i>Hygrocybe taekeri</i>	

Table 8 Bryophytes of the general Blue Tier area

MOSSES	LIVERWORTS	LICHENS
<i>Atrichum androgynum</i>	<i>Acrochila biserialis</i>	<i>Bunodophoron spp.</i>
<i>Camptochaete arbuscula</i>	<i>Bazzania adnexa</i>	<i>Cladina aggregata</i>
<i>Cyathophorum bulbosum</i>	<i>Frullani spp.</i>	<i>Cladina retipora</i>
<i>Dawsonia sp.</i>	<i>Lepicolea scolopendra</i>	<i>Cladina confusa</i>
<i>Dicranoloma billarderi</i>	<i>Lepidozia ulothrix</i>	<i>Cladonia spp.</i>
<i>Hymenodon pilifer</i>	<i>Metzgeria sp</i>	<i>Coenogonium implexicum</i>
<i>Hypnodendron vitense</i>	<i>Plagiochila fasciculata</i>	<i>Hypogymnia spp.</i>
<i>Hypnum chrysogaster</i>	<i>Plagiochila strombifolia</i>	<i>Menegazzia spp.</i>
<i>Hypnum cupressiforme</i>	<i>Radula sp.</i>	<i>Metus conglomeratus</i>
<i>Hypnum cupressiforme</i> var. <i>mossmanianum</i>	<i>Trichocolea mollisima</i>	<i>Peltigera dolichorhiza</i>
<i>Lembophyllum divulsum</i>		<i>Placopsis gelida</i>
<i>Leptostomum inclinans</i>		<i>Pseudocypbellaria colensoi</i>
<i>Leucobryum candidum</i>		<i>Pseudocypbellaria glabra</i>
<i>Lopidium concinnum</i>		<i>Pseudocypbellaria multifida</i>
<i>Macromitrium archier</i>		<i>Pseudocypbellaria rubella</i>
<i>Polytrichum juniperinum</i>		<i>Psoroma spp.</i>
<i>Ptychomnion aciculare</i>		<i>Stereocaulin ramulosum</i>
<i>Pyrrhobryum mnioides</i> subs. <i>contortum</i>		<i>Usnea spp.</i>
<i>Racopilum cuspidigerum</i> var. <i>convolutaceum</i>		
<i>Rhizogonium distichum</i>		

<i>Rosulabryum billardieri</i>		
<i>Sphagnum australe</i>		
<i>Thuidiopsis sparsa</i>		
<i>Tortula sp.</i>		
<i>Ulota lutea</i>		
<i>Weymouthia mollis</i>		
<i>Wijka extenuata</i>		

Table 9 Ferns and fern allies in the general Blue Tier area

Lycopida			
LYCOPODIACEAE		DICKSONIACEAE	
<i>Huperzia varia</i>	long clubmoss	<i>Dicksonia antarctica</i>	soft treefern
<i>Lycopodiella lateral</i>	slender clubmoss	DRYOPTERIDACEAE	
<i>Lycopodium deuterodensu</i>	conifer clubmoss	<i>Polystichum proliferum</i>	mother shieldfern
<i>Lycopodium fastigiatu</i>	mountain clubmoss	<i>Rumohra adiantiformis</i>	leathery shieldfern
<i>Lycopodium scariosu</i>	spreading clubmoss	GLEICHENIACEAE	
<i>Psilotopsida</i>		<i>Gleichenia alpina</i>	alpine coralfern
PSILOTACEAE		<i>Gleichenia dicarpa</i>	pouched coralfern
<i>Tmesipteris obliqua</i>	common fork fern	<i>Gleichenia microphylla</i>	scrambling coralfern
<i>Filicopsida sp</i>		<i>Sticherus tener</i>	silky fanfern
ASPLENIACEAE		GRAMMITIDACEAE	
<i>Asplenium bulbiferu</i>	mother spleenwort	<i>Ctenopteris heterophylla</i>	gypsy fern
<i>Asplenium flabellifoliu</i>	necklace fern	<i>Grammitis billardierei</i>	common fingerfern
<i>Asplenium terrestre</i>	ground spleenwort	<i>Grammitis magellenica nothofageti</i>	beech fingerfern
ATHYRIACEAE		HYMENOPHYLLACEAE	
<i>Diplazium australe</i>	austral lady-fern	<i>Crepidomanes venosum</i>	bristle filmyfern
BLECHNACEAE		<i>Hymenophyllum australe</i>	southern filmyfern
<i>Blechnum fluviatile</i>	ray waterfern	<i>Hymenophyllum cupressiforme</i>	common filmyfern
<i>Blechnum minus</i>	soft waterfern	<i>Hymenophyllum flabellatum</i>	shiny filmyfern
<i>Blechnum nudu</i>	fishbone waterfern	<i>Hymenophyllum peltatum</i>	alpine filmyfern
<i>Blechnum penna-marina</i>	alpine waterfern	<i>Hymenophyllum rarum</i>	narrow filmyfern
<i>Blechnum watsii</i>	hard waterfern	OSMUNDACEAE	
CYATHEACEAE		<i>Todea barbara</i>	southern kingfern
<i>Cyathea australis</i>	rough treefern	POLYPODIACEAE	
DENNSTAEDTIACEAE		<i>Microsorum pustulatum</i>	kangaroo fern
<i>Histiopteris incisa</i>	batswing fern	PTERIDACEAE	
<i>Hypolepis rugosula</i>	ruddy groundfern	<i>Pteris tremula</i>	netted brake
<i>Pteridium esculentu</i>	bracken fern		

Table 10 Dicot flora of the general Blue Tier area

APIACEAE		CAMPANULACEAE	
<i>Hydrocotyle hirta</i>	hairy pennywort	<i>Pratia pedunculata</i>	matted pratia
<i>Hydrocotyle sibthorpioides</i>	entire-leaf pennywort	CARYOPHYLLACEAE	
<i>Oreomyrrhis sp.</i>	native caraway	<i>Cerastium glomeratum</i>	sticky mouse-ear chickweed
<i>Trachymene anisocarpa</i>	parsnip trachymene	<i>Colobanthus sp.</i>	colobanth
APOCYNACEAE		<i>Sceranthus biflorus</i>	knawell
<i>Parsonsia brownii</i>	twining silkpod	<i>Silene gallica (i)</i>	campion
ASTERACEAE		<i>Spergula arvensis (i)</i>	spurry
<i>Bedfordia salicina (e)</i>	blanket leaf	<i>Stellaria flaccida (i)</i>	forest starwort
<i>Cassinia aculeata</i>	dolly bush	<i>Stellaria media (i)</i>	chickweed
<i>Cassinia trinerva</i>	three-veined cassinia	CLUSIACEAE	
<i>Cotula alpina</i>	alpine cotula	<i>Hypericum gramineum</i>	small St John's wort
<i>Cotula coronopifolia (i)</i>	water buttons	<i>Hypericum sp.</i>	St John's wort
<i>Gnaphalium involucratum</i>	cudweed	CONVOLVULACEAE	
<i>Gnaphalium sp.</i>	cudweed	<i>Dichondra repens</i>	kidney weed
<i>Helichrysum leucopsideum</i>	satin everlasting	ELAEOCARPACEAE	
<i>Helichrysum scorpioides</i>	curling everlasting	<i>Aristotelia pedunculata</i>	heart berry
<i>Hypochoeris radicata (i)</i>	cat's ear	EPACRIDACEAE	
<i>Lagenifera stipitata</i>	blue bottle daisy	<i>Epacris gunnii</i>	gunn's heath
<i>Leptorhynchos squamatus</i>	scaly buttons	<i>Epacris impressa</i>	common heath
<i>Leucanthemum vulgare</i>	ox-eye daisy	<i>Leucopogon hookeri</i>	mountain beardheath
<i>Olearia argophylla</i>	musk	<i>Monotoca glauca</i>	golden wood
<i>Olearia lirata</i>	dusty daisy bush	<i>Monotoca sp.</i>	broom heath
<i>Ozothamnus thyrsoideus</i>	arching everlastingbush	EUCRYPHIACEAE	
<i>Ozothamnus hookeri</i>	scaly everlastingbush	<i>Eucryphia lucida</i>	leatherwood
<i>Senecio linearifolius</i>	fireweed	EUPHORBIACEAE	
<i>Senecio quadridentatus</i>	cotton fireweed	<i>Poranthera microphylla</i>	small poranthera
<i>Senecio sp.</i>	fireweed	FABACEAE	
<i>Solenogyne sp.</i>	solenogyne	<i>Oxylobium</i>	shaggy pea
<i>Tanacetum parthenium</i>	feverfew	<i>Pultanaea juniperina</i>	prickly beauty
FAGACEAE		<i>Eucalyptus regnans</i>	stringy gum
<i>Nothofagus</i>	myrtle beech	<i>Eucalyptus viminalis</i>	white gum

<i>cunninghamii</i>			
GERANIACEAE		<i>Kunzea ambigua</i>	tick bush
<i>Geranium dissectum (i)</i>	cranesbill	OLEACEAE	
<i>Geranium sessiliflorum brevicaule</i>	stemless geranium	<i>Notolea ligustrina</i>	native olive
<i>Geranium solanderi</i>	native geranium	ONOGRACEAE	
<i>Pelargonium australe</i>	wild geranium	<i>Epilobium sp</i>	willow-herb
HALORAGACEAE		OXALIDACEAE	
<i>Gonocarpus humilis</i>		<i>Oxalis corniculata (i)</i>	wood-sorrel
<i>Gonocarpus serpyllifolius</i>	alpine raspwort	<i>Oxalis perrenans</i>	native oxalis
LAMIACEAE		PITTOSPORACEAE	
<i>Prostanthera lasianthos</i>	christmas bush	<i>Billardiera longifolia</i>	climbing blueberry
LOGANIACEAE		<i>Billardiera scandens</i>	apple-berry
<i>Mitrasacme pilosa stuartii</i>	stuart's hairy mitrewort	<i>Bursaria spinosa</i>	prickly box
MIMOSACEAE		<i>Pittosporum bicolour</i>	cheesewood
<i>Acacia dealbata</i>	silver wattle	<i>Rhytidosporum procumbens</i>	starry appleberry
<i>Acacia melanoxylon</i>	blackwood	PLANTAGINACEAE	
<i>Acacia mucronata</i>	variable sallow wattle	<i>Plantago paradoxa (e)</i>	mick's plantain
<i>Acacia mucronata ssp. dependens (e)</i>	variable sallow wattle	POLYGONACEAE	
<i>Acacia terminalis</i>	sunshine wattle	<i>Meuhlenbeckia gunnii</i>	macquarie vine
<i>Acacia verniciflua</i>	varnished wattle	PODOCARPACAE	
<i>Acacia verticillata</i>	prickly mimosa	<i>Phyllocladus aspleniifolius</i>	Celery-top pine
MONIMIACEAE		PROTEACEAE	
<i>Atherosperma moschatum</i>	sassafras	<i>Banksia marginata</i>	silver banksia
MYRTACEAE		<i>Peersonia muelleri (e)</i>	highland geebung
<i>Callistemon pallidus</i>	yellow bottlebrush	RANUNCULACEAE	
<i>Eucalyptus amygdalina (e)</i>	black peppermint	<i>Clematis aristata</i>	australian clematis
<i>Eucalyptus delegatensis tasmaniensis</i>	white-topped stringybark	<i>Ranunculus sp.</i>	buttercup
<i>Eucalyptus obliqua</i>	brown-top stringybark	RHAMNACEAE	
<i>Eucalyptus ovata</i>	swamp or black gum	<i>Pomaderris apetala</i>	dogwood
<i>Eucalyptus regnans</i>	swamp o ribbon gum, mountain ash	<i>Pomaderris elliptica</i>	yellow dogwood
ROSACEAE			
<i>Acaena novae-zelandiae</i>	buzzy		
<i>Cotoneaster sp.</i>	cotoneaster	SCROPHULARIACEAE	
<i>Rubus fruticosus (i)</i>	blackberry	<i>Digitalis purpurea (i)</i>	digitalis

RUBIACEAE		<i>Veronica calycina</i>	hairy speedwell
<i>Asperula gunnii curta (e)</i>	short mountain woodruff	STYLIIDIACEAE	
<i>Asperula sp.</i>	woodruff	<i>Styliodium graminifolium</i>	trigger plant
<i>Coprosma hirtella</i>	coffee-berry	THYMELAEACEAE	
<i>Coprosma quadrifida</i>	native currant	<i>Pimelea drupacea</i>	cherry rice-flower
<i>Galium australe</i>	tangled bedstraw	<i>Pimelea ligustrina</i>	tall riceflower
RUTACEAE		URTICACEAE	
<i>Nematolepis squamea</i>	lancewood	<i>Urtica incisa</i>	nettle
SANTALACEAE		WINTERACEAE	
<i>Exocarpos cupressiformis</i>	common native-cherry	<i>Tasmannia lanceolata</i>	mountain pepper
<i>Leptomeria drupacea</i>	erect currantbush		

Table 11 Monocot flora of the general Blue Tier area

CYPERACEAE (sedge family)		POACEAE (Grass family)	
<i>Carex appressa</i>	tall sedge	<i>Agrostis capillaris</i> (i)	browntop bent
<i>Carex breviculmis</i>	shortstem sedge	<i>Agrostis</i> sp.	browntop bent
<i>Carex</i> sp.	sedge	<i>Aira</i> sp. (i)	hairgrass
<i>Gahnia grandis</i>	cutting grass	<i>Anthoxanthum odoratum</i> (i)	sweet vernalgrass
<i>Gahnia</i> sp.	sawsedge	<i>Australopyrum pectinatum</i> (e)	prickly wheatgrass
<i>Lepidosperma elatius</i>	tall sword-sedge	<i>Danthonia</i> sp.	wallaby grass
<i>Lepidosperma ensiforme</i>	arching sword-sedge	<i>Echinopogon ovatus</i>	hedgehog grass
<i>Uncinia tenella</i>	delicate hooksedge	<i>Ehrharta stipoides</i>	weeping grass
JUNCACEAE (rush family)		<i>Holcus lanatus</i> (i)	yorkshire fog
<i>Juncus</i> sp.	rush	<i>Pentapogon quadrifidus</i>	five-awned speargrass
<i>Luzula flaccida</i>	pale woodrush	<i>Vulpia bromoides</i> (i)	squirretail fescue
<i>Luzula</i> sp.	woodrush	<i>Vulpia</i> sp. (i)	fescue
LILIACEAE (lily family)			
<i>Dianella tasmanica</i>	forest flax-lily		
ORCHIDACEAE (orchid family)			
<i>Acianthus caudatus</i>	mayfly orchid		
<i>Bunochilus melagrammus</i>	blackstripe greenhood		
<i>Corysanthes diemenica</i>	stately helmet-orchid		
<i>Glossodia major</i>	waxlip orchid		
<i>Prasophyllum brevilabre</i>	shortlip leek-orchid		
<i>Pterostylis nutans</i>	nodding greenhood		
<i>Pterostylis pedunculata</i>	maroonhood		
<i>Simpliglottis cornuta</i>	green bird-orchid		
<i>Simpliglottis triceratops</i>	threehorned bird-orchid		
<i>Townsonia viridis</i>	beech orchid		