

An aerial photograph of a vast forest. The foreground and middle ground are dominated by tall, mature trees with light-colored trunks and dense, bright green foliage. The forest extends into the distance, where the trees appear as a darker green carpet. In the far background, rolling hills and mountains are visible under a pale, overcast sky. The overall scene conveys a sense of a large, undisturbed natural area.

# Verification of the Heritage Value of ENGO-Proposed Reserves

IVG  
Forest Conservation  
REPORT 5A

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**Verification of the Heritage Value of ENGO-Proposed Reserves**

*An assessment and verification of the 'National and World Heritage Values and significance of Tasmania's native forest estate with particular reference to the area of Tasmanian forest identified by ENGOs as being of High Conservation Value'*

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Tasmanian Forests Intergovernmental Agreement 2011.

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## About the author—Peter Hitchcock AM

The author's career of more than 40 years has focused on natural resource management and conservation, specialising in protected areas and World Heritage. Briefly, the author:

- *trained and graduated*—in forest science progressing to operational forest mapping, timber resource assessment, management planning and supervision of field operations
- *applied conservation*—progressed into natural heritage conservation including conservation planning and protected area design
- *corporate management*—held a range of positions, including as, Deputy Director (Policy and Wildlife), NSW National Parks and Wildlife Service, and the inaugural Executive Director of the Wet Tropics (World Heritage) Management Authority (WTMA) in Queensland, Australia.

The author's professional experience in heritage conservation, including World Heritage, is extensive and ongoing, including:

### Australia

- Commissioner on Australian Heritage Commission (two terms)

### NSW

- Conservation planning, protection and management of forests in parks and reserves
- Team member in World Heritage nomination of the Central Eastern Rainforests of NSW and Qld. (now Gondwana Rainforests)

### Queensland: Wet Tropics World Heritage Area

- First Executive Director of Wet Tropics Management Authority (1991–96)

### Tasmania

- Commissioner on Commission of Inquiry into Southern Forests of Tasmania
- Consultancy on boundary review of TWWHA

### Lebanon

- Consultant advisor to UN Cedars of Lebanon project

### South East Asian Forests

- World Heritage assessment, monitoring, management planning of forests in Indonesia, including Papua.
- Management review of selected National Parks in Indonesia
- Forest Conservation Advisor, BTRF, Indonesia

### South America

- Guyana, World Heritage assessment of forest area

### Papua New Guinea

- Australian Government Adviser, World Heritage and Protected Areas

The author currently operates his Cairns based consultancy, Old Cassowary Consulting (OCConsulting), specialising in natural heritage conservation and World Heritage issues. His World Heritage experience in and/or visits include Argentina, Austria, Canada, Croatia, Guyana, Indonesia, Japan, Kiribati, Lebanon, Madagascar, Malaysia, Nepal, New Zealand Papua New Guinea, Syria, Thailand, Turkey, USA and Venezuela.

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## Executive summary

### Introduction

It proved a challenging task to assess and verify the:

National and World Heritage values and significance of Tasmania's native forest estate with particular reference to the area of Tasmanian forest identified by ENGOs as being of High Conservation Value and referred to in the Tasmanian Forests Intergovernmental Agreement of 7 August, 2011, noting that the ENGO identified HCV areas comprise 572,000 hectares.

Adding to the challenge was the fact that these lands were made up of some 270 different parcels from all parts of Tasmania.

### Assessment methodology

Given strict time constraints on the heritage verification process, most assessments were limited to landscape level assessment, drawing on any accessible and reliable data source.

Information referred to included ENGO documents posted on the Environment Tasmania website at [www.et.org.au](http://www.et.org.au) Particular use was made of published scientific papers and grey literature. A substantial amount of data was extracted from various government online databases, in particular the Land Information Service Tasmania (LIST). Considerable use was made of Google Earth imagery which fortuitously now has a layer showing Tasmanian formal reserve boundaries (not including Forestry Tasmania Forest Reserves). A substantial amount of Forestry Tasmania geospatial data was accessed. Some assessments relied on personal communications with experts and are attributed accordingly. The author is very familiar with aspects of the Tasmanian landscape and was able to draw upon this knowledge in interpreting available data, maps and imagery.

Assessment of individual parcels of land was mostly not comprehensive, and only conducted to the level sufficient to make a definitive finding on whether an area was of likely national or global significance. If a parcel of land was found to be important habitat of a species of national significance, then the assessment was often not extended beyond that identified value. In a number of cases, once an area was assessed as being of World Heritage significance, it was not assessed further for national significance on the assumption that the national significance would shadow global significance.

For some parcels of land, accessible data failed to elucidate any documented values. However, this was not proof positive that the land was not of conservation value. Indeed, in some cases the land appeared likely to be of conservation value but there was no documentation to confirm this. Where there was doubt, a precautionary approach was adopted and the finding left open and recommending further investigation.

In some cases when it was clear that a parcel was most unlikely to have conservation value at a state level of significance or above, the finding was one of 'conservation value not verified'. A significant number of very small parcels were assessed as having no conservation value. These may make locally important contributions to boundary issues.

The author's plea is that while the assessment process was conducted with every reasonable effort to accurately identify any conservation values, it is possible some conservation values have been overlooked. **A precautionary approach is therefore urged throughout the follow-up process.**

### Context for assessment

When assessing land for conservation value and hence heritage conservation significance it is important to understand the land's context. This is especially so for smaller areas of land and was the case for many of the ENGO reserve proposals, some of which were very small.

The geographic and/or ecological context can be critically important to establishing the conservation value(s) of a parcel of land. Some factors important in assessing conservation value include proximity to existing protected areas, other comparable habitat, and connectivity to other lands of known conservation value (see below).

Assessing the relative value or significance also required a contextual knowledge and understanding of the attributes of a piece of land, such as whether the same attributes are locally, regionally or nationally rare, common or are replicated elsewhere.

## Assessment at 'cluster' or landscape level

Given the many and varied parcels of land in the ENGO-proposed reserves, it was in some cases, more logical to assess at a holistic or landscape level. Compared with separately assessed individual parcels, landscape level assessments are based on shared attributes and/or recognisable geographic groupings or 'clusters' of land parcels. It was found that individual parcels in some clusters shared certain attributes and that much of their relative value came from their context within that cluster.

Most notable was the Tarkine area. It was a logical cluster that had already been assessed by others, including the National Heritage Council, as a 'cluster' or a single entity.

It was evident that there were one or two regional-scale 'clusters' in the North East and down the East Coast of the state. This was not surprising given many of the ENGO-proposed reserves within these clusters shared the theme of 'linking landscapes'. This reinforced the need to conduct the initial level of assessment of conservation value at the regional or 'cluster' level, given the role that connectivity might play between individual parcels and existing formal reserves. Smaller sub-regional or local clusters were adopted where there were indications of a shared value or theme for example Mole Creek Karst, Western Tiers, Mersey Valley escarpment.

The assessment found that the aggregate 'linked landscapes' of the North East and East Coast clusters, which includes all existing reserves and a selection of related ENGO-proposed reserves, to be lands of **national heritage significance**.

CAVEAT: In a significant number of cases involving a cluster or landscape level assessment, some existing formal reserves (usually identified in the report) formed an important part of the context for the assessment. The conservation value is often interdependent on the coexistence with those existing reserves. In ALL such cases, the assumption has been made that all existing formal and informal reserves will be retained. Should this not be the case, the assessed values and significance of the ENGO reserves may be downgraded.

## Connectivity

The assessment process placed considerable emphasis on the value of habitat connectivity in assessing the overall conservation **value** of the targeted ENGO-proposed reserves lands. Connectivity conservation is a relatively new science and is still evolving but there is strong consensus on the imperative of connectivity for ensuring successful conservation over time. The definition of 'connectivity conservation' adopted in Worboys, Francis and Lockwood (2010) was used as a guide.

For connectivity to be effective, the connecting corridors must, as far as practicable, allow movement of all relevant species, not just a particular species. Each species will have different requirements for movement and, as far as possible, this should be taken into account in assessing corridors.

This assessment was not a conservation planning and protected area design exercise. Consideration was, however, given to the relative value of the recognisable corridors for achieving long-term biological conservation. While there are no definitive rules about corridor design, simple criteria were used in assessing the relative contribution of connectivity, including:

- the wider the better
- multiple habitat corridors better than single habitat corridors
- multiple connectivity corridors better than single connectivity
- likely robustness over time
- scale of contribution (local, regional, state etc.).

Many informally recognised linear corridors exist within state forests, although many are narrow and along the edges of streams or roadsides. While these may have a local role in wildlife conservation they are not adequate nor can be relied upon for long-term species movement across the landscape at a regional scale.

While it was found that the most important value of some ENGO-proposed reserves was their likely contribution to regional connectivity, many such lands had the potential for contributing other conservation values.

### ***Contributory values***

In assessing the value and significance of some parcels of land, particularly those adjoining or adjacent to the existing Tasmanian Wilderness World Heritage Area, one of the identified conservation values of a parcel was found to be the **contribution** that parcel might make to the value and integrity of the existing Tasmanian Wilderness World Heritage Area.

This was particularly so where an attribute or feature was partly in and partly outside the TWWHA and into adjoining ENGO-proposed reserves. For example, some karst, cave and glacial features were found to cross the boundary. In this case the assessment would conclude that the proposed reserves, if added to the TWWHA, would contribute to the value or integrity of the TWWHA. This was considered grounds for concluding that the land was indeed of high heritage conservation value.

Some plant communities or other ecological features identified in ENGO-proposed reserves were found to have the potential to significantly enhance or add value to the TWWHA. For example, some of the tall eucalypt forests are identified as having the potential, if added to the TWWHA, to add to the ecological diversity of the tall eucalypt forests already cited as an official value of the TWWHA. Where it was clear that adding some lands to the TWWHA would make an important 'contribution to the integrity' of the area, it was concluded that the land parcel was of World Heritage significance.

The concept of contributory values was equally applicable to situations where a parcel could contribute to an existing valued protected area. For example, lands adjoining South Bruny National Park were found to make an important contribution to the value and significance of the national park, in this case by protecting and adding further swift parrot (nationally endangered) nesting areas to the park.

### ***Ongoing natural processes***

It is important to note that the Tasmanian Wilderness World Heritage Area has been listed against criterion (ix):

... to be outstanding examples representing significant **ongoing ecological and biological processes** in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals; (emphasis added)

Further, the conditions of integrity emphasise maintaining the ‘ongoing ecological and biological processes’:

For all properties nominated under criteria (vii)—(x), bio-physical processes and landform features should be relatively intact ... ’ (para 90)

and:

Properties proposed under criterion (ix) should have sufficient size and contain the necessary elements to demonstrate the key aspects of processes that are essential for the long-term conservation of the ecosystems and the biological diversity they contain ... (Para 94)

Many ‘ongoing ecological and biological processes’ are operating in the Tasmanian landscape, which are vital to the maintenance and ongoing evolution of the attributes for which the Tasmanian Wilderness World Heritage Area has been listed. Processes such as erosion, sedimentation, weathering, predation, decay of organic material, karst development and fire are all a part of the TWWHA landscape. One of the most critical and as well controversial processes is that of fire. Fire has played a role in the Tasmanian landscape well before human habitation. The Aboriginal people harnessed it to some extent and the contemporary human population has variously harnessed, used, abused and feared fire.

The protected area manager requires Solomon-like wisdom to balance the occurrence and use of fire to both address the reasonable concerns of society and to ensure that fire has a rightful role as one of the ‘ongoing ecological and biological processes’.

It follows that designing and setting the boundaries of a reserve is a prerequisite to facilitating fire management within the Tasmanian Wilderness World Heritage Area. The author has been very mindful of the dilemmas of fire management and so has factored this into the identification, delineation and facilitation of the ‘ongoing ecological and biological processes’ of which fire is a part.

Much the same principles have been applied to other landscapes not related to the existing TWWHA.

### ***Boundary considerations***

In many cases it was important to provide comment on the boundary implications of protecting particular ENGO-proposed reserves, especially if added to existing protected areas.

In some instances it was apparent that these reserves were designed or selected to address boundary deficiencies of existing protected areas. This is acknowledged and supported where appropriate. Where opportunities for further boundary improvement were identified, these have been recorded.

In some other cases it was apparent that conservation values were the more important consideration and that adding the land parcel to an existing protected area did not necessarily improve the boundary as such, but the contrary was sometimes the case.

Boundary issues for the TWWHA have been contentious since its inscription. The current boundary often makes little ecological or management sense and in most instances creates an artificial barrier to natural ecological interactions. In many instances inappropriate boundaries are a threat to the integrity of the TWWHA. There have been a number of minor changes to the boundary since inscription, none of which have solved the fundamental problems. The proposed revisions to the boundary represent an attempt to resolve the integrity and management challenges once and for all.

### ***Reserve designations***



In Tasmania, the level of security and protection of conservation values varies greatly according to the protected area or reserve designation, so reservation outcomes for the ENGO-proposed reserves could be an important issue.

Where designation has been raised in the report, preference has been given to simply recommend adding the area to the most logical, immediately adjoining existing formal reserve, including forest reserves. However, reservation to the highest level of protection should be applied wherever possible. Similarly, management should be assigned to the most competent authority.

## Key findings

### **General**

1. Most of the 270 ENGO-proposed reserves were assessed and verified to be of either National Heritage significance or World Heritage significance.
2. The assessed natural heritage value and significance of many ENGO-proposed reserves is significantly dependent upon their being integrally related to existing formal reserves.
3. The area known as the Tarkine\* was assessed to be of National Heritage significance and very likely of World Heritage significance. It would add a major new component to the TWWHA, recognising and protecting the largest area of cool temperate rainforest in the southern hemisphere and is recommended for addition to the TWWHA.  
*(\* Approximating the boundaries proposed by the Tarkine National Coalition differs in some important ways from the area currently being assessed by the Australian Heritage Council)*
4. The global significance of a connected area of tall eucalypt forests, albeit involving some restoration, would add a major new dimension to the TWWHA.
5. Many of the ENGO-proposed reserves in the North East and East Coast of the state were recognised as being significant for their habitat connectivity and that many existing formal reserves are critically important to that connectivity.
6. It is apparent that beyond the ENGO-proposed reserves, the great majority of state forest land in Tasmania has been extensively logged and/or converted to plantation with the result that much of the natural heritage values have been destroyed or severely degraded. It follows that in many ways the ENGO-proposed reserves are the last chance to address and protect many natural heritage values remaining in the state forest estate.
7. Many of the ENGO-proposed reserves have the potential for cultural heritage values in addition to their natural heritage values, but this study focused primarily on verifying natural heritage values.

### **The global significance of the tall eucalypt forests**

1. While the small area of tall eucalypt forest within the TWWHA is currently acknowledged as contributing to criteria (vii) and (ix) (... be outstanding examples representing significant ongoing ecological and biological processes ...), albeit with minimal mention, new research and analysis leads to the conclusion that in the context of the TWWHA they satisfy additional World Heritage criterion and more strongly qualify against (vii) and (ix) than previously acknowledged.
2. If considered as the product of an extraordinary dynamic process which is ongoing, it is argued that the whole dynamic interaction of the tall eucalypts and rainforest, the 'syndrome of a fire dependent forest above a fire intolerant forest (that) is only known in the associations between eucalypts and Australian rainforest', represents a unique ecological phenomenon, a 'superlative natural phenomenon' of global significance—'outstanding universal value'—World Heritage.

3. Not only do the tall eucalypt forests readily satisfy criterion (vii), (ix) and (x), it is highly likely that these forests also satisfy criterion (viii).
4. On this basis encompassing a functionally integrated 'connectivity corridor' of tall eucalypt forest into the TWWHA would make an outstanding contribution to the values captured and protected in the TWTasmanian Wilderness.

### **Other values**

1. At the time this report was being written substantial additional information was received revealing significant biodiversity and ecological values in many of the 270 ENGO-proposed reserves. There has not been time to attach these values to the clusters used for assessment in this report. However, it is clear that significant values exist for many of the ENGO proposals, adding weight to the conclusions regarding World Heritage and National Heritage significance. Particularly relevant is the analysis revealing the major contribution most of the proposed extensions would make to the protection of globally significant invertebrate fauna and the newly discovered and globally outstanding diversity of macro fungi.

### **Cultural heritage**

Significant information has also been provided in relation to important Aboriginal cultural sites, including for significant sites not currently protected in the TWWHA, which require full formal assessment.

### **Area specific findings**

#### **Southern Forests (Cockle Creek to Upper Derwent)**

A substantial proportion of the forested ENGO-proposed reserves adjoining and adjacent to the eastern boundary of the Tasmanian Wilderness World Heritage Area were found to have important conservation values. If added to the adjoining TWWHA they would make important contributions to its integrity. Many of these values derive from the area's tall eucalypt forests but a significant number of areas other important heritage attributes including karst, caves, Aboriginal sites and glacial features. Given their adjacency, these important attributes would add to the values and integrity of the TWWHA. Particular attention is drawn to the potential in these areas to maintain ongoing natural processes, especially those directly relevant to the TWWHA.

- Picton–Huon–Weld and Styx valleys

Notwithstanding that significant areas have been logged, a holistic long-term view was taken in establishing the contribution that the areas can make to conserving tall eucalypt forest and associated ongoing natural processes. Some rehabilitation will be necessary to restore the ecology of the area in the longer-term.

- Styx River

This is an area of outstanding conservation value and of global significance. It is also a complicated area given the extent of recent logging, which has degraded the natural integrity of the forest landscape. The conservation values are high enough to warrant taking a holistic long-term approach, which must include rehabilitating degraded areas, including removing recently-introduced eucalypt species. The Styx offers one of the rare opportunities to protect tall eucalypt rainforest at a scale and nature that makes it possible to maintain ecosystem processes in the longer term. It also includes a good representation of the world's tallest flowering plant, *Eucalyptus regnans*.

- Upper Florentine–Mount Field

Assessing some of the ENGO reserves in this area led to considering Mount Field National Park as an integral part of the cluster of conservation attributes. As a result, it is recommended that Mount Field National Park, together with associated ENGO-proposed reserves and public reserves, be added to the Tasmanian Wilderness World Heritage Area.

- Upper Derwent

The assessment confirmed the conservation importance of tall eucalypt forest on the west side of the Derwent Gorge. It also confirmed the importance of the potential restoration of previously identified wilderness values and the appropriateness of adopting the Derwent Gorge as a permanent boundary to the World Heritage Area.

### **West Coast (between TWWHA and the west coast, south of Pieman River)**

It has long been recognised that this region has very important conservation values. There is also considerable interest in known and prospective mineralisation that has prevented the area being reserved as national park and/or being added to the TWWHA. Under the World Heritage Convention, there is an obligation on State Parties to at least identify and protect World Heritage values. This assessment contributes to identifying World Heritage values. Every opportunity should be taken to at least upgrade the level of protection of these areas, if not add them to the World Heritage Area.

An aggregate of ENGO-proposed reserves and associated formal reserves identified as being collectively of World Heritage value and recommended for addition to the TWWHA is illustrated on the appended map (Map 1).

### **Northern TWWHA (Great Western Tiers, Central Plateau, Mole Creek Karst, Mersey, Cradle Mountain)**

#### *Great Western Tiers*

- Some obvious ‘clusters’ or ‘themes’ were adopted to assess the heritage values and significance along the northern boundary of the Tasmanian Wilderness World Heritage Area. Many of the ENGO-proposed reserves adjoining or adjacent to the northern boundary proved to contain significant conservation values, which made important contributions to the values and/or integrity of the TWWHA. That is, they are of World Heritage significance. The net result of the assessment of the lands below the cliffs of the Great Western Tiers is a shift in the northern boundary of the TWWHA from the plateau to below the escarpment—although some related precedents already exist. Most of the proposed additions below the escarpment are obvious.

#### *Central Plateau*

- Some areas were found to be of definite importance for adding to the TWWHA. It is apparent, however, that on more eastern parts of the Central Plateau the values need to be reviewed to design a robust and sustainable north-eastern boundary for the TWWHA. More detailed study is required in this area.

#### *Mole Creek Karst*

- The ENGO-proposed reserves in the Mole Creek karst region were demonstrably of potential World Heritage significance. The ENGO-proposed reserves provide the opportunity for an important consolidation of karst protection and the addition of the balance of Mole Creek Karst National Park to the TWWHA.

As with the Tarkine and the North East, the juxtaposition of the ENGO-proposed reserves with existing formal reserves is critically important to both assessed values and significance, as well to consolidating protection.

### **Tarkine cluster**

This cluster was assessed as having very high conservation value of at least National Heritage significance and substantial values of global (World Heritage) significance. As with a number of other cluster sites, the existing formal reserves make a major contribution to the overall heritage value and significance of the Tarkine. It was noted that the area currently the subject of National Heritage assessment by the Australian Heritage Council has had excised from further consideration some areas which the author has assessed as potentially very important to the area's integrity, especially its ecological integrity (Sumac Road area). An area recommended for consideration as a World Heritage nomination is shown on the attached map (Map 1). Note that the Tarkine might best be considered as an extension of the Tasmanian Wilderness World Heritage Area, especially given the likely connectivity between the two.

### **North Coast ENGO reserves**

A series of ENGO-proposed reserves along the north coast and not associated with the Tarkine, TWWHA or the North East cluster were separately assessed and presented in the report findings. Although most contained significant conservation values of state significance, none were considered to achieve global (World Heritage) level significance. Several clusters were assessed to be of National Heritage significance as follows:

- Dismal Swamp
- Rare plant community plus important geoconservation feature.
- Shakespeare Hills—Dip Range ('Keith River Cluster' on map)
- A substantial tract of land that is linked to the Tarkine to the south and was considered as a potential part of a Tarkine protected area. Some potentially have values which contribute to a World Heritage listed Tarkine. Based on the major extent of this cluster and its direct link to the Tarkine, the area was assessed, albeit with limited available data, as likely to be of national significance and should, as a precaution, be assessed as such.
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### **North East cluster**

The North East and East Coast were found, with minor exceptions, to be so interconnected that they were assessed as two aggregate areas or 'clusters'. The combined effect of all the existing formal reserves and the ENGO-proposed reserves is that it is potentially a single protected area with a high degree of connectivity between component parts. This was no surprise given the way the 'linking landscapes' concept had guided selection of the ENGO-proposed reserves.

It also became apparent during the assessment that the north east of Tasmania, as well as comprising bioregions separate and distinct from those in western Tasmania, also demonstrated biodiversity and genetic differences when compared with western Tasmania. This was supported by a growing amount of research. It suggests a long-standing separation of the respective biotas—the 'two Tasmanias'. This evolutionary separation contributed to assessment of the North East-East Coast cluster(s) to be of National Heritage significance.

It is very important to recognise that it is the combination of the existing reserves and the ENGO-proposed reserves that elevated the assessed significance to national significance.

Notwithstanding, ‘core areas’ such as Ben Lomond and Mount Maurice might independently rate as being of national significance because of the concentration of conservation values (rainforest, tall eucalypt outlier, glacial, geoconservation, threatened plant communities)

The aggregate clusters in the North East and East Coast that are assessed as being of national heritage significance are illustrated on the attached map. They are:

*North East cluster*

- The North East cluster is illustrated on the accompanying summary map (Map 1). This map shows the overall extent and interconnectedness of the existing and proposed reserves.

*Douglas Apsley (East Coast) cluster*

- The reality is that the assessment process discovered that connectivity between the North East Cluster and the Douglas Apsley cluster was reasonably effective. This illustrates that the National Heritage significance of both clusters are ecologically linked. Indeed, the two clusters should be considered conceptually as a single protected area complex.
- As with the Southern Forests, industrial logging of the forests in the North East has now reached a critical stage, or more to the point the remaining unlogged forests have reached a critical stage. Unless the opportunity is taken to protect these remaining forest remnants, the North East will be quickly reduced to an archipelago of island reserves. This verification process has demonstrated that option for an integrated connected reserve system remains an option—maybe a case of a single ‘Swiss cheese’ reserve versus an archipelago of island reserves. Even the ‘Swiss cheese’ protected area option is of much greater heritage conservation value than a landscape reduced to isolated islands.

## **Other National Heritage reserves**

Several other ENGO reserves or clusters of reserves not addressed in the above categories were assessed to meet National Heritage criteria. They are:

- Wellington Range

This was originally considered as an integral part of an ENGO-proposed reserve that adjoined the World Heritage Area. It was decided that, notwithstanding the increasing evidence of the conservation values of the Wellington Range, it would not be appropriate as an addition to the World Heritage Area. This significant tract of mostly eucalypt forest undoubtedly has important conservation values as well, because of its connectivity to the World Heritage Area. It could, therefore, be seen as complementing the TWWHA. Together with Mount Wellington, the Wellington Range was assessed to be of National Heritage significance.

- Bruny Island

The ENGO-proposed reserves on Bruny Island were assessed as a cluster that included South Bruny National Park. A selection of the ENGO-proposed reserves, the ones that were most relevant to the National Park, was assessed as being of National heritage significance. The habitat of a nationally endangered species, the Swift parrot, was an important contribution to the assessment.

- Tasman—Forestier Peninsula

The combination of conservation values in the cluster comprising both the ENGO-proposed reserves and Tasman National Park were considered to be potentially of National Heritage significance. A small part potentially makes a contribution to the landscape integrity of the adjacent Port Arthur section of the Convict Sites World Heritage Area.

The combination of the assessments, verification of national or world significance and subsequent recommendations offers the opportunity to greatly improve the values and integrity of the TWWHA and to create a more robust and appropriate permanent boundary to the area. Given that much of the assessment was conducted using a holistic approach it would be a mistake to disaggregate the various parcels when considering implementing as a significant number of land parcels are interdependent.

The need for more detailed investigation of some localities has been identified. This includes the need for 'gap filling' in some important breaks in connectivity. Further conservation planning is needed to establish robust and more appropriate boundaries, especially in the North East.

The assessment process was significantly constrained by data deficiencies for some individual ENGO-proposed reserves and so further investigation is recommended in those instances. Deficiencies in data available at the time prevented verification in a number of cases where significant conservation values appeared likely. More detail for some areas is available in the body of the report.

Finally, it is apparent that many of the ENGO-proposed reserves have a sound base in conservation planning. Many will make very important contributions to the existing Tasmanian Wilderness World Heritage Area, adding both to the integrity of the area and in many cases to a more robust and appropriate boundary than presently exists. The Tarkine emerged as an area of outstanding heritage value of World Heritage significance. The verification process confirmed the importance of the 'linking landscapes' concept in the North East and the East Coast. The national significance of the North East and closely associated East Coast clusters emerged from the assessment process.

## Background

### Issues relating to the Tasmanian Wilderness World Heritage Area (TWWHA)

The eastern boundary of the Tasmanian Wilderness World Heritage Area has long been recognised as unsatisfactory. Many areas, which are contiguous with the World Heritage Area, have been omitted from inclusion in the TWWHA despite being evaluated and recommended for World Heritage listing by IUCN as far back as 1988.

The 1988 IUCN field evaluation identified a number of tall forest areas, which should have been included in the World Heritage Area. The findings of the 1988 IUCN field mission report are reflected in IUCN resolution 18.70.

Despite numerous attempts to resolve the issue, including a reactive field mission in 2008, the World Heritage Committee, at its 32<sup>nd</sup> session in Quebec City 2008 reiterated an invitation to the state party to ‘consider at its own discretion, extension of the property to include appropriate areas of tall eucalyptus forest, having regard to the advice of IUCN’, and made a similar request regarding cultural sites.

Conflict has been ongoing between commercial logging operations and areas recognised to have World Heritage value by all relevant heritage experts. This has ensured that the logging operations and the subsequent damage to these forests, which are essentially ‘World Heritage in waiting’, have remained controversial. It has also prompted many attempts by Tasmanian and Australian Governments to resolve this issue.

The most recent recommendation by IUCN adopted at the 4<sup>th</sup> World Conservation Congress in October 2008 states the following:

#### ***The World Conservation Congress at its 4th session in Barcelona, Spain, 5–14 October 2008***

##### 4.124 Forest conservation in Tasmania

RECALLING Recommendation 18.70 *Wilderness and Forest Conservation in Tasmania* adopted by the 18th IUCN General Assembly (Perth, 1990) and Recommendation 19.89 *Forest Conservation in Tasmania, Australia* adopted by the 19th IUCN General Assembly (Buenos Aires, 1994);

NOTING that IUCN is committed to the importance of maintaining the integrity of the IUCN Protected Area Categories;

NOTING that in decision 32 COM 7B.41, taken by the World Heritage Committee at its 32nd session (Quebec City, 2008), the Committee ‘*Reiterates its request to the State Party to consider, at its own discretion, extension of the property to include appropriate areas of tall eucalyptus forest, having regard to the advice of IUCN*’;

NOTING that IUCN’s advice to the 32nd session of the World Heritage Committee included the following: ‘In the view of IUCN, it would be desirable that a moratorium on logging activity in areas of potential outstanding universal value be considered, as logging in these areas would foreclose the option of adding these areas to the property’;

ALARMED that most of the forests in the nine areas identified in IUCN Recommendation 18.70 (Beech Creek/Counsel River, Wylds Craig, Gordon and Tiger Range, Upper Florentine, Upper Styx, Middle Weld, Middle Huon, Picton Valley and Southeast Cape) are still under threat from logging activities;

RECALLING that Recommendation 18.70 called on the Tasmanian State Government and the Government of Australia to protect all National Estate areas contiguous with the current

Western Tasmanian Heritage Site and the temperate rainforests of north-west Tasmania already listed on the Register of the National Estate; and

AWARE that these areas together with the Tasmanian Wilderness World Heritage Area comprise one of the world's greatest temperate wilderness areas and are home to rare and threatened species such as the Tasmanian Wedge-Tailed Eagle *Aquila audax*, the Spotted-Tail Quoll *Dasyurus maculatus* and the Giant Freshwater Crayfish *Astacopsis gouldi*;

The World Conservation Congress at its 4th Session in Barcelona, Spain, 5–14 October 2008

CALLS ON the Tasmanian and Australian Governments to implement urgently decision 32 COM 7B.41 of the 32nd session of the World Heritage Committee (Quebec City, 2008) in which the Committee: *Reiterates its request to the State party to consider, at its own discretion, extension of the property to include appropriate areas of tall eucalyptus forest, having regard to the advice of IUCN*, and recalls IUCN advice to the World Heritage Committee that: *it would be desirable that a moratorium on logging activity in areas of potential outstanding universal value be considered, as logging in these areas would foreclose the option of adding these areas to the property*'.

The Australian Government responded to decisions WHC 34 COM 7B.38 and WHC 34 COM 8B.46 on 1 February 2012.

### **World Heritage Committee decision: 34 COM 7B.38**

The World Heritage Committee:

1. Having examined Document WHC-10/34.COM/7B
2. Recalling Decision 32 COM 7B.41, adopted at its 32nd session (Quebec City, 2008)
3. Recognises the efforts made by the State Party to address the actions requested in Decision 32 COM 7B.41
4. Welcomes the submission of a draft Statement of Outstanding Universal Value for the property
5. Thanks the State Party for proposing a minor modification to include 21 formal reserves within the property that are already covered by the Tasmanian Wilderness World Heritage Area Management Plan, also welcomes its commitment to add the Melaleuca–Cox Bight area to the property once mining licences have expired, and also recalls its request regarding the potential for further additional areas to be considered at the discretion of the State Party for eventual addition to the property
6. Notes the potential for impact on the integrity of the existing World Heritage property from adjoining forestry operations, and requests the State Party to maintain rigorous assessment and management systems to ensure that no such impacts arise;
7. Also requests the State Party to finalize as soon as possible the creation of a mechanism involving all relevant stakeholders, to monitor, assess and manage the impact of forestry operations, road construction and regeneration on the integrity of the Tasmanian Wilderness World Heritage Area, and adjoining reserves, as previously requested by the Committee;
8. Further requests the State Party to submit to the World Heritage Centre, by 1 February 2012, an updated report on the state of conservation of the property, especially on the outcomes of the monitoring arrangements focusing specifically on the impact of the logging operations and road construction on the Outstanding Universal Value of the existing property, for examination by the World Heritage Committee at its 36th session in 2012.



The Australian Government, in its report to the World Heritage Committee of 1 February 2012, advised that:

The Australian and Tasmanian Governments have entered into a new process to further protect Tasmania's public native forests while also ensuring a sustainable forestry industry.

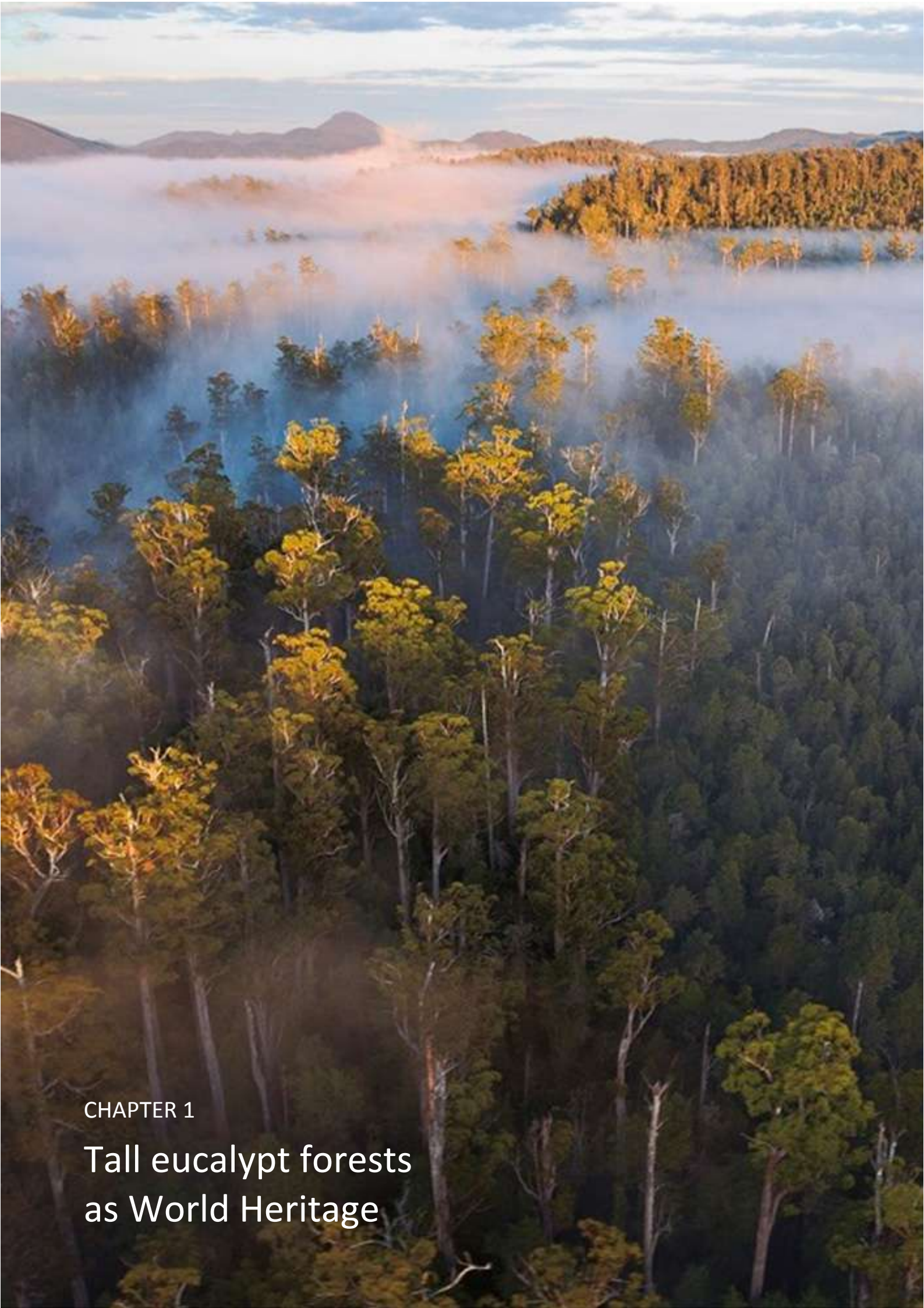
The Prime Minister, the Hon. Julia Gillard MP, and the Tasmanian Premier, the Hon. Lara Giddings MP, signed the Tasmanian Forests Intergovernmental Agreement on 7 August 2011. This delivers on the governments' commitment to provide certainty for Tasmania's forestry industry, for local jobs and communities, and further protection for the state's ancient forests.

Under the terms of the agreement, significant iconic areas adjacent to the Tasmanian Wilderness World Heritage Area will be given interim protection from logging activities, including the Upper Florentine, and areas within the Styx, Huon, Picton and Counsel River valleys, while an independent verification process to assess the values of these areas and available timber reserves is undertaken. Following conclusion of this verification process, the Tasmanian Government will provide legislative protection for those areas identified as being of high conservation value and compatible with wood supply guarantees to the forestry industry. This protection will be provided by the Tasmanian Government through appropriate forms of land tenure, and may include possible nomination of appropriate areas for inclusion in the Tasmanian Wilderness World Heritage Area.

This verification process confirms the previous evaluations, in finding that the eastern boundary of the Tasmanian Wilderness World Heritage Area is unsatisfactory and currently does not include many areas already evaluated by IUCN to be of outstanding universal value.

New information obtained as part of the verification process substantially increases our understanding of the global significance of the tall eucalypt forests contained within these areas and reinforces the need for their inclusion within a revised World Heritage area.

A map is attached with a recommended revised boundary, in line with IUCN's recommendations and the Australian Government's undertakings to the World Heritage Committee to resolve this long-running problem.



CHAPTER 1

# Tall eucalypt forests as World Heritage

# Chapter 1

## Tall eucalypt forests as World Heritage

### Global and national context of ‘tall eucalypt forests ecosystem’

#### Introduction

To understand the ongoing debate about conserving so called ‘tall eucalypt forests’ in Tasmania, and in parts of Australia, it is essential to understand the ecology and global heritage significance of these forests.

The adequacy of protection of the tall eucalypt forests of Tasmania, and especially those along the eastern boundary of the Tasmanian Wilderness World Heritage Area has been debated for decades.

It is essential to understand the context, both temporal and spatial of any places or features of potential heritage significance such as the tall eucalypt forests, in order to assess their significance.

A number of the ENGO-proposed reserves, the subject of this heritage verification processes comprise tall eucalypt forests, in particular in the ‘Southern Forests’, from Cockle Creek near South Cape northwards along the World Heritage boundary to the Upper Derwent. Tall eucalypt forests are also present in a number of other ENGO-proposed reserves elsewhere, such as in the Tarkine and the North East of the state.

#### Defining tall eucalypt forest

Tasmania is renowned for its ‘giant trees’, with individual trees that have been measured being very tall even by global standards. The ‘giant trees’ of Tasmania are just four to five species of tall growing eucalypts that make up the tall eucalypt forests. The individual trees are undoubtedly of outstanding heritage value and contribute to assessment of the overall heritage values of the forests in which they occur. No-one disputes the importance of individual giant trees and their heritage significance at the state, national or global levels. But individual trees are not forests although they are useful indicators of where the best developed tall eucalypt forests are.

The tall eucalypt forests and the ecosystems of which they are a part, and how to define and recognise them have been the subject of debate for decades. Scientists, foresters and conservationists often see the forests differently but for conservation and heritage assessment it is important to understand them and preferably have a defensible definition. A very recent unpublished paper (Tng, Williamson, Jordan et al. 2012) has adopted a stand height of 70 metres for defining the ‘Giant Eucalypt Forests’. Others have nominated stand heights ranging from 40 metres to 65 metres for ‘tall’ eucalypt forests but the perceptions and understanding of what it is that is being defined vary significantly.

The simple matter is that the tall eucalypt forests of Tasmania, Australia, indeed the world, have not yet been defined by consensus because we are still trying to comprehend where they fit into the ecology of the world’s forests. But by describing their origin, location, appearance, and ecology we are getting closer to being able to find the concepts and terminology that will eventually define them. They are not just forests made up of tall growing eucalypts, and this is one of the confusions. The reality is that the tall eucalypt forests are distinguished by the

fact that they occupy ‘rainforest habitat’, habitat with climate and soils conducive to the development of rainforest. Little surprise then that both eucalypt and rainforest species may cohabit such sites, leading to the dichotomy of those who seek to interpret such forests as either ‘eucalypt forest’ or as ‘rainforest’, even giving them a name that is neither, such as ‘mixed forest’. ‘Tall eucalypt forests’, sometimes qualified as ‘tall (wet) eucalypt forest’, is one term in use that seeks to recognise the distinctiveness of these forests. It is adopted in this report to be consistent with the popular use of the term.

In order to spatially identify tall eucalypt forest a conceptual model has to be adopted, Hitchcock 2012 (in prep) has reviewed current thinking, research and methods for considering the ‘tall forest ecosystem’. While acknowledging that a definition is not yet possible there are three components identified which can be used to establish an indicative spatial layer for this ecosystem in Tasmania.

The three components that can be spatially identified using current available data are: Vegetation Community, Height Potential, (by using height potential data the analysis is constrained to public land), old-growth and Forestry Tasmania’s disturbance classes. Old-growth and regeneration year are surrogates for condition. Appendix 1: Spatially Identifying Tall Eucalypt Forests in Tasmania further describes the approach adopted to spatially identify tall eucalypt forests.

As several authors have documented, the delimitation of rainforest and mixed forests from sclerophyll forests has led to considerable debate, especially between conservation and forestry groups (Lynch & Neldner 2000, Bowman 2000, Kirkpatrick & DellaSella 2011). These debates demonstrate that the definition of these vegetation types can have significant implications for the conservation and management of these systems. (Williams 2012,

#### **Definition 1**

Rainforest in Australia is a tree-dominated plant formation, where the tallest tree layer is usually closed (with a projective foliage cover of greater than 70%) and greater than 5 m in height. Rainforest also includes tree-dominated plant formations where the tallest tree layer is not closed (projective foliage cover of less than 70%) and the canopy is less than 5 m high, but the tallest trees are rainforest species. (\*\*Additional qualifying criteria for Definitions 2 and 3). Rainforest plant species are adapted to regenerating in the low-light conditions experienced under the closed canopy or in localised gaps caused by recurring disturbances which are part of the natural rainforest ecosystem, and are not dependent on fire for successful regeneration. The closed-canopy mangrove communities are specially adapted to the intertidal zone, and should be considered a distinct formation.

#### **Additional qualifying criteria for Definition 2**

\*\*The ecological definition of rainforest includes transitional (ecotonal) and seral (secondary or mixed) communities with a minimal (to be defined—somewhere between 5 and 50%) component of emergent non-rainforest species, where the community is of similar botanical composition to mature rainforests in which non-rainforest species are absent.

#### **Additional qualifying criteria for Definition 3**

\*\*The ecological definition of rainforest includes the late successional stages of transitional (ecotonal) and seral (secondary or mixed) communities with emergent non-rainforest species in their older growth stages, where the community is of similar botanical composition to mature rainforests in which non-rainforest species are absent.

unpublished)

**Box 1:** A nationally applicable rainforest definition developed by Lynch & Neldner (2000) designed to apply across Australia. The first definition forms the basis for all three

recommended definitions. The additional two definitions incorporate mixed forests. in Williams 2012 (unpublished)

There is a tendency to recognise three components in the rainforest—wet sclerophyll eucalypt forest, with an intermediate or transition forest being described, perhaps rather aptly, as ‘mixed forest’ (Williams 2012), that is:

- rainforest
- mixed forest
- wet sclerophyll eucalypt.

## Context for assessment

In the quest to understand the tall eucalypt forests, it is instructive to explore the evolving knowledge of their origins in a geological time scale.

Separation of the Australian continental plate\* from Antarctica, the final step in the breakup of the Gondwana super-continent, saw Australia drifting northward for the next 60 million or more years. The overall climate change inflicted first by the separation (resulting in creation of a circumpolar ocean current) and northward drift (increasing warmth) ultimately led to incremental drying of the continent, especially in the past two million years. This imposed a dramatic but incremental shift from the presumed previously vast rainforest cover of Australia subsequent to separation, favoring sclerophyllous vegetation adapted to increasingly drier conditions.

\* Includes much of what is now the island of New Guinea, being part of the Australian tectonic plate.

Many elements of the moisture-loving rainforest vegetation characteristic of Gondwana prior to the split of Australia from Antarctica failed to adapt to the dramatic drying of the continent. This led to extinctions or vegetation being forced to retreat to those increasingly limited areas where climatic conditions remained conducive to their survival—climatic refugia. Western Tasmania is an obvious example of such refugia and hence the survival of many cool temperate rainforest species and communities in that region.

The rainforests of predominantly Gondwanan species on the Australian continent (includes New Guinea up to 6,500 years ago) retreated to the point where today, circa 60 million years since the Australian continent split from Antarctica, they are now largely limited to just a scatter of relict forests in Tasmania, in south-east and eastern mainland Australia and in the cooler mountains of New Guinea. Other continental and island fragments of Gondwana also retained some of the Gondwanan rainforest, notably South America and New Zealand where southern beech forests (*Nothofagus* species) survive to the present.

The two areas of greatest extent where cool temperate forests survive on the Australian tectonic plate are in the wet highland regions of New Guinea and the wet mountains of western Tasmania, including the Tarkine. Smaller isolated relict communities survive in the highlands of North East Tasmania, the Otway Ranges in Victoria and mountainous terrain along the Great Dividing Range and Great Eastern Escarpment from eastern Victoria to the Wet Tropics of northern Queensland.

In response to the increasingly drier conditions, some elements of the Gondwanan biota, both plants and animals, were favored and underwent major evolutionary adaptation and radiation into the new drier habitats. Most spectacularly the eucalypts evolved into a diverse array of hundreds of species that would eventually occupy and dominate almost every one of the new niche habitats across the continent. Although a few species escaped into islands north of the Australian plate, the eucalypts and their many close relatives have become synonymous with the Australian continent, a distinctly Australian biota. Only nine eucalypt species are not

found in Australia. No other continent has a comparable extant biota so distinctly different to all other continents.

A recent study of 52 million-year-old (Eocene) fossils discovered in Patagonian Argentina in South America reveals graphic evidence of plants that we would today recognise as eucalypts. This raises the possibility that ancestral eucalypts had already evolved in Gondwana prior to the separation of Australia and Antarctica and likely prior to the separation of South America from Antarctica. Although it was long believed that the eucalypts evolved in situ in Australia (Specht & Specht 2002), long after separation from Antarctica, it is now apparent that the evolutionary history of the eucalypts is much older and likely existed prior to final breakup of Gondwana (Gandolfo et al. 2011).

Furthermore, other fossil evidence from the 52 million-year-old Patagonian fossil site reveals that the 'eucalypts' of Patagonia closely coexisted with rainforests, suggesting the cohabitation or interaction of eucalypts with rainforest has a much older history than some have previously assumed.

The presence of *Eucalyptus* in Eocene South America, however, adds a new dimension to what was once a regionally limited understanding of the biogeographic history of the genus and suggests that *Eucalyptus* also once occurred on Antarctica, because this continent served as a connection between Australia and South America during the Paleogene. —Gandolfo et al. 2011

Based on the South American fossils, it is apparent that the present day eucalypts in Australia are directly traceable to ancestral eucalypts prior to the split from Antarctica, suggesting eucalypts are every bit as Gondwanan as the much publicised rainforests, indeed that perhaps they have coexisted and likely cohabited since before the split of Australia from Antarctica.

The question arises as to whether the present day eucalypt species that compete with rainforest are direct descendants of the ancestral eucalypts that occupied the same ecological niche in Gondwana. While it is tempting to conjecture that the 'tall eucalypt' species of today are the direct descendants, the evidence is not yet definitive. The eucalypt fossils certainly have characteristics that are shared with at least one modern eucalypt (*E. microcorys*), a feature tree of tall eucalypt forests of northern New South Wales where it is often found in close association with Gondwanan warm temperate rainforest.

Eucalypts and rainforest species have coexisted for 27 million years, in Victoria at least. The widespread radiation of sclerophyllous taxa appears to have occurred around 20 Ma, with wet eucalypt forest and mixed forest communities identified elsewhere around 10–15 Ma. —Williams 2012

While our understanding of the evolution of eucalypt species continues to grow, especially given new analytical techniques, it is likely that wet eucalypt forests and mixed forests have existed widely in some form for at least 10–15 million years. Given that there is strong fossil evidence *Nothofagus* and eucalypts coexisted as long ago as 27 Ma (Stear et al. 2005), certain vegetation associations go back even further in some parts of Australia. The recent discovery of eucalypt macro-fossils associated with rainforest species in Patagonia, and new phylogenetic analyses (e.g. Crisp et al. 2011), raise many questions about the evolution and interaction of eucalypt and rainforest taxa. These and other studies point to a longer and more geographically diverse evolutionary history for eucalypts than previously thought. —Williams 2012

Given the latest evidence of the evolutionary history of the eucalypts, particularly the fossil evidence from South America, it seems likely that ancestral eucalypts not only coexisted with but cohabited with rainforest in Gondwana and that the competitive interaction between these two communities is perhaps not a newly evolved phenomenon but rather one of great antiquity. Only further fossil evidence, particularly from Australia, is likely to reveal the extent of that antiquity.

The eucalypt and eucalypt-related biota has undergone adaptive radiation to almost every habitat in the continent, from near desert conditions, to hot monsoon tropical to alpine environments. Most eucalypt species now occupy habitats where conditions are no longer conducive to rainforest plants and therefore development of rainforests.

The eucalypts as a whole demonstrate extraordinary adaptation to a huge spectrum of habitat types across Australia and the islands to the north of Australia. It is, however, only a select few species that have remained in or adapted to life in the relatively uncommon higher rainfall/wet conditions. This brings them into direct competition with the shade tolerant rainforest species and hence closed canopy rainforests.

A relatively select few species of the hundreds of eucalypts presently occupy rainforest habitats and are able to compete with or become part of a rainforest. Increasingly the tall eucalypt forests existing in rainforest habitat and which cohabit with rainforest plant and animal species are increasingly being described by ecologists as rainforests (Tng et al. 2012) To the lay person the question is naturally ‘how can a eucalypt forest develop in rainforest habitat, let alone be called a rainforest?’

All of the more than 600 species of eucalypts\* share one particular characteristic, that of being essentially **shade intolerant**. As a consequence they require direct sunlight to germinate. Eucalypts therefore cannot regenerate under a shading rainforest canopy, but as can be readily demonstrated in many parts of Tasmania, the east coast forests of Australia, New Guinea, Sulawesi (Indonesia) and the Philippines, eucalypts are commonly found in rainforests—but only as an emergent tree with the crown held above the shading rainforest.

\* Eucalypts is here used in the broader sense (*sensu lato*) and includes the related taxa such as *Eudesmia*, *Corymbia* and *Angophora*.

Those distinguishing evolved characteristics of the tall (wet) eucalypt species, which are able to occupy rainforest habitat, even cohabit with rainforest, include:

- **Tallness:** only those eucalypt species capable of growing taller than rainforest would be capable of surviving the shading canopy of rainforest; the taller the rainforest the taller eucalypt must be to compete.
- **Rapid growth:** to facilitate growth at a rate faster than competing rainforest species. This allows eucalypts to take advantage of the rare occasion of exposure of the forest floor to light as a result of fire or other gross disturbance, so ensuring continued site occupation, albeit with a rainforest understorey.
- **Flammability:** the flammability of eucalypts and their litter (e.g. oil rich leaves, durable and combustible wood) plays an essential role in destroying the shading rainforest species to expose mineral soil conducive to germination of eucalypt seed.
- Seeds which are:
  - **protected** from dry conditions and fire (held high up tree, non-fleshy and in thick walled capsules and so not vulnerable to desiccation)
  - **durable** so can germinate in any season
  - **abundant** so as to maximise rare opportunities for germination.

Even equipped with those evolved characteristics, for any tall eucalypt species to continue to occupy a ‘rainforest’ site beyond one generation, the externalities of fire or other intense site disturbance are critically important. Most ‘tall eucalypt’ species in Australia, from tropical north Queensland to southern Tasmania are heavily dependent on fire, high intensity fire, to destroy rainforest and prepare the seedbed. *Eucalyptus deglupta* in tropical rainforests of New Guinea, Indonesia and the Philippines relies more on mass soil movement as a result of river erosion or landslip for life-giving site disturbance, and much less on fire. But the principles are the same; removal of any shading and exposure of mineral soil to allow germination.

It should be no surprise that modern forestry practice in Tasmania, which puts a premium on eucalypt wood, attempts to simulate nature with a combination of clear felling and applying intense fire. This removes the shading rainforest understory and exposes the mineral soil by burning any debris or peaty soil mat on the forest floor.

Forestry practices may be capable of maintaining a stand of eucalypt trees but are incapable of doing so for the natural ongoing ecological processes that are so important for keeping the whole ecosystem and on which a premium is placed for ecologically-based conservation.

## The tall eucalypt forests—a class assessment

What makes the tall (wet) eucalypt forest ecosystem globally significant?

The expert workshop convened in 1999 reporting on the ‘World Heritage Eucalypt Theme’ reported, inter alia:

The eucalypts are widely regarded as globally outstanding and as an exemplar of the unique character and diversity of the Australia biota (e.g. see Blakers 1987, Busby 1992, Mosley & Costin 1992, Kirkpatrick 1994). Factors important in contributing to the outstanding universal value of the eucalypts include their ancient Gondwanan origins and their subsequent evolution which parallels the geological and ecological history of the Australian continent, their success in dominating the majority of woody ecosystems throughout an entire continent, the diversity of their growth forms which range from the tallest hardwood forests in the world to prostrate shrub forms, the wide diversity of the communities which they dominate, and their unique ecology. —Expert Workshop Report: World Heritage Eucalypt Theme 1999

### Comment

It should be noted that the expert panel workshop was held within the context of the Regional Forest Agreements. It is apparent that this constrained the approach adopted. Other points worth mentioning to provide a context for this section include:

- The process was limited to a thematic approach—one developed for cultural heritage but later applied to natural heritage (see box right). However, it is not intended to be the only basis for identifying natural heritage values.
- It relies on a ‘theme to place’ sequence rather than a ‘place to values’ approach which is the fundamental of the World Heritage Convention. The thematic approach constrains addressing the context of a place, which could be critical for natural heritage.
- In identifying possible places, the expert panel considered only ‘forested’ areas as defined in the National Forest Policy Statement (Commonwealth of Australia 1992) and did not consider other areas with eucalypt-dominated vegetation such as woodlands or mallee, thereby truncating the definition of the eucalypt theme.
- ‘It should be noted that for some regions, governments have agreed that any potential World Heritage nomination can be achieved from within the CAR Reserve System.’ (Expert Workshop Report: World Heritage Eucalypt Theme 1999)

The Global Strategy was initially developed with reference to cultural heritage. At the request of the World Heritage Committee, the Global Strategy was subsequently expanded to also include reference to natural heritage and combined cultural and natural heritage.

<http://whc.unesco.org/en/globalstrategy>

(Explanatory note in Operational Guidelines 2008)

This suggests a limit to the sites that might be considered:



The Panel also took a wider view of the genus *Eucalyptus*. For example, it commented that a best global representation of eucalypt-dominated vegetation in Australia ‘would necessarily be based on a series of areas. The areas would, together, represent the major types of ecological relationships exhibited by the genus *Eucalyptus* (sensu lato) [i.e. in the broad sense] including such taxa as *Eudesmia*, *Corymbia* and *Angophora*, the major structural types and the floristic variation in the genus. —World Heritage Report 1997b

Two hypotheses have been proposed: either the fossils represent an ancient lineage for the eucalypts which was more widely distributed in Gondwana prior to the break-up or, alternatively, the fossils resulted from long-distance dispersal either from Australia or from some other part of the natural distribution of the eucalypts. Either hypothesis might explain the New Zealand fossils, whereas verification of the South American fossils as eucalypts would constitute stronger support for the former explanation. There is no clear fossil evidence to support either of these explanations to date. —World Heritage Report 1997b.

## Comment

**Update**—The South American fossils have now been confirmed as 52 million-year-old eucalypts, adding strong support for the option of ‘fossils representing ancient lineage for the eucalypts which was more widely distributed in Gondwana prior to the break-up’. The ancient lineage is further reinforced by the great similarity in the fossil eucalypts to the modern eucalypts, indicating that the eucalypts were already evolved and recognisable as eucalypts 52 million years ago. This raises the likelihood that eucalypts existed prior to the final break-up of Gondwana.

Certain species of eucalypts can attain great size in response to the high rainfall conditions and the deep, relatively fertile soils of the continent’s most resource-rich environments. These exceptional species constitute the tall open eucalypt forests of Australia. They have been described as the ‘supreme expression of the genus *Eucalyptus* sensu lato.’ —Ashton 1981a. (Emphasis added)

## Comment

This tends to follow the traditional approach in not referring to the associated rainforests and attributing exceptional ‘great size’ to rainfall and soil. All such species have of course evolved those characteristics and many can reach such sizes even on poorer soils. Rainfall is the key, bringing them into typical rainforest habitat and hence rainforest.

### *Summary comments on workshop:*

The workshop focused mainly on the ‘representative’ approach to identifying representative examples of eucalypt forests that exhibited the nominated features considered to be of ‘outstanding universal value’. The workshop dealt with all eucalypt forests, and was not limited to tall eucalypt forests.

The thematic approach leading to identifying areas that exhibit predetermined features of ‘outstanding universal value’ must be seen as only one approach and very limiting when analysed in the full context of World Heritage criteria. The usual approach under the convention is area-specific but the thematic approach can be integrated into an area specific approach as a way of informing assessment at the area level.

The author does not argue against the importance of recognising the global significance of the eucalypt biota. There is a case for special consideration for the tall eucalypt forests, beyond the confines of the ‘eucalypt theme’ guiding the expert panel, viewing them for both for what Ashton describes as ‘supreme expression of the genus *Eucalyptus* sensu lato’ (Ashton 1981)

and as ‘superlative natural phenomena’ (World Heritage Criterion [vii]). A wider view of the tall eucalypt forests is presented in the following preliminary assessment.

### **Tall eucalypt forest and World Heritage Convention—a preliminary assessment**

With the eucalypt-dominated vegetation being such a ubiquitous part of the Australian landscape, even extending beyond Australia, it might well be asked what is so special about tall eucalypt forests? What makes them of World Heritage significance?

The eucalypts (including the 13 sub-genera e.g. *Corymbia*) are the dominant botanical group in the vegetation of the Australian continent and so represent a unique and distinctive element in the context of the global plant world. The eucalypt group is exemplified by its evolutionary adaptation to major continental-scale climatic drying to the point where eucalypts now occupy a huge range of habitats and ecological niches across the continent and some islands beyond. But they also continue to occupy that unique ecological niche where they continue to directly compete with the shading rainforest that the ancestral eucalypts coexisted with for tens of millions of years.

The eucalypts of Australia present an exceptional biological\* and ecological diversity of global significance—‘many species, many places’.

\* “‘Biological diversity’ means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.’ —Convention on Biological Diversity

The World Heritage nomination document for the Greater Blue Mountains in New South Wales had a primary focus on the eucalypt heritage:

The crux of the case for its World Heritage listing could be said to lie in the outstanding universal significance of eucalypt-dominated vegetation, of which it represents the best single example through its outstanding richness of **species** in a protected area with large components of wilderness. (emphasis added) —nomination document 1998

The inscribed values for the now inscribed property record that, inter alia:

The Greater Blue Mountains Area provides outstanding examples representing ongoing ecological and biological processes significant in the evolution of Australia's highly diverse ecosystems and communities of plants and animals, particularly eucalypt-dominated ecosystems.

While ‘tall eucalypt forest’ and rainforest are both present in the Greater Blue Mountains and often cohabit, both are now a relatively minor relictual part of the landscape, occupying the deeper, well-watered soils in steep valleys sheltered from frequent fire or on basalt-capped misty mountain tops. The rainforests here are warm and temperate with species of predominantly Gondwanan ancestry (*Cunoniaceae*, *Atherospermataceae*, *Escalloniaceae*) and the tall eucalypts are limited to a few species including *E. deanei*, a species not found in Tasmania, and *E. obliqua* which is shared with Tasmania. The overlap between tall eucalypt forest and rainforest is very short due to often-steep ecological gradients of deep valleys. The tall eucalypt-rainforest ecosystem in the Blue Mountains, being such a minor part of the landscape, are but a thin bookend to the otherwise impressive eucalypt story that can be told in this site.

The phenomenon of eucalypts occupying rainforest habitat can be found discontinuously through 50 degrees of latitude, all the way from Tasmania to the Philippines. The species may change through that huge distance but the ecological characteristics remain essentially constant. In the tropical forests of Sulawesi and Mindanao huge *E. deglupta* tower above dense tropical rainforest and regeneration is mostly in response to disturbance from soil mass movement, especially flood erosion along rivers (author observations). In the Wet Tropics of

Far North Queensland, *E. grandis* can be found towering above ‘cool’ tropical forest, albeit only in limited patches in the World Heritage listed parts on the Atherton highlands. Research has demonstrated that fire plays the essential role of providing disturbance of the rainforest for eucalypt regeneration (Tng et al. 2012, Hopkins et al. 1993).

Through southern Queensland and northern New South Wales the phenomenon of eucalypt forests occupying rainforest habitat is well developed with a suite of eucalypt species, indeed also eucalypt related species, interacting with rainforests that range from sub-tropical, through warm temperate to cool temperate (*Nothofagus moorei*). The overlap or extent of ‘mingling’ of tall eucalypt and rainforest is in places quite extensive, with so-called ‘transitional’ forests that may be kilometres in width. The Gondwana Rainforests World Heritage Area provides outstanding examples of tall eucalypt forest that demonstrate much of the genetic and ecological diversity of tall eucalypt forests of the sub-tropics. See table below.

Examples of eucalypt-rainforest associations in Gondwana Rainforests World Heritage Area	
Rainforest type	Typical tall eucalypt species
Cool temperate ( <i>Nothofagus moorei</i> )	<i>E. obliqua</i> , <i>E. fastigata</i>
Warm temperate (e.g. Coachwood, Sassafras)	<i>E. microcorys</i> , <i>E. laevopinea</i> , <i>E. viminalis</i> ,
Subtropical (e.g. Mixed species such as Booyong, Cedar, Black Bean, Figs etc.)	<i>E. saligna</i> , <i>E. grandis</i> , <i>E. pilularis</i> ,
Dry	

### Tall eucalypt forests and the World Heritage criteria

There are four World Heritage criteria against which tall eucalypt forests might be assessed to test their World Heritage values and global significance. Tall eucalypts as a class of forest are evaluated against the criteria as a way of testing the World Heritage value and significance of tall eucalypts forests in general.

**CAVEAT:** The World Heritage criteria have been framed so that they can be applied to evaluate particular places or protected areas for the presence of World Heritage values. It follows that some of this assessment can only be indicative, as it is not area specific.

(vii) contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance;

IUCN, the official advisory body to the World Heritage Committee, says of Criterion (vii):

2.22 Two distinct ideas are embodied in this criterion. The first, ‘superlative natural phenomena’, can often be objectively measured and assessed (the deepest canyon, the highest

mountain, the largest cave system, the highest waterfall, etc.). The second concept, that of ‘exceptional natural beauty and aesthetic importance’ is harder to assess and evaluation tends to be more subjective.

A substantial proportion of Australian World Heritage properties were inscribed on the World Heritage List against Criterion (vii) but most of those only invoke the ‘exceptional natural beauty and aesthetic importance’ element. There are, however, several Australian sites which have invoked the ‘superlative natural phenomena’ element including:

1. **Uluru-Kata Tjuta National Park**—the superlative natural phenomena of the two massive monoliths.
2. **Great Barrier Reef**—is described ‘as an example of superlative natural phenomena’ in the statement of significance.
3. **Fraser Island**—invokes Criterion (vii) but the Statement of Significance appears to interpret these as scenic features. There is no doubt that Fraser Island qualifies as a ‘superlative natural phenomena’ given that it is the world’s largest sand island.
4. **Shark Bay, Western Australia**—Criterion (vii) clearly qualifies as containing ‘superlative natural phenomenon’ to include
  - \*‘stromatolites which represent one of the oldest forms of life on Earth;
  - \*‘Hamelin Pool which is the only place in the world with a range of stromatolite forms comparable to fossils in ancient rocks;’ inscribed World Heritage values.

A number of forested World Heritage areas such as Redwood National and State Parks cite Criterion (vii) in relation to the redwood forests, referring especially to the ‘tallest living plants’.

Other guidance for interpretation of the ‘superlative natural phenomena’ component of Criterion (vii) might come from the ordinary meaning of ‘phenomena’.

The ordinary dictionary meaning of phenomenon is:

*Phenomenon*—meaning: noun (plural phenomena /-nə/) 1 a fact or situation that is observed to exist or happen, especially one whose cause or explanation is in question: glaciers are interesting natural phenomena  
—Oxford Dictionary online

Criterion (vii) potentially could be applied to tall eucalypt forests given that IUCN recognises its two distinct ideas. These ideas could be applied to high profile World Heritage sites such as several of the Australian sites with the understanding that ‘superlative natural phenomena’ is not limited to areas of scenic beauty nor to non-living landscape features.

Indeed, the inscribed values statement for the Tasmanian Wilderness World Heritage Area already cites ‘eucalypt tall open forests’ against Criterion (vii) ‘eucalypt tall open forests including *Eucalyptus regnans*, the tallest flowering plant species in the world ...’

This is consistent with the redwoods being similarly cited against Criterion (vii).

The tall eucalypt tree species that make up these forests are globally outstanding for their exceptional tallness. *Eucalyptus regnans* is the tallest flowering plant in the world, recorded at more than 100 metres in height and only eclipsed by the coniferous Californian Coast Redwood with a global record of 115 metres. The five tallest growing eucalypt species are found in the tall eucalypt forests of Tasmania.

It can be argued that tall eucalypt forests have a broader claim to ‘*superlative natural phenomena*’ than the singular focus on *E. regnans* being the tallest flowering plant species in the world. This is dependent on how the ‘tall eucalypt forests’ are defined (see above).

Tall eucalypt forests are not just another type of forest that happens to include a species that is the world's tallest flowering plant. As outlined above, the term 'tall eucalypt forest' needs to be interpreted according to its global and ecological context.

Interpreted as eucalypts that inhabit rainforest habitat and/or cohabit with rainforest species and/or rainforest, the definition will automatically embrace rainforest species as an essential element of these forests. It is this interaction between these two great forest types—rainforest and eucalypt forest—that is a globally extraordinary feature or phenomenon. Importantly, the relationship between the rainforest and the eucalypts is a dynamic one, resulting in two major forest formations being locked in competition for control of what would otherwise be, based on climate and soil conditions, a rainforest habitat.

Indeed, Tng, Williamson, Jordan et al. (2012) state:

We argue that because giant eucalypts are restricted to rainforest climates and share traits with rainforest pioneers they should be regarded as long-lived rainforest pioneers, albeit with a globally unique dependence on fire for regeneration.

Tng et al. in conducting a global comparison refer to a similar ecological phenomenon in coniferous forests on the west coast of North America quoted by Busina (2007):

However, amongst angiosperms this syndrome of a fire dependent forest above a fire intolerant forest is only known in the associations between eucalypts and rainforest. — Tng 2012

They go on to add:

The resulting syndrome of a fire dependent forest above a fire intolerant forest is only known in the associations between eucalypts and Australian rainforest. These unique ecosystems are of high conservation value, particularly given that clearing and logging has reduced their abundance substantially over the last 150 years. —Tng et al. 2012

Notwithstanding the great genetic and ecological diversity to be found in the huge array of eucalypts, what sets the 'tall eucalypts' apart from all other eucalypt species is that they have evolved the capacity to directly compete with rainforests in rainforest habitat, enabling them to become part of the rainforest from time to time. The combination of uniquely evolved morphological and ecological characteristics (tallness, fast growth rate, low shade foliage, flammable litter, abundant seed in woody capsules protected from fire) and periodic fire maintains this 'superlative natural phenomenon' of global significance.

Tall eucalypt forests, defined in the broader sense to comprise the zone created by the phenomenon of dynamic ecological interaction between rainforests and eucalypts, are arguably a globally outstanding natural phenomenon, 'superlative natural phenomena'.

## Conclusion

If tall eucalypt forests are considered just as static forests, then their recognition as 'superlative natural phenomena' is dependent upon the 'giant trees' element as used in the TWWHA documentation: '*Eucalyptus regnans*, the tallest flowering plant species in the world'.

If considered as the product of an extraordinary dynamic process that is ongoing, it is argued that the whole dynamic interaction of the tall eucalypts and rainforest, the 'syndrome of a fire dependent forest above a fire intolerant forest', represents a unique ecological phenomenon, a 'superlative natural phenomena' of global significance—outstanding universal value.

(viii) be outstanding examples representing major stages of earth's history, including the record of life, significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features;

Interestingly, the inscribed Values of the Tasmanian Wilderness World Heritage Area, the Gondwana Rainforests WHA, and the Wet Tropics WHA, all of which qualified against Criterion (viii) and which contain significant representations of tall eucalypt forests, fail to record any contribution to meeting Criterion (viii) made by eucalypts. This includes the tall eucalypt forests that are intimately mingled with the rainforests that get all the attention in qualification against Criterion (viii).

Yet, the eucalypts are every bit as much a product of Gondwana as the rainforests which tend to take centre stage in Criterion (viii). The eucalypts in general provide graphic evidence of the impact of the breakup of Gondwana and the dramatic changes it inflicted on continents and hence on the evolutionary development of the biota.

Whereas many eucalypt species and communities are products of evolutionary adaptation and radiation to the new warmer and drier environments on the Australian tectonic plate, the tall eucalypts are looking increasingly like the closest facsimile of an ancient coexistence, if not cohabitation, between Gondwanan rainforests and the ancestral eucalypts of Gondwana.

The recent fossil evidence from Argentina, confirming the existence of eucalypts in South America circa 52 million years ago is a revelation of just how ancient the eucalypts are (Gandolfo 2011). Further, the same fossil site demonstrates the coexistence and likely cohabiting of Gondwana rainforest and eucalypts. While the data are still limited, there seems to be every likelihood that the phenomenon of cohabitation and interaction between these two dissimilar communities is also of ancient lineage.

Similarly, the evidence of fire in ancient landscapes is being confirmed in various places so we no longer need to assume that fire is a recent phenomenon on the Australian plate, although fire frequency no doubt increased with human colonisation. If the three players, rainforests, the ancestral eucalypts and fire were present tens of millions of years ago, we have the three essential ingredients for developing and maintaining tall eucalypt forests—tall eucalypt rainforests as some authors prefer (Tng 2012).

When we analyse the distribution of rainforests and tall eucalypt forests in Australia, not surprisingly they are very similar. The notable exception is the tall eucalypt forests of Western Australia where we know on a geological timescale rainforest coexisted with the eucalypts but which has now been lost, presumably to climate change. In eastern Australia, wherever there is Gondwanan rainforest, from Tasmania to northern Queensland, there are tall eucalypts closely associated with them, often intermingled. But Australian tradition, both from a forestry and botanical perspective was for many decades to separate the rainforests from the tall eucalypts while at the same time being aware of the many cases of 'transitional forests', or 'mixed forests' of the two. The author personally encountered the dilemma in mapping of tall eucalypt forests where there was an expectation to decide whether a forest was rainforest or eucalypt forest when the reality was that it was both! Rainforest with eucalypt emergents or was it eucalypt with rainforest understorey?

Preliminary analysis suggests that the coexistence, cohabitation and dynamic interaction between the Gondwanan rainforests and the ancestral eucalypts is of ancient origin, possibly dating back to pre-break up of Gondwana, tens of millions of years at the very least. Whereas adaptive radiation has seen the proliferation of eucalypt species across the drier parts of the continent, the tall eucalypt forests occupying rainforest sites and mingling with rainforests of Gondwanan origin are very different and are arguably 'outstanding examples representing major stages of earth's history, including the record of life ...':

... the breakup of Gondwana, the subsequent northward drift of the Australian plate and a record of the biota, including the coexisting rainforests and eucalypts, presently in intimate juxtaposition, a relationship that is reasonably assumed ancient in origin.

It is increasingly evident that tall eucalypt forests, being so intimately associated with rainforests, some saying they are rainforests, more closely representing the ancient Gondwanan forests than any other eucalypt forest in the world. Indeed their unique association with the rainforests adds an additional dimension to our celebration of the rainforests of ancient Gondwanan lineage. The tall eucalypts forests are in reality are a part of that rainforest heritage.

## Conclusion

Notwithstanding that each of the Australian World Heritage sites containing tall eucalypt forests (Tasmanian Wilderness, Greater Blue Mountains, Gondwana Rainforests, Fraser Island and Wet Tropics of Queensland) have qualified against Criterion (viii), none cite the tall eucalypt forests as contributing to that criterion. But the rainforests with which they are intimately associated in those sites are cited for their Gondwanan ancestry; the eucalypts of Gondwanan ancestry are not.

Our knowledge and understanding of the ancestry and ecology of tall eucalypt forests has now advanced sufficiently to be able to more readily recognise the Gondwanan ancestry of the eucalypts just as has been the case for the rainforests of Gondwanan origin.

The evidence is increasingly confirming that this is not a recent ‘collision’ between rainforest and recently evolved eucalypts but rather is an ancient relationship. Given the intimate association of tall eucalypt forests with Gondwanan rainforest, tall eucalypt forests can now be recognised for what they are—an integral element of the Gondwana rainforests and can be considered, along with the rainforests, to be ‘outstanding examples representing major stages of earth’s history, including the record of life ...’, sharing with the Gondwanan rainforests of Australia, an ancient coexistence and probable cohabitation which dates back tens of millions of years and possibly prior to the final stages of breakup of Gondwana.

As a globally distinct class of forest, the tall eucalypt forests can be demonstrated to qualify against Criterion (viii) and are of global significance.

(ix) be outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals;

Of the three main World Heritage areas in Australia which contain tall eucalypt forests—Tasmanian Wilderness, Gondwanan Rainforests and Wet Tropics—only in the case of Tasmanian Wilderness is tall eucalypt forest even mentioned, albeit briefly, as a contribution to meeting Criterion (ix). In some ways this may be understandable as each was assessed as a specific parcel of protected area rather than assessing tall eucalypts as a globally significant class.

Early evolution of the tall eucalypts to compete with and cohabit with rainforest was limited to Gondwanan derived rainforest but with latitudinal drift northwards, the tall eucalypts have since undergone ecological and biological evolution and adaptation to engage with tropical forests with species of non-Gondwanan plants and animals. Tall eucalypts as a class have been particularly successful in adapting to almost 50 degrees of latitude, from temperate southern Tasmania to the tropical Philippines but at all times sharing the characteristics that facilitate their ability to occupy rainforest habitat.

The tall eucalypt forests as a class therefore provide an ‘outstanding example representing significant ongoing ecological processes in the evolution and development of ... (forests) ... communities and plants and animals.’ (Criterion (ix))

### **Conclusion**

Tall eucalypt forests as a class provide ‘outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial ... ecosystems and communities of plants and animals;’ namely, the ongoing evolution and adaptation of a shade intolerant forest to achieve cohabitation with shading rainforests over a latitudinal range globally unequalled by any other genus of flowering plants.

Tall eucalypts and tall eucalypt forests as a class are globally distinctive, if not unique, and are of global significance.



(x) contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.

As with Criterion (ix), the tall eucalypt species are barely mentioned as making any contribution to qualifying against Criterion (x) for the Tasmanian Wilderness, Gondwana Rainforests and Wet Tropics. Wet sclerophyll forests (read tall eucalypts) in the Gondwana Rainforests site are specifically nominated for their contribution but not at all mentioned in the ‘inscribed values’ listed for the Tasmanian Wilderness.

Given the recent interest in classing tall eucalypt forests as ‘rainforest’, perhaps what has happened in the past is that so many species of plants and animals recorded in the tall eucalypt forests have been assigned as ‘rainforest species’ because to field ecologists they understandably perceive at ground level, that they are working in what is, in many respects, a rainforest.

Taking a wider view or global view of tall eucalypt forests, one thing they do demonstrate is a great diversity of eucalypt species, all of which share the unique evolutionary characteristics which facilitate their distinctive role as eucalypts that are capable of occupying rainforest habitat. The eucalypt species of the tall eucalypt forests vary greatly according to climate and soil types, ranging from the *E. regnans* in temperate southern Tasmania to *E. deglupta* in tropical rainforest in the Philippines in the northern hemisphere.

But beyond the dominant eucalypts there is an abundance of plants and animals that are to be found in tall eucalypt forest, albeit many not restricted to this formation. In reality the tall eucalypt forests are a very biodiverse forest community.

The greatest element of biodiversity in the tall eucalypt forest class is arguably their ecological diversity, their adaptation to a range of conditions within the rainforest habitat that they occupy. They have for many decades defied consensus on their definition and delineation for understandable reasons—they comprise a mix of what convention dictates to be two very different plant communities—rainforests and eucalypts. But they are both, and they therefore include much of the biodiversity of each class, combined in an often disorderly and confusing pattern of mix, often the product of the unseen third party in this ecosystem, fire. Fire is an infrequent and sometimes not evident but critically important factor in maintaining the existence of tall eucalypts within the rainforest.

## Conclusion

Given that Criterion (x) has been framed to assess a place rather than a class, it is difficult to be definitive about the tall eucalypt forests as a class qualifying against this criterion. However, there can be no doubt that as a class they represent an important suite of global biodiversity, both in terms of eucalypt species diversity and also the many and diverse species of plants and animals they contain. It is therefore legitimate to conclude that tall eucalypt forests as a globally recognisable class represent:

... important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.

## Overall conclusion on criteria

While the World Heritage natural criteria were framed to evaluate particular places or protected areas to establish if World Heritage values existed, it is legitimate to apply them to

a thematic class to test the value and significance of a class of natural attributes for World Heritage value and significance.

A previous attempt by an expert panel to evaluate eucalypts as a class was unnecessarily constrained by adopting a thematic approach and the ‘sub-theme’ had been predetermined by the convenors to be eucalypts. Being further limited to the concept of ‘representativeness’ it is not surprising that the tall eucalypt forests were not a central focus. The thematic approach was bound never to capture the extraordinary phenomenon of the ‘syndrome of a fire dependent forest above a fire intolerant forest’ because the theme was already limited to representation of eucalypts.

It should be apparent from the foregoing that as a globally recognised class of forest, the tall eucalypt forests can qualify against most if not all World Heritage criteria, that as a class they are of ‘Outstanding Universal Value’—World Heritage.

Hopefully this assessment will contribute to putting to rest the perceived ‘cringe’ in response to the often-asked question of whether tall eucalypt forests are of World Heritage natural value. Tall eucalypt forests are an ecologically unique class of forest, of ‘outstanding universal value’ and hence, of World Heritage value.

**CAVEAT:** The conclusion that tall eucalypt forest are of World Heritage value cannot be interpreted as all tall eucalypt forests being necessarily of World Heritage value. Matters of condition and integrity need to be applied at the place or protected area level. Assessing a stand of forest within a nominated area may end up with different results to an assessment at the class level. Assessment at the site-specific level needs to test and take into account the existence and maintenance of the various elements that make tall eucalypt forest of World Heritage value. For a site to qualify as World Heritage or to contribute to the integrity of the TWWHA, the forests in that site need to qualify against at least one of the four criteria to qualify.

## Recommendations

A number of recommendations arise from this preliminary assessment.

1. Recognise the recent advances in knowledge and thinking regarding the origins of the eucalypts and understanding of the ecology of tall eucalypt forests and associated rainforests.
2. Recognise the importance of the natural ecological dynamics of the tall eucalypt forests, in particular the ongoing ecological interaction between the tall eucalypts and the rainforests.
3. Recognise the need to factor in all biological and ecological attributes of tall eucalypt forests and maintaining ongoing natural processes in planning their conservation and management.
4. Consider the concept of a serial nomination\* of tall eucalypt forests of Australia.

\***NOTE 1:** a serial nomination would endeavor to capture the full biological and ecological diversity of the class. The key sites are likely to be:

- Far North Queensland (most already in Wet Tropics WHA—need to review integrity)
- Northern NSW (most key areas already in Gondwana Rainforest WHA)
- NSW, Barrington Tops (most key areas already in Gondwana Rainforest WHA)
- Victoria (Gippsland and Otway Ranges)
- Tasmania (western Tasmania. Most key sites under consideration for addition to TWWHA and for reservation as Tarkine National Park)
- North East Tasmania (e.g. Mount Maurice relict area).

**\*NOTE 2:** Considering the conservation of tall eucalypts beyond Australia, *Eucalyptus deglupta* is now uncommon and in many places threatened by logging and clearing in Papua New Guinea, Philippines and Indonesia. The key sites are likely to be:

- PNG, Nakanai Mountains on New Britain Island. Already on World Heritage Tentative List (Nakanai section of Sublime Karsts of PNG) but presently under threat
- Indonesia, Seram, Manusela National Park
- Indonesia, Sulawesi, Bogani Nani Wartabone National Park
- Philippines.

## Implications for heritage assessment and reserve design

The main implications of the results of the preliminary assessment of the tall eucalypt forests as a class is that in the design of reserves to protect tall eucalypt forests it is essential to as far as practicable protect the full range of key attributes and to facilitate the ongoing natural processes which maintain those values such as their ecological diversity.

Conserving any plant community or ecosystem must not be seen as a mere 'stamp collecting' exercise where statistical sampling presence/absence considerations subvert ecological considerations.

Tall eucalypt forest is more than just the dominant eucalypts but rather must be recognised as a complex ecosystem in its own right and comprising many other associated plants and animals. When planning to conserve tall eucalypt forest it is important to think of it in terms of an ecosystem and not just a stand of trees as might be done where forestry is the main (commercial) interest. In many cases non-eucalypt components of a tall eucalypt ecosystem may be extend beyond the eucalypts into other habitats such as the rainforest or shrublands, a factor needing to be taken in to account when delineating areas for conservation.

Perhaps more than most plant communities and in particular forest communities represented in Australia, conserving tall eucalypt forest requires special consideration. The dynamics of the interaction between tall eucalypts and rainforest at the wetter end of the ecological spectrum is a case in point. The very survival of tall eucalypt forest, indeed the associated rainforest, may be very dependent upon prevailing climate or climatic events. Fire incidence in particular, will be key to survival of tall eucalypt forest on sites capable of otherwise supporting rainforest to the exclusion of eucalypts.

Given the role that wildfire plays in establishing or regenerating eucalypts within the tall eucalypt forest ecosystem, the eucalypts usually exhibit even age across extensive areas. This means that the eucalypt component may exhibit a relatively few ages and stages in development. It would be ecological folly to rely on conserving a single age class in a tract of forest and so conservation should as far as practicable seek to protect a diversity of age classes as a hedge against incremental ecosystem simplification (loss of species and ecological diversity).

Conserving tall eucalypt forest must therefore take into account the full biodiversity of the forest community, ecological diversity including the ages and stages of the eucalypt communities and above all the natural processes that govern the relationship between the eucalypts and the rainforests. From a World Heritage perspective, providing for the maintenance of natural processes can be very important.

In the context of the verification process for the ENGO-proposed reserves the following key attributes were considered in the assessment process.

### **Key attributes**

#### **Tallness**

A good indicator of those areas of forest that best demonstrate the tallness of the tall eucalypt ecosystem is provided in the current official inventory of what are termed ‘giant trees’ (Giant Trees Consultative Committee 2011). Two important conclusions can be drawn from the current registrar:

- a clear distribution pattern is generally located outside and to the east of the TWWHA
- *Eucalyptus regnans* is especially prominent but not exclusively so.

A significant proportion of the tall trees on the registry are within forest tracts that have been intensively logged and the listed tall trees no longer form part of an intact or near intact ecosystem. Such ‘island’ trees retain some heritage significance but no longer retain the other heritage values of intact tall eucalypt forest. They are certainly of limited value from a World Heritage perspective. Those ‘giant trees’ of greatest overall heritage conservation significance are those still embedded within the tall eucalypt ecosystem which is still subject to ongoing natural processes.

‘Giant trees’ remain in concentrations or core areas in Tasmania, all close to or outside the eastern boundary of the TWWHA, namely:

- Upper Derwent–Lower Florentine Valleys
- Styx River Valley
- Huon Valley.

A fourth very significant outlier area of tall trees and tall eucalypt forest is in the north-east of the state.



Map illustrating the location of concentrations of ‘giant trees’ The Giant Trees Register provides a valuable indication of the location of those eucalypt forest communities with the greatest height development. All overlap with or are immediately adjacent to temperate rainforest. The greatest overlap with rainforest occurs at

lower elevations in the Weld–Huon–Picton and Styx valleys. Most of the giant trees together with their associated high forests are located immediately adjacent to but outside the TWWHA. See Map 2 at end of report for indicative distribution of tall forest ecosystems and giant trees.

In the Upper Derwent–Lower Florentine there has been extensive logging with many large trees, likely ‘giant trees’, being destroyed in the past. Of the ‘giant trees’ remaining, a significant proportion is within largely unlogged tracts of tall eucalypt forest. An estimated six in the Upper Derwent appear to be within the existing TWWHA and a further two in Upper Coles Creek are also within the TWWHA. Some 16 trees on the Giant Trees Registrar are in the Florentine Valley and outside the TWWHA. Eight of the Florentine Valley trees are within tracts of intensively logged forests and are therefore no longer embedded in intact natural forest ecosystem and as such, are of limited heritage significance. On the other hand, the other eight ‘giants’ are within tracts of forest that are still capable of functioning as natural ecosystems and useful indicators of the stature and condition of the surrounding forest stands.

The three clusters or core areas of ‘giant trees’ point to three important tracts of forests that extensively exhibit tall growth. Parts or all of these indicated ‘tall’ forests are in the High Conservation Value (HCV) lands, which are the subject of this assessment (they will also be dealt with at the specific level). Based on the measure of ‘tallness’, all three tracts contain the cluster of ‘giants’, potentially contributing to forming a tract of tall eucalypt forest of outstanding universal value.

The assessment takes into account the location of the registered giant trees but this was not considered to be a critical determining factor. More than anything, the concentrations of giant trees were used as an indicator of the best development of the tall eucalypt forest and hence a guide to ecological diversity.

Including exceptionally tall individual trees and forests is important to meeting at least one element of being a ‘superlative natural phenomenon’.

### ***The two ‘bookends’***

There is a zone between pure rainforest, beyond which no eucalypt has penetrated, and dry sclerophyll forest beyond which point rainforest plants do not live. Within this zone, the ‘conflict zone’ between the two ‘bookends’, fire and shading forces operate and compete, thereby maintaining the overlap between rainforest and eucalypt species and communities.

#### **a) Interface with rainforest**

One of the two ‘bookends’ to the tall eucalypt forests is the interface of eucalypts with pure rainforest, an important indicator of the full operation of the phenomenon of the shade intolerant species pushing the limits of its interaction with the fire intolerant rainforest.

The interface with pure rainforest is an indicator of the tall eucalypt forest at its current ecological limit in terms of rainfall and/or wildfire incidence. Particular attention was paid in assessment to including the pure rainforest zone where it existed.

#### **b) Interface with dry eucalypt forest**

The second ‘bookend’ of the tall eucalypt ecosystem is the interface with the dry sclerophyll forest. Put another way, this is the point that delimits rainforest habitat, beyond which conditions are not conducive to survival of rainforest species.

Those tracts of tall eucalypt forest that embraced the sequence from the dry sclerophyll forest to pure rainforest, with extensive overlap with rainforest, were assessed as especially valued

both for demonstrating their ecological diversity and for the prospects of being able to maintain ongoing natural processes.

The assessment paid particular attention to including the pure rainforest zone where it existed and was practicable to include. In many situations, commercial timber production has truncated the transition from the dry forests to the wet forests.

### ***Dynamics***

Strong consensus exists in the literature regarding the dynamic nature of the relationship between the tall eucalypt forests and rainforest, with fire being the primary driver. However, the precise nature of these dynamics is still a matter for debate and discussion with a number of different models being presented including the successional model (Jackson 1968) and more recently a ‘stable state’ model. As noted by several authors, the alternative stable state model is not mutually exclusive to succession as it can form a framework for describing the transitions from one stable state to another (Biesner et al. 2003, Walker & del Moral 2008, Cain 2009).

From a conservation perspective, the important thing is to ensure that as far as possible, reserve design facilitates ongoing natural processes, in particular the role of fire in this vegetation complex. Fundamental to that is an understanding of fire behavior at the landscape level and what the author terms ‘fire paths’. The very real risk is that truncation of the spatial dimensions of natural fire paths and hence fire intensity and behavior has the potential to trigger changes in the ecology of rainforest—eucalypt forest complex or ecosystem. Any imposed measures that deliberately or inadvertently reduce or increase fire frequency in this vegetation complex has the potential to cause changes, in some cases this could even be substantial. One glance at the successional model illustrates how changed (increased) fire frequency could lead to driving rainforest back through the tall eucalypt stage of succession to buttongrass.

Effective conservation of the tall eucalypt and rainforest complex, especially in Tasmania, cannot rely alone on the more conventional sampling and representation approach where relatively small sample blocks of the different forest communities are protected. Instead, conservation must recognise the ecological dynamics and, as far as practicable, ensure that natural processes, including fire, are facilitated so maintaining the natural evolutionary processes.

The dynamics of the tall eucalypt–rainforest vegetation complex was an important consideration in assessing the value of tall eucalypt forests. Those offering the greatest likelihood of natural processes being maintained were considered of greatest value. These are the areas that will most readily meet the tests set out in the Conditions of Integrity in the World Heritage Operational Guidelines. Where boundaries other than the ENGO ones were recommended, the dynamics of natural processes were used as a guide to identifying appropriate boundaries.

Protected areas that facilitate ongoing natural processes will contribute to recognising the tall eucalypt forests as a ‘superlative natural phenomenon’—the phenomenon of a shade intolerant tree surviving in a shading rainforest.

### ***Fire management***

When the conservation objective is to protect and maintain an ecosystem as distinct from a stand of trees, it is critically important to ensure that as far as is practicable all natural ecological and other associated natural processes are ongoing. Given that fire is such a key factor in the ecology of tall eucalypt forest, it needs to be given special attention, especially in Tasmania. Fire was a part of the ecology of these forests long before the arrival of the first humans on what is now the island of Tasmania. No doubt human use of fire since earliest

Aboriginal times influenced the disposition and condition of the tall eucalypt forest but to what extent is unclear.

While the tall eucalypt forests of Tasmania are not absolutely dependent upon wildfire for survival, for all intents and purposes, disturbance and exposure of mineral soil to sunlight is usually the result of intense fire. In drier sites, localised fire from lightning strikes or from Indigenous burning had the potential to create conditions conducive to regeneration of the ash type eucalypts. In the wetter habitats such as those that might otherwise be colonised by rainforest, the need for more intense fire is critical. Fire must not just be able to expose mineral soil but be able to destroy any shading rainforest present on a site. Such fire conditions could be expected to arise only rarely when drought conditions, extreme (fire) weather conditions and an ignition source (lightning) coincide.

The more recent advent of industrial forestry and proliferation of roads through the tall eucalypt forest have arguably changed the fire regime in many places. Notwithstanding the changed fire regime, in 200 years of European settlement in Tasmania, significant areas of tall eucalypt forest appear to have escaped fire.

In those forests where the well-developed rainforest occurs as an understorey to the tall eucalypts, the only prospect of those stands being able to replace themselves over time will be as a result of such intense fire as to destroy the rainforest understorey. In some cases, especially in *Eucalyptus regnans*, such fire is likely to also kill the eucalypts.

The great difficulty in officially seeking to accommodate natural wildfire is the juxtaposition of the intact forests with commercially valued regrowth and plantation eucalypt to the east and hence an economically-based policy needing wildfire prevention. Managing the tall eucalypt forest both within and outside protected areas is therefore always likely to be seen to be an integral part of a statewide fire policy.

Notwithstanding the official policies regarding suppression of wildfire, the author has long argued that there will always be the prospect of those naturally ignited uncontrollable wildfires occurring in these forests and which appear responsible for maintaining them. Wildfire in these forests does not necessarily mean tree crown conflagration but can equally be an intense ground fire fueled by the massive build-up of ground fuel, including peat, on the forest floor. Either kind of fire can, on occasions, prove difficult if not impossible to control.

Given the common belief that the maximum life expectancy of tall eucalypts in Tasmania is in around 450 years, such tall eucalypt forest forests would theoretically require only one wildfire event during the life of the stand to achieve the ground conditions needed to regenerate eucalypts on the site.

The advanced age of some existing stands of tall eucalypt forest means that they are already of an age that, within a few hundred years without wildfire, eucalypt occupation of the site may be threatened. The question arises then as to whether a threat like this justifies management intervention to regenerate such a tall eucalypt forest stand. Fortunately, that is not a question that requires an immediate answer but if the primary management objective is to, as far as practicable, maintain natural ecological and associated processes, intervention to regenerate a stand threatened by senescence would be contrary to such management principles.

Taking a longer-term view, if some stands of tall eucalypt forest failed to be naturally regenerated and rainforest took control of the site, this could be viewed as just a part of the longer-term interaction between the rainforests and the tall eucalypt forests, '... ongoing ecological and biological processes in the evolution and development of terrestrial, ... ecosystems and communities of plants and animals'. It is for this reason that conservation must ensure that there is sufficient geographic space for the ongoing advance and retreat of the tall eucalypt forest—and rainforest—across the landscape over the long term.

Those narrow tracts of forests on a single slope, where there is little buffering from industrial forestry, such as Snowy Range, will always be the most vulnerable to irreversible impacts by too frequent fire events.

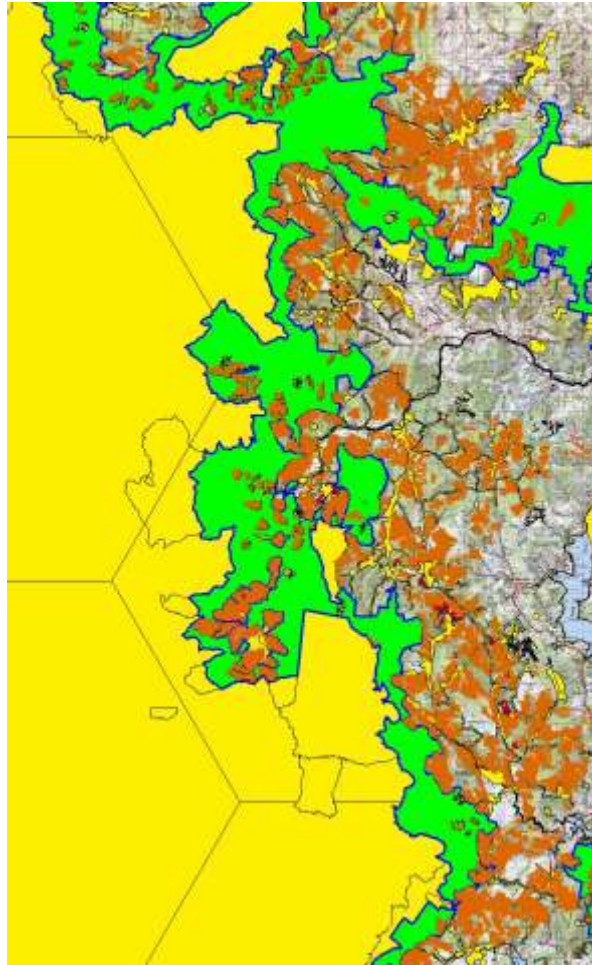
## Boundary determination

In assessing the ENGO-proposed reserves, consideration was given to the various factors outlined above. When it came to assessing the adequacy or appropriateness of the proposed boundaries to serve also as permanent Protected Area/World Heritage boundaries, the guiding considerations were nominated as:

- protection of identified key attributes
- ecological diversity
  - range of age classes
  - range of elevation and aspects
  - range of understorey
- eucalypt species diversity
- facilitating ecological processes (catchment, fire)
- needs of non-eucalypt species components
- connectivity (see 'C2C')
- fire management
- adjoining land uses
- visual.

The exercise was constrained by the requirement to assess only those forest areas nominated as ENGO-proposed reserves. Where the logical boundary setting extends beyond those lands, the author has drawn attention to that situation and in some cases made specific recommendations.





Map illustrating the pattern of logging in part of the ‘Southern Forests’—most areas outside the ENGO-proposed reserves have been extensively logged (red?) and there are significant inroads of logging into some of the proposed reserves. With the trend expected to continue, the ENGO-proposed reserves (blue edge) offer the last chance to ensure that a substantial representation of tall eucalypt forests is protected as an integral part of the Tasmanian Wilderness World Heritage Area. (Map derived from data supplied by Forestry Tasmania)

Given the importance attached to the ‘ongoing natural processes’ in valuing the tall eucalypt forests, considerable attention was given to assessing the factors that would likely determine if natural processes would be able to prevail. In attempting to, as far as possible, preserve the option of facilitating ongoing natural processes, a longer-term view was given priority over short-term considerations. Recommendations on occasions included incorporating some logged or degraded lands where the more holistic longer-term view prevailed.

## Rehabilitation

In Tasmania today, few tall eucalypt forest stands have survived intact; most have been subjected to commercial timber extraction. The ENGO-proposed reserves are no exception; most have some recent clear fall logging coupes and associated roads.

The small map above illustrates the extent to which recent logging has advanced towards the current boundary of the World Heritage Area. With the trend continuing, the ENGO reserves now represent the last chance to secure substantial representation of tall eucalypt forests as an integral part of the Tasmanian Wilderness World Heritage Area and to provide a prospect of natural ecological and evolutionary processes being maintained.

Clear fall logging destroys some of the important heritage values of the tall eucalypt forests. In assessing the natural heritage values, any logged areas were dealt with by taking a holistic long-term approach to the tract of forest. It was a case of weighing up the short-term negative contribution of clear felled areas against the long-term restoration and maintenance of ecological processes.

The evidence is that areas that have been previously logged will, through a process of natural rehabilitation, eventually acquire many if not all of the ecological characteristics of the surrounding forest.

Obviously as a consequence of incorporating logged coupes and logging roads into the proposed reserves there will be a need to rehabilitate logging coupes and roads. The actual intensity and needs of a rehabilitation program will vary greatly from area to area, in some cases requiring minimal intervention. In other cases introduced species will need to be eradicated such as *Eucalyptus nitens* used in some plantations in areas such as the upper Styx. Closure and rehabilitation of any roads would need to be assessed on a case-by-case basis.

## Key sites for conserving tall eucalypt forest in Tasmania

Considering the opportunities for a sustainable tall eucalypt forest ecosystem in Tasmania, the tracts of forest that offer the greatest prospect for conserving tall eucalypt forest at the ecological and landscape level of potential World Heritage significance extends from the Upper Derwent River near Lake St Clair southwards to near South Cape. This tract or corridor is often bounded on the wetter western side by rainforest, and on the drier/lowland eastern side by open eucalypt forest, woodland and grasslands.

It offers scope to substantially demonstrate the biological diversity, in particular the ecological diversity, exhibited by the tall eucalypt forest ecosystem in Tasmania, if not the whole of Australia.

Furthermore, there still exists an effective regional connectivity in the tall eucalypt forest ecosystem extending from sea level in the south to around 1,000 metres above sea level in the centre of the island. That connectivity is regarded as an important consideration in assessing the heritage significance of each component area along its length. The author refers to this corridor as the 'C2C' corridor—derived from Counsel River in the north to Cockle Creek in the south.

The tall eucalypt forests of southern Tasmania—the 'Southern Forests'—are of special significance given they adjoin, interact and partly overlap some of the most extensive cool temperate rainforest on the Australian continent. Some of these forests offer good prospects for long-term maintenance of natural processes, although in most cases this will require some rehabilitation for this to be achieved.

While examples of tall eucalypt forest associated with cool temperate rainforest occur in other places such as North East Tasmania, Victoria and parts of New South Wales, **the forests of southern and western Tasmania are by far the most outstanding combination of cool temperate rainforest and tall eucalypt forest in Australia.**

Other important sites for conserving tall eucalypt forest in Tasmania are the Tarkine and the North East of the state (see North East cluster).

The ENGO-proposed reserves represent the last opportunity to protect the full biological and ecological diversity of the tall eucalypt forests of Tasmania, and for their attributes to contribute to their being a 'superlative natural phenomena' of global significance. Commercial timber production is rapidly eliminating options for preserving the 'best of the best' of the tall eucalypt forests. This makes it critically important to finally delimit the boundary between the forests where ongoing natural processes prevail, and the forests where timber production prevails.

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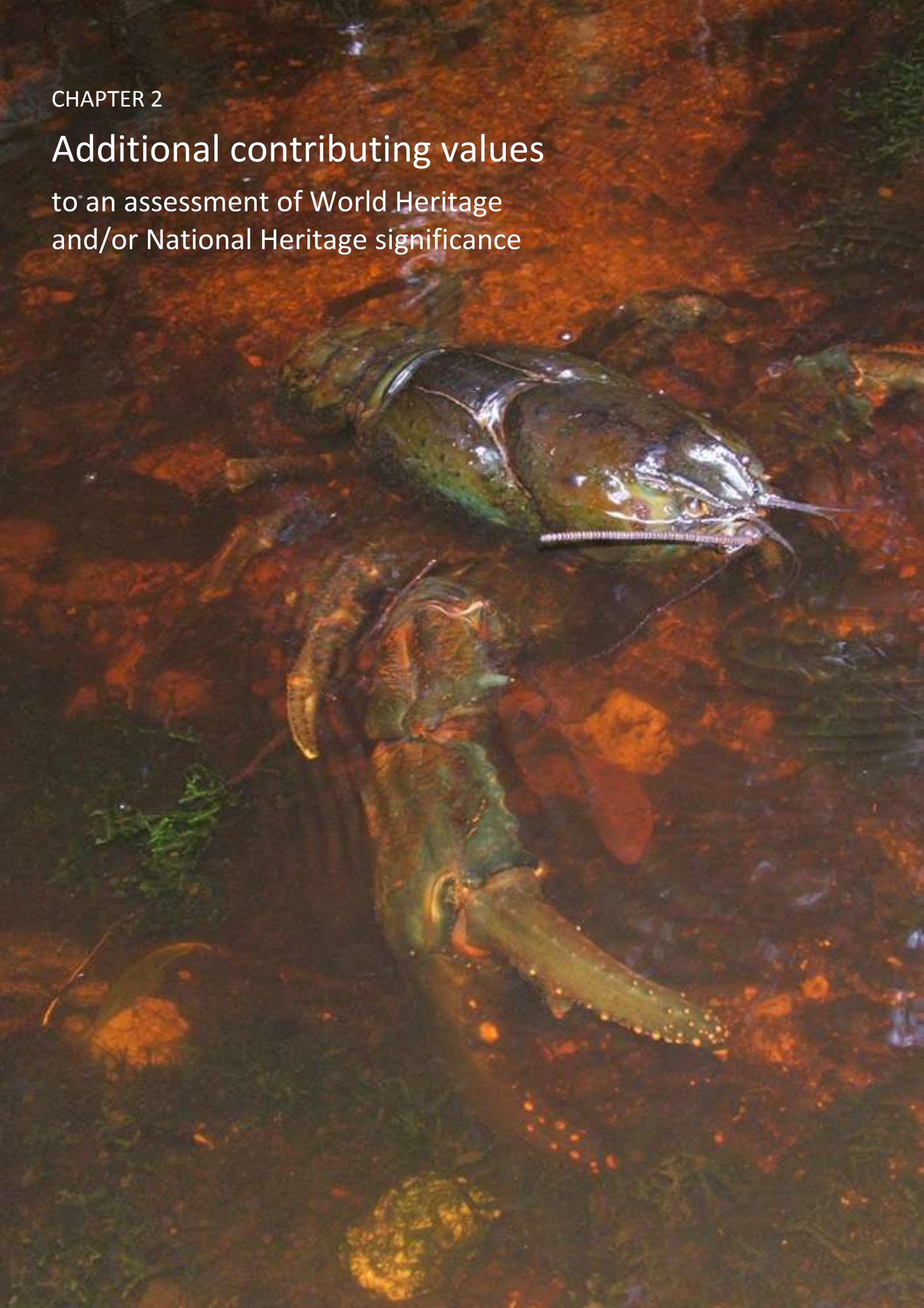
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CHAPTER 2

**Additional contributing values**  
to an assessment of World Heritage  
and/or National Heritage significance



## Chapter 2

### Additional contributing values to an assessment of World Heritage and/or National Heritage significance

Many of the other projects undertaken for the Tasmanian Forests Independent Verification (IVG) process provide substantive information relevant to any formal World Heritage or National Heritage assessment of the areas recommended for heritage protection in this report. In particular, IVG forest conservation reports 2A, 2B, 3A, 3B, 3C, 3D, 5B, 5C, 7A, 8B and 9A provide information and assessments relevant to heritage assessment. All relevant findings in these reports should be fully integrated into any formal National Heritage and World Heritage assessments, as they contain specific contextual and spatial information pertinent to an assessment of heritage significance

A full analysis of the information contained in these reports has not been possible in the limited time available. All IVG projects were running concurrently and thus the information provided in other reports has only recently been received and has therefore not been fully integrated into this heritage assessment. Some of the more significant findings from other IVG reports are outlined below.

### Contributing findings

#### Relictual fauna

**Report 3A** assesses the contribution the proposed ENGO reserves would make to protecting the large, highly diverse, ancient and relictual group of Tasmanian invertebrate fauna. The report identifies a significant number of ancient or relictual faunal groups supported in Tasmania and which are described as globally significant.

Figure 1 in the report, illustrates the high invertebrate diversity and high proportion of globally significant, ancient species within the potential TWWHA extension.

The analysis for these species also illustrates ancient, faunal ‘breaks’ or biogeographic demarcations still evident and operating in Tasmania. The report notes that ‘although the processes involved in these features is not always clear they represent important biogeographical phenomenon, ones which have probably been lost in more developed landscapes elsewhere in Australia’.

Figure 2 in the same report illustrates hotspots of phylogenetic interest and the distribution of the crustacean seepage fauna, which intersect with proposed ENGO reserves on the eastern boundary of the TWWHA and in the North West.

Figure 3 illustrates hotspots, which intersect with ENGO-proposed reserves.

Figure 4 illustrates those proposed reserves, which intersect with parapatric boundaries.

Table 2 includes all the potential reserves intersected by the values illustrated in Tables 2 to 4.

**Report 9A** also documents: ‘The emerging use of invertebrates in defining areas of conservation significance’.

The Tasmania fauna incorporates an extraordinary heritage of invertebrate animals, estimated to number 46,500 species (McQuillan et al. 2009). Evidence collated two decades ago for the World Heritage evaluation of western Tasmania showcased an irreplaceable fauna involving

ancient Pangean and Gondwanan taxa, island endemism, speciation bursts, insular gigantism, rare cave fauna and other globally outstanding phenomena.

Investigations since that time have continued to add further examples of high conservation value. These include:

- the most ancient living dragonfly (*Hemiphysalia mirabilis*) (Lak et al. 2009) recently discovered to occur in NE Tasmania
- the world's largest member of the cabbage moth family (*Proditrix nielsenii* Plutellidae) in montane forests (McQuillan 2003)
- a mandibulate moth *Tasmantrix tasmaniensis* of a group which pre-dates the rise of the angiosperms (Gibbs 2010)
- an outstanding representation of ancient spiders (Rix 2005, Lopardo & Hormiga 2008, Rix & Harvey 2010)
- newly-discovered species of endemic Gondwanan stag beetles (Bartolozzi 2003)
- an extraordinary evolutionary pulse in terrestrial flatworms (Sluys 1999) and millipedes (Mesibov 2010).

Many appear to be restricted to consistently humid microhabitats, and the greatest diversity of species exists in temperate rainforests and tall wet forests where moss, thick leaf litter and rotting logs offer refuge and buffered microclimates.

Invertebrates have a special use in defining areas of high conservation value due to their intimate microhabitat requirements and functional relationships with other species (New 2009). Vertebrates or vascular plants are rarely useful for identifying significant areas for invertebrate conservation in temperate latitudes and invertebrate groups can even show poor congruence amongst themselves (Fattorini et al. 2011). Temperate eucalypt forest in Western Australia shows that whereas vascular plants, mammals and frogs have different centres of endemism within an area, centres of endemism for millipedes encompass all of these plus other areas (Moir et al. 2009).

Mountainous areas in Australia are notably rich in invertebrate biodiversity, including ancient taxa, but montane biota is especially vulnerable to rapid climate change (e.g. Wilson et al. 2007). Within Tasmania, several eucalypt dependent moth genera incorporate largely allopatric species pairs that differentiate into a widespread lowland and a more restricted highland form (e.g. *Plesanemma*, *Paralaea*). The influence of topography on species richness is apparent even in areas with modest relief. Millipede diversity and endemism are positively associated with differences in elevation in south-western Australia for example. A species turnover boundary was positively associated with annual rainfall, broadly located in the transition zone of 300–600 mm (Moir, Brennan et al. 2009).

Our relative lack of knowledge on the endemism patterns of invertebrates hampers their ready incorporation into conservation planning. Nevertheless Tasmania is emerging as a global biodiversity hotspot for forest invertebrates (e.g. Sluys 1999; Mesibov 2010) and this knowledge should eventually assist the recognition of essential conservation areas' (pp. 50, 51).

## Threatened species

**IVG Reports 2A, 2B, 7A and 9A** illustrate the potential contribution that the ENGO-proposed reserves would make to the protection of state and federally listed biodiversity (animal and plant species and ecological communities).

Many of the proposed ENGO reserves would improve the protection status of listed and priority species, very significantly for some species, (see figures in these reports).

## Refugia

**Reports 3A, 3B, 3C and 3D** assess the contribution the proposed ENGO areas would make to protecting ecological and evolutionary refugia.

It is clear that a small number of the proposed ENGO reserves in western Tasmania would make a significant contribution to protecting paleo-endemic plants (see page 8 in report 3B). Western Tasmania is a genuine global hotspot for plant paleo-endemics. The species *Athrotaxis* is likely to rate among the 10 most relictual plant groups in the world (*Ginkgo*, *Amborella*, *Welwitschia* and *Austrobaileya* are among the very few that rate more highly). *Athrotaxis* is in a few of the proposed reserves. *Bellendena* and *Lagarostrobos* also rate respectably highly on an international scale, and both are in a small number of the proposed reserves.

It is also clear that many of the areas proposed for protection have significant value as ecological refugia. Restoring degraded wet forest ecosystems and removing threatening processes such as logging and putting in access roads to forests would greatly improve the overall ecological integrity and function of ecological processes in the TWWHA and other existing protected areas. Many of the ENGO-proposed reserves have considerable potential to act as fire refugia (see IVG Report 3D figure 6). Similarly many of the proposed reserves are valuable as drought refugia.

**Report 9A** makes the point that the complex topography of Tasmania, along with its marked environmental gradients, has generated a diversity of both local and landscape-scale refugia. This has made it possible for many species to survive long-term:

Physical refugia from dryness and fire are highly variable in scale and can be scattered across landscapes and regions. Microrefugia support locally favourable climates amidst unfavourable regional climates.'

The report describes important physical refugia from drought and fire (pp. 32–38) notably, cloud forests in eastern Tasmania. Cloud forests create special microclimates near the ground, which support many rare and unusual species with poor tolerance to drought. Many of these forests have been captured in the current formal and ENGO-proposed reserves. A map on page 39 of the report shows the elevation range of the ENGO-proposed reserves.

## Rainforest

**Reports 5B and 5C** are referred to in Chapter 1 of this report. Both reports confirm the global significance of Tasmania's tall eucalypt forests. The distribution of giant eucalypts and tall eucalypt forests is illustrated in Map 2 at the end of this report

## Genetic diversity

**Report 3C**, provides an important assessment of the significance of the ENGO-proposed reserves for maintaining eucalypt phylogenetic and genetic diversity. It also documents noteworthy values within the proposed reserves for various eucalypt species or variants of these species (e.g. natural hybrids, intergrades or atypical populations). The pattern of genetic variation of a number of eucalypts is described, with notable differences evident for some species, e.g. between northern and southern races of *E. globulus*; between western, eastern and Tasman Peninsula populations of *E. obliqua* in maternally-inherited chloroplast DNA; and differentiation in chloroplast DNA in *E. regnans* where unique haplotypes in north-eastern and south-eastern Tasmania suggest the presence of glacial refugia.

The report also describes a dynamic and actively evolving system for neo-endemic species, noting that 'marked changes in environment occurring over short distances in response to rapid changes in aspect, altitude, geology and drainage are often associated with rapid

transitions in the Tasmanian eucalypt flora'. The genetic variation in the group is indicative of the close adaptive response of eucalypts to their environment, an important consideration in the face of global change.

The south-east of the island around Storm Bay is believed to have been a major forest refuge during glacial periods and endemic eucalypt taxa are concentrated in the south east of the island.

Also discussed is the dynamic evolutionary interplay between adaptive radiation and convergence, drift and hybridization as populations have and continue to respond to changing environments and distributions. The global significance of Tasmania's eucalypt flora is well documented, with a long history of scientific research and commercial use. Tasmania's eucalypts include the type specimen for the genus, the world's tallest flowering angiosperm, one of the smallest species and one of the most frost-resistant species. While the island only has 30 species, it has high levels of endemism. Its tall eucalypt forest is internationally known. The eucalypts are important foundation species, important for food, habitat and resources for other dependent biota and are core habitat for a number of nationally threatened species.

Tasmania is an island of rapid environmental turnover, (see Report 1B(i) Ferrier) and these rapid changes in aspect, altitude, geology and drainage are associated with rapid transitions between the eucalypt species and adaptive clines within species.

The report highlights the importance of south-eastern Tasmania for eucalypt diversity and evolution, and this is particularly evident in the east and south-east of the state. The Wielangta area (ENGO-proposed reserve **29**) has some of the highest levels of eucalypt species richness in Tasmania, and includes a range of other values such as disjunct eucalypt populations, variants, and natural hybrids (including possible genetic remnants from the Last Glacial).

Other important proposed reserves with the high richness of eucalypt species include Little Swanport (**45, 39**) and St Marys (**123**) and (in order of decreasing reserve area): **208, 39, 68, 76, 14, 117, 122, 204, 40, 215** and **214**—many representing species disjunctions and outlier records and/or races.

Several proposed reserves in both the north and south of the island (**13, 35, 82, and 258**) contain relatively large areas of *E. regnans* forest and also include giant trees, as do several smaller proposed reserves (**166, 197**). *Eucalyptus regnans* is relatively rare in the Flinders and King bioregions, and stands in these regions represent geographical/ecological outliers for this south-eastern Australian species.

**Report 9A**, also contains information relevant to protecting significant genetic diversity within Tasmania (pp 17–23):

New information on genetic variation now evident in a number of ancient flora and fauna species illustrates the impact of past climate and evolutionary processes on driving genetic diversity. Genetic variation between eastern and western populations for a number of species (e.g. *Nothofagus cunninghamii*, pademelons *Thylogale billardierii*, giant freshwater crayfish *Astacopsis gouldii* and sassafras *Atherosperma moschatum*) is evidence of the influence of deep historical processes.

This report notes that 'the cryptic lineage from north-east Tasmania for *A. gouldii* may ... be of extremely high conservation value' and goes on to identify the north-east of Tasmania as a highly significant conservation asset:

The north-east quadrant is one of the most poorly studied regions of Tasmania for the purpose of biodiversity assessment. Yet, when considered at the community level, the regional combinations of co-occurring species highlight the importance of the north-east as a nationally and globally unique bioregion. For example, beetle communities occurring on Dicksonia tree ferns are notably different in the north-east than elsewhere



(Fountain-Jones et al. 2012). Similarly, the profile of millipede communities in NE Tasmania is unique to the bioregion and includes local hotspots of endemism and diversity, and examples of short-range endemism (Mesibov 2006); similar patterns are seen in velvet worms including unusual phenomena such as parapatric boundaries that separate species' distributions. Cryptic lineages in freshwater crayfish also highlight the novelty of the north-east domain (Sinclair 2011). It is noteworthy that various taxa display independent responses to the environment, with Cranston & Trueman (1997) reporting almost no overlap in the species diversity patterns of eleven groups of invertebrates surveyed in NE Tasmania (p. 33).

## Biogeographical processes

**Report 9A** illustrates and describes parapatric boundaries for millipedes and stag beetles (for which Tasmanian has the highest diversity in the world) on p. 28.

The same report also cites newly emerging evidence of both long past and recent evolutionary processes within Tasmania:

An unusually species-rich and highly endemic soil and litter fauna is only now being revealed. Small animals such as these play important roles in nutrient cycling and soil conditioning. In the last decade significant new species of ants, earthworms, beetles, pauropods and millipedes have come to light (Blakemore 2000; Mesibov 2006, 2009, 2010; Scheller 2009). Earthworm communities in Tasmania are remarkably rich by global standards (more than 200 species).

It also appears that Tasmanian tall forests harbour some of the highest diversity in macro fungi in the world (Gates 2010):

Knowledge of an entire biotic kingdom within Tasmanian tall forests, the fungi, is only just emerging, but recent inventories of macrofungi alone point to outstanding biodiversity in these habitats (G. Gates, pers.comm.2011). It is noteworthy that these numbers exceed those recorded in the temperate forests of south western China, regarded as one of the world's richest domains for macrofungal diversity (Zhang et al. 2010).

Further the report states:

Fungi are crucial to many ecosystem functions and have great ecological and economic value.

Many trees have evolved mutualisms with ectomycorrhizal (ECM) fungi that facilitate their phosphorus nutrition. Mycorrhizal fungi depend on photosynthetically fixed carbon produced by their associated trees. Forest resilience, recovery, vigour, and composition are intricately tied to EMF diversity (Amaranthus 1998).

Ratkowsky & Gates (2005) recently documented 360 named species of macrofungi (305 Basidiomycota and 55 Ascomycota) present in Tasmanian forests (mainly wet sclerophyll).

In a benchmark study, Gates et al. (2011a) found 331 ECM species in a limited area of tall *Eucalyptus obliqua* forest in southern Tasmania. The family Cortinariaceae (mainly *Cortinarius*) dominated the communities and covariation of plant and fungal communities was exhibited in the woody perennial plant community and their fungal assemblages. In a further study, Gates et al. (2011 b) showed that litter in these tall forests also supports a rich and diverse mycota, with 146 macrofungal species found fruiting in or on litter in one hectare of native forest, which had a range of fire histories. Regenerating forest after fire (including CBS harvest) is dominated by opportunistic, mainly saprotrophic fungi and has few symbiotic basidiomycetous ectomycorrhizal species that are abundant in the soils of mature forests (Ratkowsky & Gates 2009).

The macrofungi of lowland wet *Eucalyptus obliqua* forest respond to forest succession. Gates et al. (2005) recorded a total of 307 species of macrofungi with 248 species observed in the

mature forest (more than 70 years since wildfire) and 131 in the two or three-year-old regeneration. The large proportion of single records would suggest that many more undetected species might be present. The number of species that were observed exclusively in the mature forest (176) was three times the number observed exclusively in the regeneration (59). Most species known to be mycorrhizal were confined to the mature forest, suggesting that such species may take many years to establish, or reach maturity, following major disturbance. Most macrofungi were associated with either soil or wood, highlighting the importance of these substrates.

Tasmanian and Victorian wet forests contrast to northern hemisphere temperate forests in that *Laccaria* and *Cortinarius* fungi are among the most abundant ECM taxa (Tedersoo 2007). This suggests that these austral lineages may have different ecological roles and importance compared with Holarctic ecosystems (p. 43)

## The Peninsulas

**Report 9A** notes, that:

... despite their modest area, the Peninsulas are a hotspot of diversity for endemic fauna and flora as well as outliers of remnant rainforest ecosystems. Areas near MacGregor Peak on the Forestier Peninsula and Tatnells Hill on the Tasman Peninsula have been identified as areas indicative of high flora species richness with 14 eucalypt species present within 10km<sup>2</sup>. <http://www.parks.tas.gov.au/file.aspx?id=7040>

... The Peninsulas' important function as a refuge from past climatic stress is likely related to a benign maritime climate from its proximity to the ocean, relatively high rainfall, and complex topography including elevated peaks offering small scale refuges and various environmental gradients. To exploit these opportunities species must be able to move across the landscape facilitated by good connectivity and large contiguous areas of natural habitat.

## Freshwater ecosystems

In terms of assessing the freshwater ecosystem values of the proposed ENGO reserves and the contribution they would make to the quality and quantity of freshwater and overall freshwater ecosystem health an analysis by the Department of Primary Industries, Parks, Water and Environment reveals that the ENGO-proposed reserves would significantly increase protection of these values.

## Carnivores

**Report 7A** notes that:

Tasmania is globally significant for the largest and most intact guild of marsupial carnivores ... With the demise of the thylacine, there are three species in this size structured guild. The Tasmanian devil (6–14 kg), now positioned as the apex predator, is the largest remaining marsupial carnivore (and) is a predator and specialist scavenger. Now restricted to Tasmania, it was extirpated on the mainland by introduced dingoes 4000–5000 years ago. With recent severe disease-induced decline it is now listed as Endangered at state (*Threatened Species Protection Act 1995*), federal (EPBC Act 1999) and International (IUCN) levels. The spotted-tailed quoll (2.5–6 kg) is also found in a patchy distribution along the Great Dividing Range to far north Queensland and is classified as Vulnerable nationally (EPBC Act 1999) and Rare in Tasmania (*Threatened Species Protection Act 1995*). It once occurred much further west into the semi-arid zone but has disappeared from all but the wettest parts of its mainland range. The eastern quoll (0.7–1.5 kg), a carnivore/insectivore, disappeared from mainland Australia between the

1930s and the 1960s. Foxes are implicated as a major factor in its extinction. It is listed as Near Threatened (IUCN).

Until recently all these species were secure in Tasmania but are now in decline and in the case of the devil, extremely seriously so. The report identifies where the most potential exists for the proposed ENGO reserves to increase connectivity of reserved habitat in areas that function as refugia. This would be done by providing consistently suitable conditions for co-occurrence of all three species in Tasmania's large carnivore guild. The report identifies three clear hotspots and notes a significant number of proposed reserves 'which would greatly improve the reservation/protection status and connectivity for this carnivore guild.'

## Connectivity

**Report 9A** highlights the importance of protecting extensive elevational gradients and corridors of vegetation that connect populations and maintain pathways from sea level to the mountains. These would provide an essential buffer against impacts of both natural and human-enhanced climate change on native species:

These should be regionally replicated where possible in order to offer multiple pathways for retreat or expansion. The present distribution of many species and communities in present-day Tasmania is best explained by such migration in the past ...

Proposed reserves, which make a good contribution to elevational range are shown on page 39 and 40. The report also notes that 'blocks which abut existing reserves may contribute an even greater collective elevational gradient which further enhances their value.'

## Cultural heritage

Significant information has also been provided in relation to important Aboriginal cultural sites, including for significant sites not currently protected in the TWWHA, which require full formal assessment.

## Conclusions

A matrix is attached to this report, which notes all values found in IVG assessment projects to be present in all 270 polygons of the ENGO-proposed reserves.

The contributing values described above highlight the rich biodiversity of Tasmania's forests. Recent discoveries add value to the better-known core conservation values, including the many nationally and globally significant heritage values.

The values identified in the above reports coincide with many of the areas identified in here as having National or World Heritage significance. They reinforce the arguments for their protection and overall heritage value.

CHAPTER 3

# Southern Forests



## Chapter 3

### Southern Forests

#### Introduction

Many of the proposed ENGO nominated reserves identified as a part of the lands to be examined by Tasmanian Intergovernmental Forest Agreement Independent Verification Group either adjoin or are near to the boundary of the Tasmanian Wilderness World Heritage Area.

The boundary and proposed additions to the TWWHA have long been a matter of debate and as a result a number of adjustments have been made to the boundary from time to time. A series of the currently nominated parcels relate to particular themes such as tall eucalypt forests and boundary appropriateness.

Rather than individually assess each parcel, it was decided at least for initial assessment, to group the parcels into aggregates that appeared to share a single theme.

A separate section addresses the global significance of tall eucalypt forest, laying the foundations for assessing the several aggregate areas containing tall eucalypt forest, which relate to the existing World Heritage Area.

A number of separate projects undertaken for the IVG process add to the global significance of this and other areas within the ENGO proposals to extend the TWWHA. A full analysis of the information contained in these reports has not been possible in the limited time available. See Chapter 4 of this report for description of some of the other relevant values that contribute to the overall significance of the proposed areas.

The following clause from the World Heritage Operational Guidelines is particularly relevant when considering the various ENGO-proposed reserves adjacent to the TWWHA.

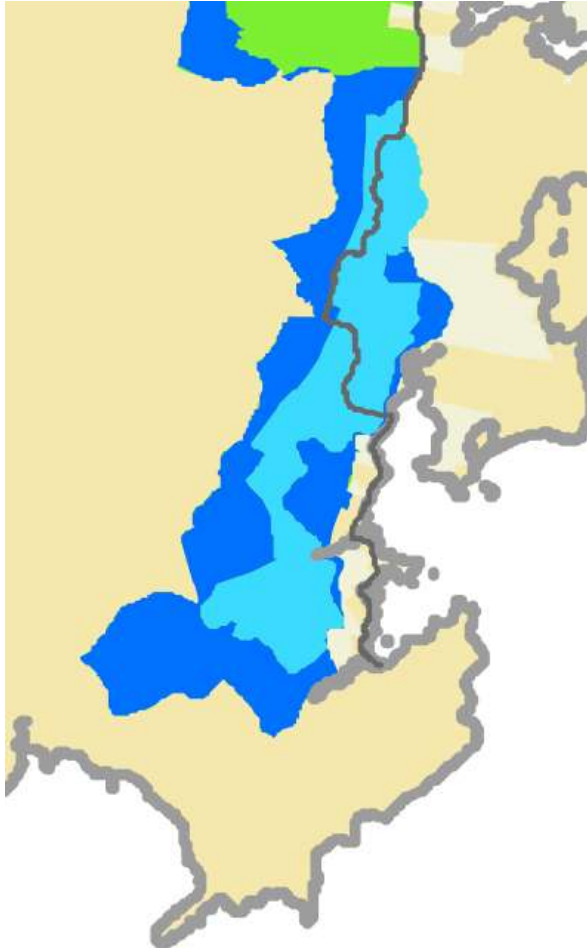
**'96.** Protection and management of World Heritage properties should ensure that the outstanding universal value, the conditions of integrity and/or authenticity at the time of inscription are ***maintained or enhanced*** in the future.' (emphasis added) —World Heritage Operational Guidelines 2008

**CAVEAT:** The assessments of heritage significance in this report are based on data that the consultancy could access in the limited time permitted and therefore not necessarily based on fully comprehensive data. Any data omitted is only likely to increase the heritage significance of the affected areas rather than invalidate or diminish significance. In a number of cases, assessment has been curtailed when a high level of significance has already been established without resort to greater depth of data analysis.

#### Recherche Bay to D'Entrecasteaux Catchment assessment area

## Introduction

The ENGO-proposed reserves illustrated in the diagram below, extending from Cockle Bay in the south to the watershed between the D'Entrecasteaux and Lune River catchments was initially considered to be a logical aggregate for assessment. It was later divided into two sections, north and south of the D'Entrecasteaux River because of certain complications in the northern section.



ENGO-nominated reserves (dark blue and light blue) in the Recherche Bay and D'Entrecasteaux catchment adjoining the TWWHA (green).

For the section of the boundary of the TWWHA between Cockle Creek in the south and Adamson's Peak in the north, there has been a longstanding issue of the appropriateness of the boundary of the TWWHA. The original boundary was based on an early delineation for the South West Conservation Area, adopting in many cases contours across steep hill slopes quite inappropriate for any major protected area/World Heritage Area. In the past decade some parcels of land along the boundary have been converted to national park improving the situation to some extent but leaving an otherwise illogical and unsustainable boundary. The natural sequence from tall eucalypt upslope to rainforest and beyond that, alpine ecosystems, has been arbitrarily truncated by the contour boundary. This denies the opportunity to maintain natural ecological processes, especially fire driven ecology which is a major determinant in interaction between the eucalypt and rainforest ecosystems.

South of the D'Entrecasteaux River there remains an opportunity to extend protection from the steep hill slope escarpment down slope and to the coastline, therefore mostly preserving the opportunity for natural ecological processes to be maintained or restored across the landscape. One of the important benefits of extending protection to the shoreline would be to shorten and simplify the TWWHA boundary. Eliminating clearing and other forest development would greatly enhance the ecological integrity of the Mount La Perouse–Recherche landscape unit within the TWWHA.

North of D'Entrecasteaux River the greater extent of development has all but eliminated the option of maintaining or fully restoring natural ecological processes, particularly fire. Accordingly, the strategy north of the river is to, as far as possible, remedy the defective TWWHA boundary and to improve manageability at the local and landscape level.

**NOTE:** There are a number of small clusters of waterside settlement along Cockle Creek Road and parts of the western shore of Recherche Bay, for example Moss Glen. The status of these house clusters has not been established and some appear to be located on Recherche Bay State Recreation Reserve. Ideally, management of the forest hinterland adjacent to these settlements should be harmonised with if not integrated with that of the TWWHA forests.

### **Assessed sub-unit: Recherche Block**

[Part FID 002]

The 'Recherche' Unit 1 is described as comprising all unreserved lands in FID 002 south of the D'Entrecasteaux River. Because of the similarity and integral relationship of the two land classes, 'Immediate Protection' and 'Interim Protection' zones of the ENGO-proposed reserves, in this instance it was logical to assess them as a single entity.

Notwithstanding a significant amount of past disturbance within the assessed area caused by coupe based logging, the longer term view is that natural rehabilitation can be expected to progressively eliminate both the direct and indirect impacts of those logged coupes. The assessed area comprises mostly coastal lowland rising inland to foothills and is predominantly forested with significant areas of tall eucalypt forest (see diagram below) The ENGO-proposed reserves are bounded in the upslope to the west by the boundary of a tract of protected lands, mostly Tasmania Wilderness World Heritage Area. (It is apparent there may be several small areas of National Park not yet included in the TWWHA. This should be checked.)

The Recherche Bay region has historic significance for the discovery and first formal description of the eucalypts of the world. The first eucalypts collected for science were from the region and the first eucalypt officially described also came from the region (Bruny Island).

On his return to France, Labillardière wrote the first major work devoted to the botany of Australia and Tasmania, *Novae Hollandiae Plantarum Specimen* (Labillardière 1804–1807). In the book, he describes 265 new species, including several eucalypts which he had collected from Tasmania: *E. amygdalina*, *E. cordata* (Photo 2), *E. globulus* (Photo 3), *E. ovata* and *E. viminalis*. Another of his specimens, that of *E. pulchella*, was described by his friend and colleague, René Louiche des Fontaines, director of the Natural History Museum in Paris.

In 1804–06 Labillardiere also identified about 100 new plant species including the blue gum, *Eucalyptus globulus*, now Tasmania's floral emblem. The publication of the botanical material collected by the d'Entrecasteaux expedition represented the first general publication extensively covering Australia's flora to this extent. Much of Labillardiere's Australian material came from Recherche Bay.

National Heritage List: 7 October 2005

## Context for assessment

The assessment area is essentially fully forested, mostly tall eucalypt, and has been subject to some past episodes of logging. The assessment area occupies a strategic position between the TWWHA and the shores of Recherche Bay, although in part separated from the shoreline by various public reserves and possibly small blocks of private land.

The adjacent section of the TWWHA incorporates only a disjunct series of remnant tall eucalypt forest, the greater part of the otherwise continuous tract of tall eucalypt forest being located just outside the TWWHA boundary, an artifact of the drawing of the original protected area boundary to exclude the commercially important tall eucalypt forest. The ENGO-proposed reserves include the main corridor of tall eucalypt forest otherwise excluded from this section of the TWWHA. This corridor of tall eucalypt forest is relevant to the concept outlined elsewhere for protection—within the TWWHA—of a regional scale tall eucalypt corridor from Cockle Creek to central Tasmania, (see 'C2C' corridor) as a means of ensuring regional connectivity for the globally significant tall eucalypt ecosystem in Tasmania.





The eastern boundary of the World Heritage Area mostly follows a contour just above the tall eucalypt forest. Then ENGO-proposed reserves would move the boundary downslope to include a strip of tall eucalypt forest.

Given the gross under representation of the ecological diversity of tall eucalypt forest in the Tasmanian Wilderness World Heritage Area, there is a clear case to remedy that situation. The tall eucalypt forests in the lowlands of the Recherche Bay–D’Entrecasteaux coast potentially represents a significant contribution to the ecological integrity of the TWWHA (southern limit, alpine summit to sea sequence on one slope—The ‘French transect’—Mount La Perouse to Recherche Bay]. This area provides the best opportunity to capture the full range of elevation values in the TWWHA—of significant benefit to the ecological function and integrity of the TWWHA and particularly important to assist adaptation to climate change.

The existing boundary of the TWWHA south of the D’Entrecasteaux River reflects the history of protected area boundary design superimposed with incremental change. The boundary still includes some lengths of the original contour boundary of the South West

Conservation Area, mixed with a number of straight-line boundaries later created as a result of small parcels being protected and/or added to the TWWHA.

## Preliminary heritage assessment

Managing for maintenance of ongoing natural processes in the adjoining section of the TWWHA would be greatly facilitated if other potentially conflicting land uses were excluded from the lowland forest.

Similarly, maintenance of tall eucalypt connectivity in this district would be achievable only if these lowland tall eucalypt forests are protected.

**NOTE:** This assessment has been limited to the landscape level due to serious time constraints. Species level biodiversity was not input to the assessment. However, as noted above, a number of other IVG reports contain relevant information to assist a full World Heritage assessment and it is clear that new information provided in these reports adds to the overall significance of the proposed ENGO areas, especially of old-growth tall eucalypt forest.

Landscape level assessment was considered relevant for addressing maintenance of natural processes and protection of tall eucalypt forest (tall eucalypt ecosystem, connectivity, fire processes).

## Attributes

The ENGO-proposed reserves [Part FID 002] south of D'Entrecasteaux River have the following special attributes at the landscape level:

- The eucalypt forests in the assessed area, including some stands of tall eucalypt forest, represent the larger of the two\* **most southerly tracts of eucalypt forest in Australia, indeed the world.** (Tall eucalypt forest extends from north of the equator (Philippines) south to this southern most locality in Tasmania).
- The natural diversity of this small forest complex at the southern latitudinal limits of the Australian eucalypt and rainforest flora and fauna, especially the globally significant eucalypts can be expected to be of enduring **scientific interest**, especially given the historic research conducted by the French scientists in the 18th century.
- The eucalypt forests of the Recherche area would **contribute to the ecological integrity** of the adjoining Tasmanian Wilderness World Heritage Area (TWWHA) by preserving the natural vegetation sequence from sea level to tree limit on Mount La Perouse. This is particularly important for maintaining vegetation conditions conducive to natural fire interaction with the vegetation, especially on foothills and escarpment of the existing TWWHA.
- The eucalypt forests of this narrow lowland corridor are an integral part of a still existing natural connectivity of tall eucalypt, which extends up the eastern side (mostly outside) of the TWWHA, an important element in the long-term conservation of this ecosystem.

(\*NOTE: The other isolated smaller 'island' of tall eucalypt stands is on the opposite side of the Mount La Perouse mountain range and has a south westerly aspect and completely cut off from the main tracts of eucalypts on the eastern side of the TWWHA.)

## Assessed heritage significance

Those parts of the ENGO-proposed reserves, comprising mostly unlogged or little disturbed forest (some recent logging coupes) are of clear: *National Heritage Significance*: (c) because of their contribution to the integrity of the adjoining National Heritage listed TWWHA.

## World Heritage

The same areas would make a significant contribution to Criterion (ix) (ongoing natural processes); criterion (vii) (superlative natural phenomena of exceptional natural beauty ... ); criterion (x) (the most important and significant natural habitats for in-situ conservation of biodiversity ... ); and possibly criterion (viii) (outstanding examples of major stages of earth's history, including the record of life ... )

**NOTE 1:** As noted in Chapter 4 of this report there are other *in-situ* biodiversity values that need to be assessed.

**NOTE 2:** Two recorded Aboriginal cultural sites were noted in this preliminary assessment.

## Boundary considerations

Protection of the assessed area for conservation purposes and its addition to the adjoining TWWHA would have the benefit of greatly shortening (in the order of 25 kilometres) and simplifying (seashore, river) the boundary of the TWWHA, thereby greatly enhancing the manageability of this important protected area. Adoption of the seashore and a river as a boundary, instead of the existing difficult cross-country boundary, the boundary definition and manageability of this section of TWWHA would be greatly improved.



The Recherche assessment sub-unit is dominated by tall eucalypt forest. The TWWHA boundary largely excludes the best-developed tall eucalypt forest—in the ENGO reserve. The tall eucalypt forests of the Recherche Bay—Cockle Bay area are some of the southern most tall eucalypt forests in Tasmania, indeed the world.

**NOTE:** The intention is to include the Recherche Bay State Recreation Area in the same protected area as the assessed area. The actual tenure is less important than the need to ensure 'seamless ecologically based management' in the Recherche landscape, from seashore to tree line (from Recherche Bay to Mount La Perouse).

## Presentation considerations

Protection of all forest south of the D'Entrecasteaux River would greatly enhance the perception of natural landscape values for any visitor to Australia's southern most forested lands. Crossing the D'Entrecasteaux River on the South Cape Road provides a 'sense of arrival' for visitors traveling south into the TWWHA, including South Cape, the southern most point of Tasmania and hence Australia.

Consideration should be given to consolidation of protection in this southern coastal precinct of Tasmania, linking up the World Heritage Area, Southport Lagoon Conservation Area and the National Heritage listed Recherche Bay area. The cultural heritage value of the Recherche Bay area would make a significant contribution to the integrity of the TWWHA.

## Bibliography

<http://www.recherchebay.org/>

<http://www.environment.gov.au/heritage/places/national/recherche/information.html>

## Assessed sub-unit: Recherche 2 (R2)

This area comprises mostly lower foothills extending north from the D'Entrecasteaux River in the south to watershed between the Lune and D'Entrecasteaux catchments in the north. The area comprises areas described by ENGOs as both 'Immediate Protection' and 'Interim Protection' proposed reserves.

### ***ENGO-proposed reserves 'immediate protection'***

These lands comprise a narrow corridor along the eastern boundary of the TWWHA. As such it is expected that they would contribute to the ecological integrity of the TWWHA and improve the boundary.

Much of the lands in this unit are eucalypt forest, including stands of globally significant tall eucalypt forest and often adjoins non-eucalypt (mostly rainforest) in the immediately adjoining TWWHA. As such, this fringe of eucalypt forest contributes to the ecological integrity of this section of the TWWHA and so, is strongly recommended to be protected and included in the TWWHA. These forests make an important contribution maintaining a regional connectivity corridor for tall eucalypt forests along the eastern margin of the TWWHA.

## Heritage assessment findings

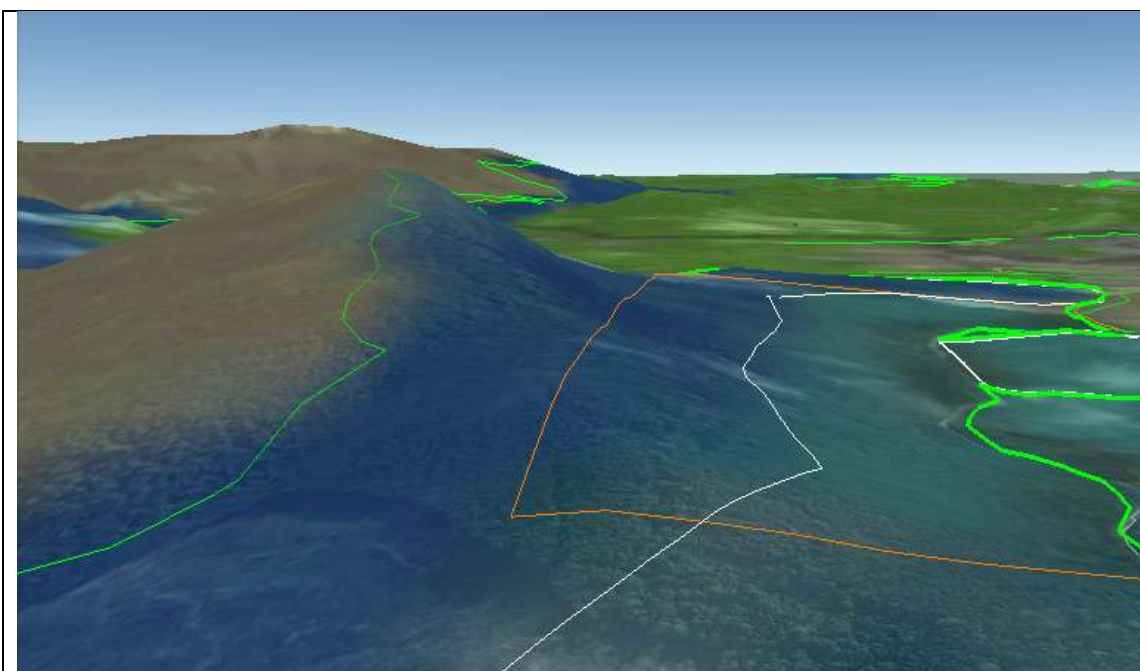
The assessed forests:

- contribute to ecological integrity (transition sequence from lowland tall eucalypt to rainforest) of the adjacent section of TWWHA
- contribute to ecological integrity (connectivity) along the eastern side of the TWWHA—see 'C2C'\* tall eucalypt corridor
- contribute to boundary definition and manageability of TWWHA.

\* **NOTE:** 'C2C' is a concept designed to maintain/restore effective long distance connectivity of tall eucalypt forests derived from Counsel River to Cackle Creek—the two approximate extremities of this natural linear corridor of eucalypt forest. (P Hitchcock 2008 unpublished)

### **ENGO-proposed reserves ‘interim protection’**

These lands have been subject to a long history of logging and have mostly been subject to clear felling in recent decades. For the most part they don’t appear to retain significant naturalness or biodiversity value. (*Caution:* Species records should be checked in detail as a routine precaution)



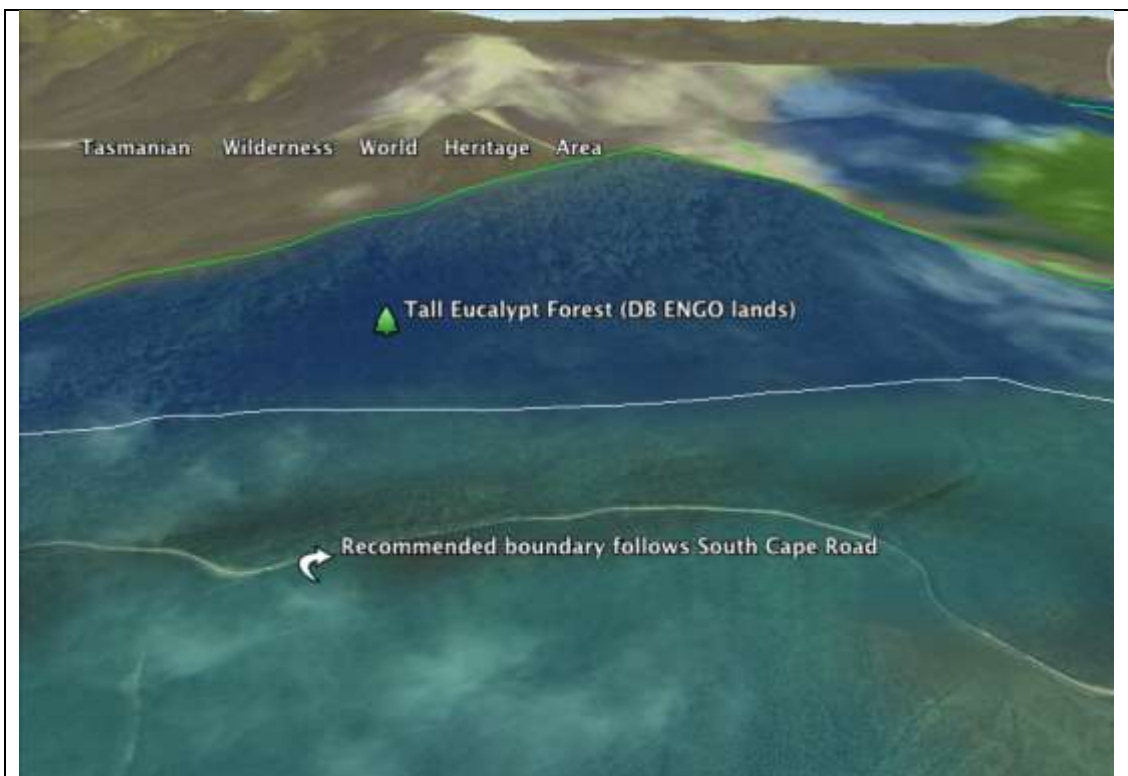
Multiple tenures, multiple boundary options. WHA boundary (left), Fossicking Area (orange), ‘Immediate protection’ (white) and South Cape Road (light green). The most appropriate and sustainable boundary is likely to be the main road. (But note complications with the Fossil Reserve—see below)

### **Boundary considerations**

Incorporation into the TWWHA of the ENGO-proposed reserves between D’Entrecasteaux River and the Lune watershed provides the opportunity to significantly improve the manageability of the existing TWWHA boundary by relocating it from hill slopes and ridge top to a more accessible location on the lower slope.

One option is to adopt a section of the South Cape Road, ensuring a well-defined and more appropriate field management boundary (but see below)

However, by protecting the full east-west extent of the ENGO-proposed reserves in this locality, there is the opportunity to provide a direct link to the Southport Lagoon Conservation Area, securing habitat connectivity between the TWWHA and this important formal reserve. Although this link is not important to the TWWHA, it is good conservation planning and enhances the value of Southport Lagoon CA.



That part of the ‘Interim Protection’ lands (light blue) west of the South Cape Road would, if added to the TWWHA, improve boundary definition and simplify field management. One option is to adopt the South Cape Road for a section of new TWWHA boundary. The preferred option is to protect all of the ENGO-proposed reserve lands in FID 002, thereby providing habit connectivity to the Southport Lagoon Conservation Area.

**Summary—Recherche to D’Entrecasteaux—Lune Divide (not including Lune Fossil Sites)**

**WORLD HERITAGE**

Attribute	Relevant criterion	Value
Tall eucalypt forest	(ix) (Outstanding examples of ongoing evolution) (vii) (superlative natural phenomenon) (viii) (outstanding examples of major stages of earth’s history)	Contributes to ecological diversity of already cited World Heritage values ‘ <i>pristine tall eucalypt forests</i> ’ (Australian Heritage database)  <i>See Chapter 1 for rationale for this criterion.</i>  <i>Possible value. See Chapter 1 for discussion of relevance to this value.</i>

Tall eucalypt forest	Criterion (x)	Tall eucalypt forests are of world heritage significance; this area contributes an additional value to the WHA. Contributes to the integrity of the TWWHA.
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### Assessed sub-unit: Lune River fossil sites

The ENGO-proposed reserves include two nationally\* significant fossil sites which have been formally recognised. The two sites are the only known in situ sites of Jurassic age fossils in Tasmania and have yielded many important plant fossils. (See Sharples 1995 and Calver 2009)

Both sites are within state forest and both have been previously logged, cleared and regenerated. Notwithstanding that much of the ecological value has been lost from the sites, they are of such geoconservation heritage significance that they deserve formal high-level protection and, most importantly, appropriate management.

\* Tasmanian Geoheritage List 2009

### Heritage significance

#### National Heritage

Criterion (b) and (c) ‘... the place’s possession of uncommon, rare or endangered aspects of Australia’s natural ... history; ...’ and ‘... the place’s potential to yield information that will contribute to an understanding of Australia’s natural ... history;’

Two of the Lune River fossil sites/features have been listed on the Tasmanian Geoconservation Database (TGD) as being of national significance namely:

Lune River in situ Jurassic plant fossils	Southern Tasmania, Lune River
Lune River large silicified Jurassic logs	Southern Tasmania, Lune River

In *State of the Environment Report 2008*

Given that the Lune River fossil sites are already known, have been studied and professionally evaluated as being of at least national significance, preliminary assessment is that they have the potential to meet both criteria (b) and (c) of the National Heritage criteria.

#### World Heritage

Criterion (viii) (‘...to be outstanding examples representing major stages of earth’s history, including the record of life, ...’)

Assessed in the context of the adjacent Tasmanian Wilderness World Heritage Area, the Lune River Fossil Sites would make an important contribution to the integrity of the already cited outstanding geo-heritage values and significance of the Tasmanian Wilderness World Heritage Area.

## Reference

[http://www.mrt.tas.gov.au/mrtdoc/dominfo/download/UR2009\\_02/ur2009\\_02.pdf](http://www.mrt.tas.gov.au/mrtdoc/dominfo/download/UR2009_02/ur2009_02.pdf)

Apart from the significant conservation values of the two Lune River Fossil Sites, this assessment failed to find other significant values.

(Caution: Species records should be checked in detail as a routine precaution).



Oblique view showing relationship between Tasmanian Wilderness World Heritage Area (TWWHA) boundary, 'Immediate Protection; (beyond white line), 'Interim Protection' lands (forward of white line and Lune River fossil sites. Proposed boundary is bright green and steps around the two fossil sites to incorporate them into the TWWHA.

## Heritage assessment

Summary—Lune River Fossil Sites		
WORLD HERITAGE		
Attribute	Relevant criterion	Value
Lune River in situ Jurassic Plant Fossils	Criterion (viii)	Contributes to the integrity of already cited geoh heritage values of TWWHA by adding unique new dimension to geodiversity.
Lune River Large Silicified Jurassic Logs	Criterion (viii)	Contributes to the integrity of already cited geoh heritage values of TWWHA by adding unique new dimension to geodiversity.



NATIONAL HERITAGE		
Attribute	Relevant criterion	Value
Lune River in situ Jurassic Plant Fossils	(b) and (c)	Already assessed as national significance on Tasmanian Geoconservation Database(TGD)
Lune River Large Silicified Jurassic Logs	(b) and (c)	Already assessed as national significance on Tasmanian Geoconservation Database(TGD) and therefore meeting criteria for National Heritage.

**Heritage summary—Lune River Fossil Sites**

**World Heritage:** Assessed in context of adjacent TWWHA, addition to the WHA would contribute significantly to the integrity of the geoh heritage values of the WHA, adding a unique new dimension.

**National Heritage:** Meets criteria (b) and (c) as National Heritage.

### Protection and boundary considerations

The Lune Jurassic fossil sites present a situation that may require special attention. Firstly, there is no doubt about the heritage significance, secondly the area has been subjected to intense forestry activity and thirdly, the two already reserved sites are adjoined by a designated public fossicking area.

The fossil sites could be added to the adjoining/adjacent Tasmanian Wilderness World Heritage Area and in so doing they would definitely contribute to the integrity of the TWWHA (Jurassic fossil sites that would complement the already cited ‘fossiliferous Ordovician limestone’ in the TWWHA).

Arguably the designated fossil sites deserve a greater level of formal protection. The options are that the fossil sites be either added to the adjoining TWWHA or the adjoining Southport Lagoon Conservation Area.



Withdrawal of forestry activities and regeneration of the eucalypt forest would provide the opportunity to permanently re-establish habitat connectivity between the TWWHA and Southport Lagoon Conservation Area, enhancing the conservation value and integrity of the Conservation Area and the Tasmanian Wilderness World Heritage Area.

### Recommendation

1. Add the Lune Fossil Sites as currently configured to the TWWHA (not including that part of the Fossicking Reserve east of the South Cape Road).

## Lune–Hastings Cave assessment area

LH1 (Lune Divide north to Hastings Cave)

	
<p>ENGO reserve FID 02 is bounded in the west by the unsatisfactory boundary of the WHA. If added to the TWWHA, the proposed reserve would move the boundary of the TWWHA to an accessible location on the coastal lowlands.</p>	<p>ENGO reserve FID 02 embraces much of the remaining tall eucalypt forest along the escarpment, mostly outside the TWWHA.. Protection of the forests in the proposed reserve would also contribute to regional connectivity for tall eucalypts right along the eastern side of the TWWHA.</p>

**NOTE:** There appear to be some boundary discrepancies in between the TWWHA and ENGO-proposed HCV boundaries. As they are essentially ‘internal’, they have no impact on the recommendations.

### Context for assessment

In this region, the natural sequence of forest communities from east to west (dry to wet, low elevation to higher elevation) is progression from eucalypt forest and treeless areas with impeded drainage on the lowlands, through a band of tall eucalypt forest (mixed forest) to rainforest and/or subalpine and alpine vegetation on Adamson’s Peak. In the vicinity of Hastings Caves and north of Hastings Caves the globally significant tall eucalypt forest is all but excluded from the TWWHA. Good heritage conservation planning should seek to remedy this situation by including the tall eucalypt forest zone in the TWWHA to as far as possible protect a corridor of tall eucalypt forest **within** the TWWHA. (See Chapter 4 on the heritage significance of tall eucalypt forests)

This section of boundary of the TWWHA has undergone a number of small changes since original listing, primarily to protect the limestone karst areas of Exit Cave and the vicinity of Hastings Caves. The current boundary remains variable, at times high on ridge tops and in other places at the break of slope. This section of TWWHA boundary suffers the often-repeated deficiency up the eastern boundary of the TWWHA of all but excluding the tall eucalypt forest. A glance at a forest community map will reveal that the existing boundary completely excludes the tall eucalypt ecosystem in this locality. Protection of the tall eucalypt forest of the ENGO-proposed reserves, as well as adding an additional ecological dimension

to the TWWHA (extending from alpine on Adamson's Peak down to coastal lowland eucalypt forest) also makes a significant contribution to maintenance of a north-south connectivity in the eucalypt ecosystem. It is recommended that they be fully protected.

#### Mining On Hastings

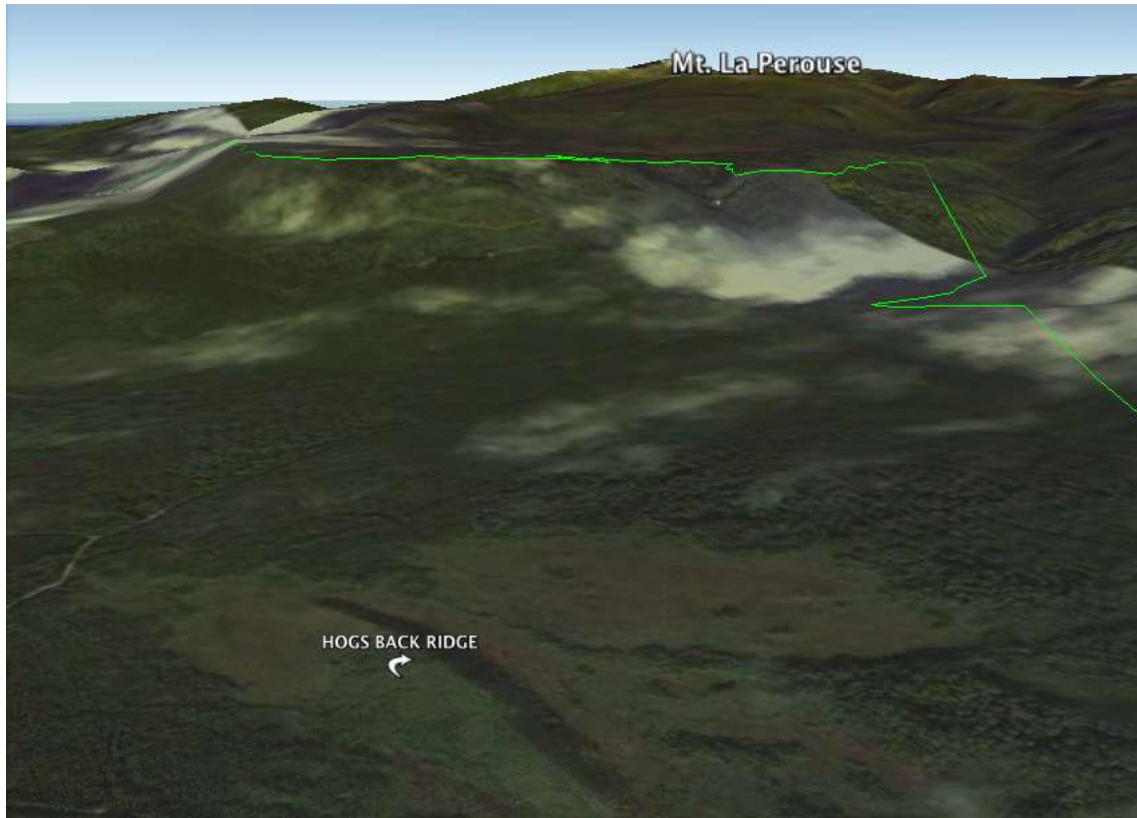
##### Plain

At the Boar's **Back**, on the Hastings Plain, a gang of men under Mr. R. Havls mining ferro-silicon, and another gang is building a tram line for about three quarters of a mile to bring the material to the cave mad for conveyance to Ida Bay for transshipment to Electrona.

It is believed that several hundred tons are required for a bulk assay. The Industry, if established, will be of great benefit to the district

(Hobart Mercury 14th May 1940)

An interesting feature within the Interim Protection area south of Hastings Caves is a distinctive ridge known as the Hog's Back, rising above the treeless Hog's Back Plain. It falls within Sharples' Southeastern complex karst valleys (Area 12) of fluvial environmental domain mosaics found in or adjacent to the Tasmanian Wilderness World Heritage Area. (Sharples, based on Jerie et al. 2003). The Hog's Back is a siliceous sandstone ridge, which includes a stratum assaying as 98 per cent silica. During World War II high quality silica was quarried from the site for use in ferro-silica metallurgy. The reserves of quartzite have been tentatively assessed at four million tonnes (Summons 1981).



Looking across Hogs Back Plain towards the North Lune valley. Note that TWWHA boundary (green) follows a contour and then descends (right) to straight lines down spurs and across foothills. The current boundary all but excludes the tall eucalypt forest from the TWWHA. Adding the ENGO-proposed reserves to the TWWHA would enhance the integrity of the TWWHA and greatly improve the manageability of the boundary (North Lune Road on left).

## Heritage significance and contributions

### ***World Heritage***

The ‘inscribed values’ statement for Tasmanian Wilderness World Heritage Area only specifically cites tall eucalypt forest as a value against Criteria (vii) and (ix) and omits any reference under Criterion (x) for example:

... eucalypt tall open forests including *Eucalyptus regnans*, the tallest flowering plant species in the world; (Criterion (vii))

The citation fails to acknowledge that the important natural ecological interaction between eucalypt (‘fire forests’) and the rain forests, together with the ‘ongoing natural processes’ have been seriously truncated in many places along the eastern boundary.

The ENGO reserve forests along the Hastings Caves–Lune section of TWWHA boundary have important contributions to make to the World Heritage conservation values of the TWWHA including:

- contributing to the value and integrity of the World Heritage values of the TWWHA, in particular to the globally significant tall eucalypt ecosystem
- contributing to the maintenance of natural ecological processes of the forests along the eastern margins of the TWWHA, including interaction between tall eucalypt forest and rainforest and maintenance of regional scale ecological connectivity (tall eucalypt forests)

- contributing to facilitating field management of the TWWHA.

Given the significant identified values and contribution to the value and integrity of the TWWHA, a substantial part of the ENGO-proposed reserves between the D'Entrecasteaux–Lune watershed and in the vicinity of Adamson's Peak in the north are considered to be of such National and World Heritage significance as to warrant permanent protection and inclusion in the TWWHA.

### **National Heritage**

The tall eucalypt forest of the TWWHA is cited as a component of the National Heritage values of the TWWHA. However, the citation fails to acknowledge that the natural ecological transition from the eucalypts ('fire forests') to the rain forests has been truncated in many places along the eastern boundary.

The ENGO-proposed forests along the Hastings Caves–Lune section of the boundary would make important contributions to the conservation values of the National Heritage listed TWWHA, namely:

- contribute to the value and integrity of the World Heritage values of the TWWHA, in particular to the globally significant tall eucalypt ecosystem
- contribute to the maintenance of natural ecological processes of the forests along the eastern margins of the TWWHA, including interaction between tall eucalypt forest and rainforest and maintenance of regional scale ecological connectivity (tall eucalypt forests)
- contribute to facilitation of field management of the National Heritage listed TWWHA.

<b>Summary Lune–Hastings Caves</b>		
<b>WORLD HERITAGE</b>		
<b>Attribute</b>	<b>Relevant criterion</b>	<b>Value</b>
Tall eucalypt forest	(vii), (ix) and (x)	Contribution to the integrity of the TWWHA (ecological diversity and connectivity)
Karst	(viii) Outstanding examples of stages of earth's history.	Contribution to the integrity of the already cited karst values of the TWWHA
Glacial features	(viii) Outstanding examples of stages of earth's history.	Contribution to the integrity of the already cited glacial values of the TWWHA

NATIONAL HERITAGE		
Attribute	Relevant criterion	Value
Eucalypt forest including Tall Eucalypt ecosystem	(a) and (d)	Contribution to the integrity of the TWWHA as a place of National Heritage significance (ecological diversity and connectivity)

## Heritage summary

While no specific feature or process was identified as being unique to the section of ENGO proposals between the D'Entrecasteaux–Lune divide and Hastings Caves, the lands have been assessed in the context of the immediately adjoining Tasmanian Wilderness World Heritage Area which is both on the National Heritage List and the World Heritage List. As such, the ENGO-proposed reserves make an important contribution to **enhancing the values and integrity** (as defined in the World Heritage Operational Guidelines) **of the TWWHA** and concurrently to that of the National Heritage listed values of the TWWHA.

The ENGO proposals extend the vegetation sequence to more clearly incorporate the poorly represented tall eucalypt zone in the sequence from the alpine vegetation on Adamsons Peak to the coastal lowlands, thereby contributing to the ecological diversity and integrity of the TWWHA. Further, coupled with other adjacent important areas to the north and south, the ENGO-proposed reserves contribute to maintaining regional connectivity in the tall eucalypt ecosystem extending down the eastern margins of the TWWHA from central Tasmania to the south coast (see 'C2C' connectivity).

## Boundary considerations

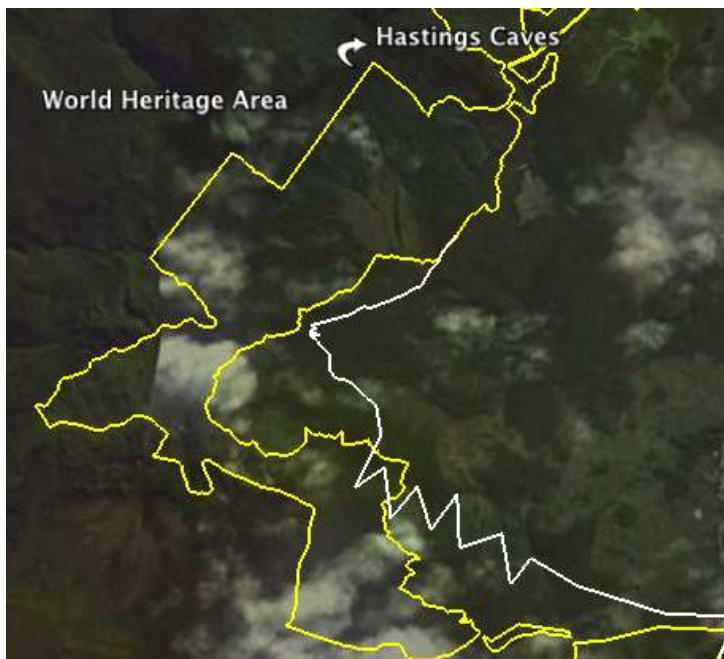
Considered in the context of the TWWHA, the ENGO-proposed reserves between Exit Cave and Hastings Caves are considered to be of World Heritage significance given the important contribution that they make to the integrity and hence value of the immediately adjoining TWWHA. That value is sufficiently important to recommend adding the land to the TWWHA.

That leaves the question of the appropriateness of the resultant new boundary that would be created. The eastern boundary of the ENGO proposals appears intended to be the North Lune Road but the small scale maps provided show some departure from this alignment, excluding a block of regrowth eucalypt north-west of the road. The preferred long-term boundary for the TWWHA would be to consistently follow the North Lune Road south-westwards from the Hastings Caves Road. The intent of the proposed new boundary is twofold—to capture a continuous tall eucalypt forest zone on the foothills and lowlands and to create a more appropriate and manageable boundary, which is readily recognisable and accessible in the field.

The section of boundary contained in kmz files which appear as a zigzag are indicative only and subject to detailed determination consistent with the indicated intent of the boundary. The proposed boundary varies in a few places from the boundary proposed by ENGOs, including small areas of state forest not identified as ENGO reserves, and conversely, excluding small areas of ENGO reserves.



Recommended additions to TWWHA incorporating mostly HCV (Immediate protection) lands—eucalypt forest including tall eucalypt forest on lowland and foothills. Recommended boundary is mostly accessible by road—converting a combination of contour and straight-line boundaries to create a permanent boundary that follows roads and natural features. The TWWHA boundary is yellow. Proposed new boundary is white. The zigzag sections indicate more field detail is needed to design a boundary.



The recommended most appropriate TWWHA boundary extends outside the ENGO-proposed reserve boundary.

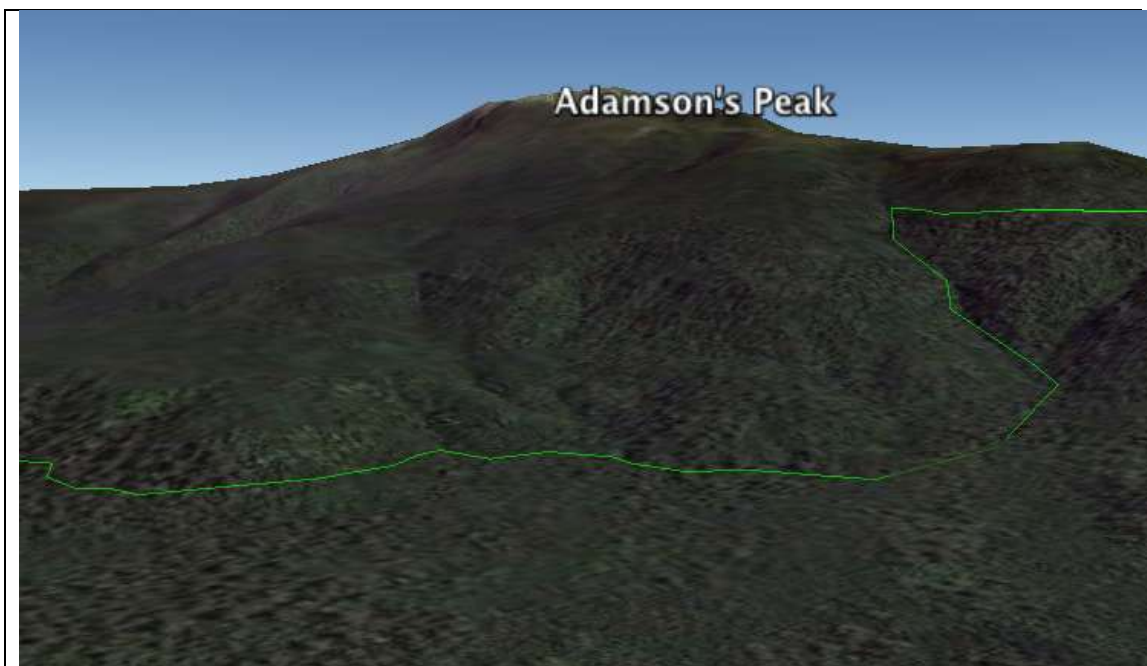
## Hastings Caves to Hartz National Park assessment area

Part FID 25

### Introduction

The section of boundary of the Tasmanian Wilderness World Heritage Area (TWWHA) between Hastings Caves in the south and Hartz National Park in the north epitomises the boundary deficiencies of much of the eastern boundary of the TWWHA. The entire length of this section of boundary is defined by a contour, mostly on steep slopes. The boundary is an artifact of an earlier period where boundaries were drawn for political expedience rather than capture of important conservation values, ecological processes or manageability.

Not surprisingly, the contour boundary is an artifact of excluding the commercially significant tall eucalypt zone at the time of creation of the South West Conservation Area, South West National Park and hence the TWWHA rather than the product of a carefully designed protected area boundary.



The boundary of the World Heritage Area adjacent to Adamson's Peak clearly demonstrates the deficiencies of much of this eastern section of boundary; first the boundary is a mix of footslope and contour lines on steep topography, second, it effectively excludes the tall eucalypt forest zone, thereby truncating the otherwise natural connectivity of the tall eucalypt forests along or adjacent to the eastern boundary.

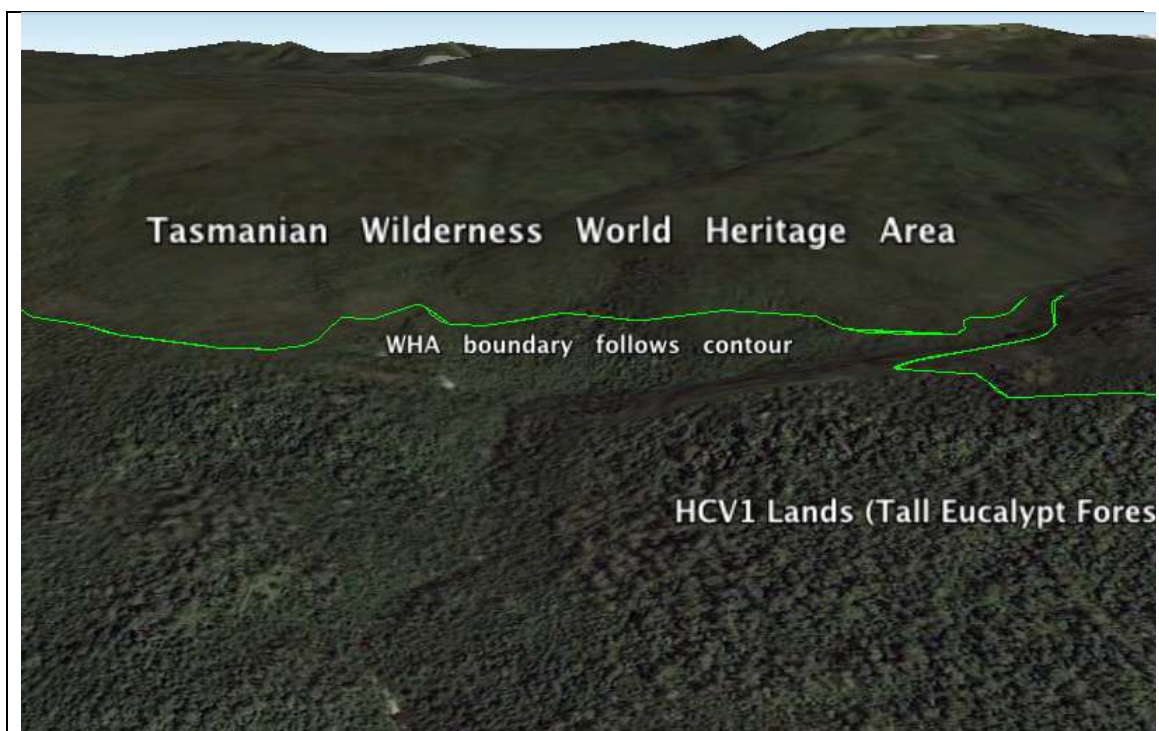
### Context for assessment

The forests extending along and adjacent to the eastern boundary of the TWWHA between Hastings Caves and Hartz National Park is part of the same corridor of globally significant



tall eucalypt forest which extends northwards from Recherche Bay and so the context for heritage assessment is very similar to that of other areas to the south.

One consequence of the existing contour boundary of the TWWHA is that it cuts across the flow of key natural processes such as water drainage, nutrients, soil, debris and propagules which tend to flow downslope and fire which has its maximum impact when traveling upslope. While the downslope driven processes flow from the TWWHA, it is fire that is of most importance in terms of flow direction into the protected area. Fire plays a profound role in maintaining the eucalypt component of the eucalypt–rainforest ecosystem and can strongly influence, if not dictate, the dynamics of the interaction between fire sensitive and fire tolerant species and associated communities of plants and animals. A substantially modified fire regime within the downslope tall eucalypt forest will have longer-term ecological consequences for upslope communities, in this case within the TWWHA. Maintenance and restoration of conditions conducive to maintaining natural processes, in particular natural fire **pathways**, is considered a priority for protecting natural processes within the TWWHA.



The boundary of the TWWHA between Hastings Caves and Hartz National Park comprises a contour across mostly steep terrain. The setting of this contour has ensured exclusion of the tall eucalypt forest zone from the TWWHA. As such the natural sequence from dry eucalypt, through tall eucalypt forest (wet sclerophyll) to rainforest has been denied.

Protection of a corridor of tall eucalypt forest between Hastings Caves and Hartz Mountain would greatly contribute to the values and the ecological integrity of the TWWHA. It would also contribute to maintaining connectivity along the 'C2C' tall eucalypt corridor from the southern tip of Tasmania—the world's most southern eucalypt forests—to central Tasmania.

## Heritage assessment

Unit HH1 comprises that part of the ENGO-proposed reserve [FID 25] between Hastings Caves and Hartz Mountains National Park. Most is eucalypt forest, much of that tall eucalypt forest. Some coupe-type logging has occurred in the area.

It was highly relevant to conduct the heritage assessment in the context of the immediately adjacent TWWHA.

The heritage conservation significance of the forests at the landscape level comes mostly from their juxtaposition with the Tasmanian Wilderness World Heritage Area. Species level attributes, which are likely to exist, are described in other IVG reports outlined in Chapter 4 of this report.

As presented elsewhere, the tall eucalypt ecosystem is under represented in the TWWHA, those stands of tall eucalypt present in the TWWHA are often ‘islands’ with little or no guarantee of long-term connectivity to the wider eucalypt landscape. Neither do the tall eucalypt forests within the WHA reflect the full biodiversity or ecological diversity that exists in these forests in Tasmania. By adding a selection of the tall eucalypt forest ecosystem into the TWWHA, the value and integrity of the TWWHA will be greatly enhanced. Ensuring as far as practicable that those tall eucalypt forests so protected are ecologically connected, provides a greater prospect of long-term ecological survival of this globally important ecosystem.

The effective connectivity along the ‘C2C’ regional corridor not only enhances long-term ecological survival but also, by its nature, embraces a substantial part of the ecological diversity of the tall eucalypt forest ecosystem in Tasmania.

### **World Heritage**

**HH1** is critically important to the long-term natural integrity of the eastern margin of the World Heritage Area. In particular, protection of this forest unit would:

- contribute to the value and integrity of the World Heritage values of the TWWHA by increasing the **ecological diversity** of the TWWHA, in particular of the globally significant tall eucalypt ecosystem
- contribute to the maintenance of natural **ecological processes** of the forests along the eastern margins of the TWWHA, including interaction between tall eucalypt forest and rainforest (the eucalypt–rainforest interaction) and maintenance of regional scale ecological connectivity (tall eucalypt forests)
- contribute to facilitation of ecologically based **field management** of the World Heritage listed TWWHA.

### **National Heritage**

(NOTE: Where it is apparent that an area has World Heritage significance, National Heritage values have not been detailed.)

The National Heritage significance of the Tasmanian Wilderness World Heritage Area will be significantly enhanced by protection of a continuous corridor of tall eucalypt forest ecosystem in the adjacent HC1 lands. In particular, such forests will:

- contribute to the value and integrity of the National Heritage values of the TWWHA by increasing the **ecological diversity** of the TWWHA, in particular of the tall eucalypt ecosystem
- contribute to the maintenance of natural **ecological processes** of the forests along the eastern margins of the TWWHA, including interaction between tall eucalypt forest and rainforest (the eucalypt–rainforest interaction) and maintenance of regional scale ecological connectivity (tall eucalypt forests)
- contribute to facilitation of ecologically based **field management** of the National Heritage listed TWWHA.

Summary–Hastings Caves to Hartz National Park		
WORLD HERITAGE		
Attribute	Relevant criterion	Value
Tall eucalypt forest	(vii), (ix) and (x)	Contribution to the integrity of the TWWHA. (added ecological diversity and connectivity)

NATIONAL HERITAGE		
Attribute	Relevant criterion	Value
Eucalypt forest including Tall Eucalypt ecosystem	(a) and (d)	Contribution to the integrity of the TWWHA as a place of National Heritage significance (ecological diversity and connectivity)

## Boundary considerations

As indicated above, the contour boundary is a highly unsatisfactory boundary for a protected area both from a management perspective and in terms of maintaining natural ecological processes. From a conservation perspective, the more important issue along this section of boundary is to protect and incorporate into the TWWHA, a continuous corridor of tall eucalypt forest.

The complexity of logging and roads in the area, makes it somewhat difficult to select a new boundary which permanently reserves a continuous corridor of tall eucalypt forest along the eastern margin of the TWWHA and creates a more appropriate boundary which is more readily identifiable in the field. Notwithstanding this difficulty, the benefits of improving the values and integrity of the TWWHA far outweigh the status quo.

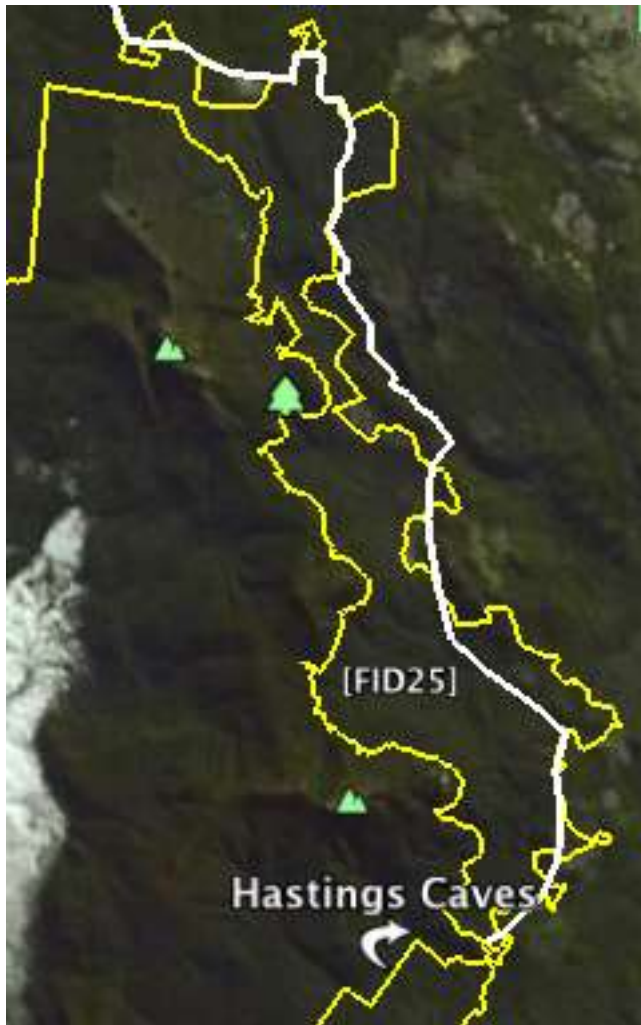
Short of moving the boundary east to more accessible lowlands, conservation objectives for the tall eucalypt ecosystem can be substantially achieved by adopting a sub-optimal boundary within the tall eucalypt zone. The recommended ‘compromise’ boundary is still superior to the existing contour boundary high up on the mountain slopes above the eucalypt zone.

The proposed new boundary can be ‘finetuned’ using local knowledge providing the guiding principle is to protect a continuous north-south corridor of tall eucalypt forest and there is no significant reduction in the corridor width relative to the boundary recommended in this report.

An indicative boundary (a ‘give and take’ boundary) excising some ENGO-proposed areas and adding in some non-ENGO state forest is provided in the section relating to the Hastings Caves–Hartz boundary proposal.

## Recommendation

1. Recognise that a continuous corridor containing tall eucalypt forest adjacent to the TWWHA boundary between Hastings Caves and the north boundary of Hartz National Park makes an important contribution to the integrity of the TWWHA.
2. Develop detail of the precise boundary based on the indicative boundary presented in file ‘HASTINGS CAVES–HARTZ Boundary proposal copy.kmz’ provided separately.

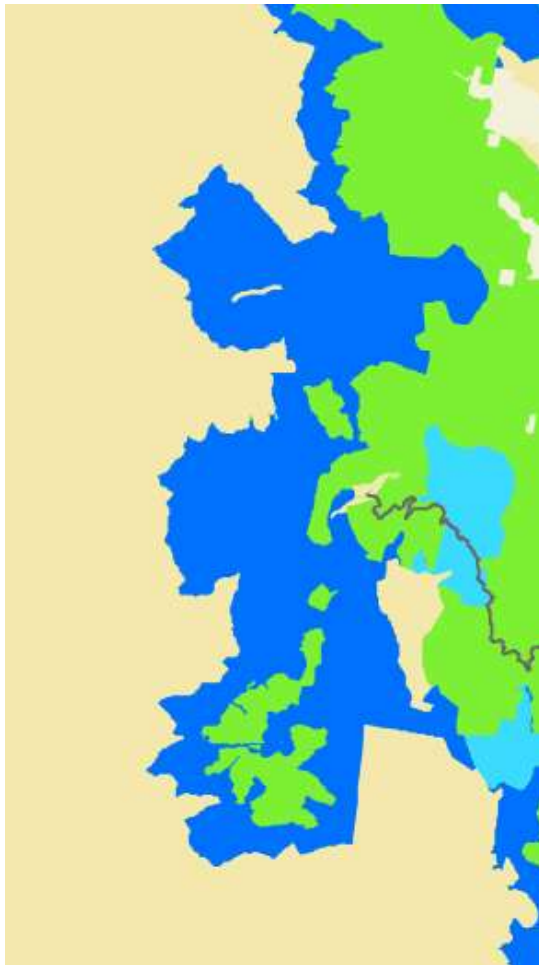


The recommended boundary (white) generally follows the proposed-ENGO boundary but varies in places. This would be a much more appropriate Tasmanian Wilderness World Heritage Area boundary than the present unsatisfactory contour boundary.

## Three Valleys assessment area (Weld–Huon–Picton valleys)

### Introduction

To assess and delineate boundaries, the lower sections of the Weld and Picton valleys, together with the closely associated middle Huon Valley, were dealt with as a single entity. They each have many shared attributes and values. The tall eucalypt forests in this area are collectively part of the largest single tract of tall eucalypt forest ecosystem extant in Tasmania. They are also intimately linked through natural processes such as fire, drainage and water flow.

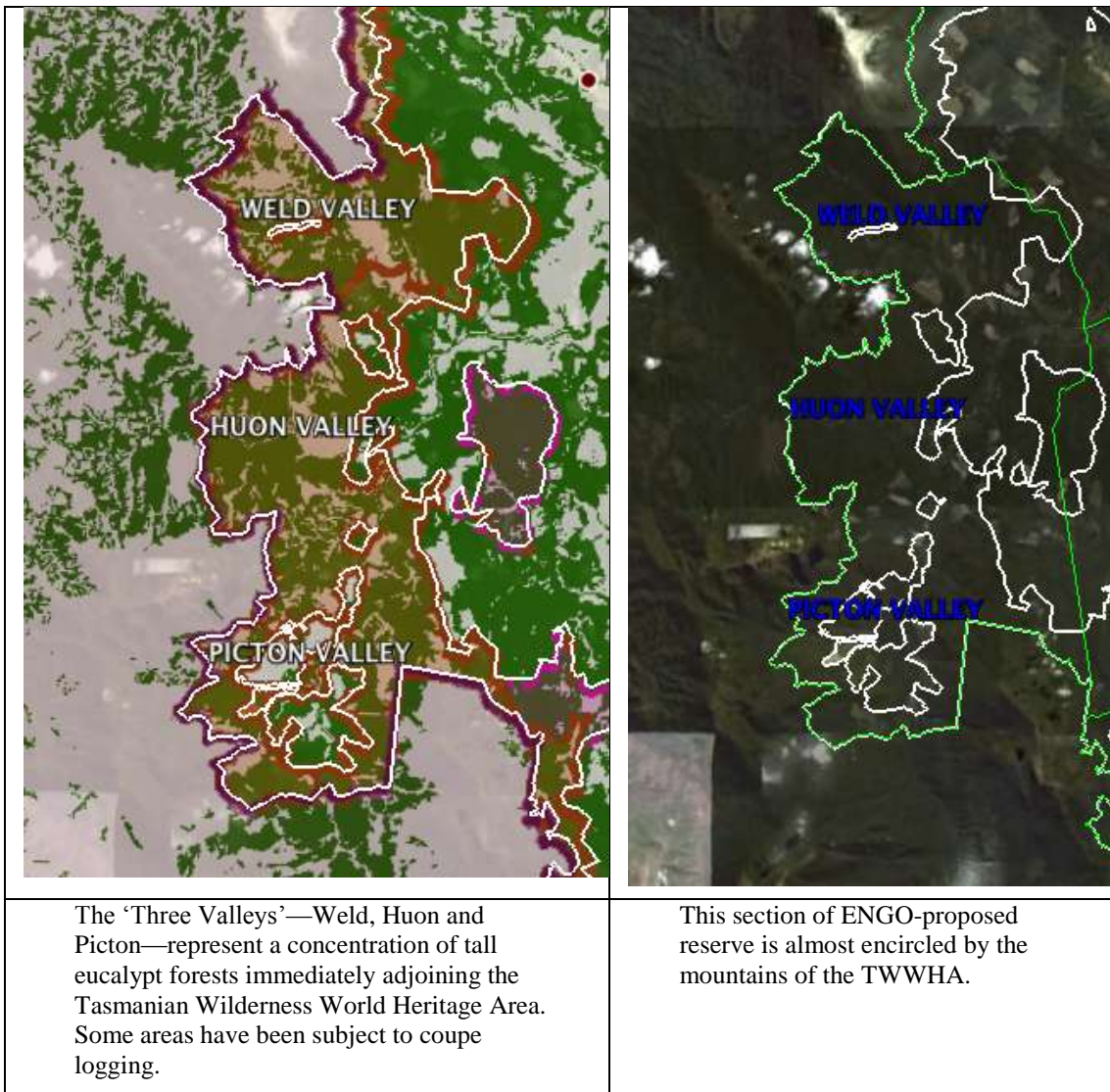


ENGO-proposed reserves (dark and light blue) in the 'Three Valleys'. Note the convoluted boundary, mostly contours, of the TWWHA (green).

The three valleys—Weld, Huon and Picton—have been the focus of considerable debate over the heritage significance of the tall eucalypt and rainforest in these areas and the appropriateness of this section of the boundary of the Tasmanian Wilderness World Heritage Area. In effect the state forests in the three valleys intrude into the boundary of the TWWHA and contributed to criticism of the boundary by IUCN. This was the section of the Tasmanian Wilderness World Heritage Area boundary that IUCN was particularly concerned about in the

first assessment of major additions in 1988 when it advised ‘IUCN’s main concern relates to the boundaries ...’ and that the boundary of the nomination ‘does not follow natural features as is evident from its complex convoluted design’.

Since 1988, as a result of various agreements between the Tasmanian and Australian Governments, a number of relatively minor additions have been made to the TWWHA in this locality, with associated changes in the boundary. However, the end result is that the boundary of the TWWHA remains problematic and important conservation values remain outside the TWWHA. The ENGO-proposed additions to the TWWHA are so positioned that they have the potential to provide a final resolution of the various issues relating to the TWWHA.



**Context for assessment**

‘Three Valleys’—Unit TV1—comprises an area delineated as Weld, Huon and Picton river valleys by ENGO. Most is eucalypt forest, much of that tall eucalypt forest of a range of size/age classes. Significant areas have been subject to coupe type logging.

The ‘three valleys’ are a centre of development of tall eucalypt forest and demonstrate great ecological diversity including altitudinal ranges from about 50 metres asl up almost to the

local treeline. There is substantial interaction with temperate rainforest including many eucalypt 'islands' within rainforest-dominated landscapes (Weld). The concentration of registered 'giant trees' (Huon) in the precinct is an indicator of the exceptional development of the tall eucalypts in this area.

Because of the varied terrain and slope direction, each of the valleys exhibits evidence of a diversity of fire regimes. The Weld has the greatest development of rainforest but there are islands of tall eucalypt scattered within the rainforested landscape. The Huon on the other hand is much more open and with an east-west orientation, is conducive to the passage of fire along the valley from either direction.

The Picton, being a shorter valley is almost a 'blind valley' hemmed in by alpine and rainforest communities on three sides so the pattern of eucalypt and rainforest communities and their interactions are different again to the Huon and especially the Weld. These characteristics are illustrative of the substantial ecological diversity evident in the tall eucalypt and rainforest communities in the 'Three Valleys'.

Each of the valleys has experienced various episodes and scales of glaciation with evidence of glaciation extending almost to the confluences of the valleys.

Both the Weld and the Huon have important karst resources together with important evidence of Ice Age Aboriginal use of caves in the area.

The very convoluted boundary of TWWHA, creates an intimate relationship between activities in the lower valleys and the TWWHA which is everywhere upslope from such activities. Much of the TWWHA boundary is defined by an arbitrary contour line that in many places truncates the natural altitudinal vegetation sequence and offers a boundary that is difficult to identify in the field without the use of instrumentation.

The Warra Long Term Ecological Research Site is located partly within the TWWHA and partly within the ENGO-proposed additions to the area.

As will be outlined below\*, in addition to outstanding natural heritage values, the 'Three Valleys' precinct also has very important cultural heritage site(s) of World Heritage significance.

\* Subject to official access to the report Household et al (undated).

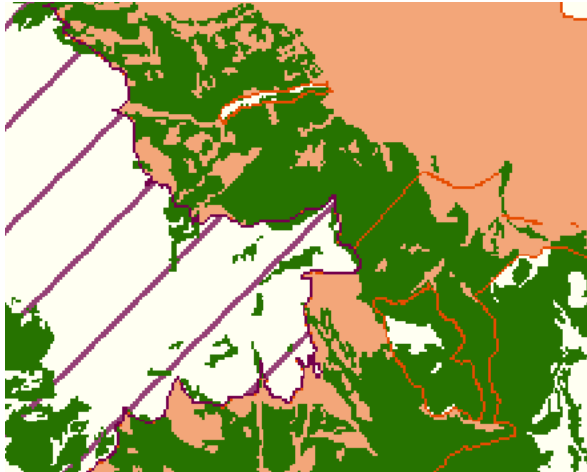
## **Heritage assessment**

Heritage assessment of the 'Three Valleys' has been at the landscape level in the context of its location relative to the TWWHA.

### ***Tall eucalypt***

The tall eucalypt forest in the ENGO-proposed reserves is obviously a key attribute of the 'Three Valleys' area, with near continuous tall eucalypt forest across the valley floor and lower slopes of each of the valleys.

This is one of the few precincts in Tasmania where there is a major concentration of tall eucalypt-rainforest ecosystem and where the forests are mostly intact with potential for ongoing natural processes to operate. Notwithstanding that some parts of the forests have been subject to coupe logging, the combination of the intact forests and the option of being able to naturally rehabilitate the logged areas, means the 'Three Valleys' forests still offer outstanding potential for conservation, including maintaining natural processes.



The green represents the tall eucalypt forest in the lower Weld and Huon Valley. Much of the boundary of the TWWHA (diagonal hatched) mostly follows a contour, which closely correlates, to the upslope limit of the tall eucalypt forest, thereby excluding the tall eucalypt forest from the protected area. The boundary is flawed both in the truncation of the natural hillslope sequence and in the impracticability of managing to such an artificial boundary.

In particular, the ‘Three Valley’ forests would contribute new ecological diversity of the globally significant tall eucalypt and eucalypt–rainforest ecosystems represented in the TWWHA. For example, on the north side of the Weld River, the tall eucalypt forest is both well-developed and intimately mixed with temperate rainforests. In the Picton there is long low gradient transition up valley from the forest floor. By contrast, the Huon Valley gives way upstream to isolated treeless buttongrass moorland areas and eventually to wide expanses of moorland.

The soil substrates are also very varied and in the Weld and Huon include soils derived from karstic limestone and dolomite.

This area is home to possibly the highest recorded fungi diversity in the world and would make a significant contribution to protecting globally significant populations of ancient, relictual fauna (see Chapter 4 of this report).

### ***Giant trees***

Contribute to the integrity of tall eucalypt ecosystem in TWWHA by including superlative examples of individual trees (more than doubling the number of recorded giant trees in the TWWHA).

### ***Wilderness***

Importantly, all of the ENGO-proposed additions in these valleys back onto the wilderness of the TWWHA. Parts of the ENGO-proposed reserves in all three valleys are an integral part of that major tract of wilderness, which is in many ways the key heritage value of the TWWHA. That is, parts of these areas have wilderness values, which would clearly enhance or contribute to the integrity of the TWWHA’s wilderness values. Rehabilitation of some areas would enhance the wilderness of the TWWHA.



## **Karst**

Karst has been located in the floor and lower slopes of all three valleys. The TWWHA section of the Weld karst is regarded as being independently globally significant, especially as a major system where all natural processes operate and the whole catchment is fully protected. That karst extends downstream into the ENGO-proposed reserves (partly in the TWWHA, partly out).

Karst of special significance is located in the ENGO-proposed additions in the Huon valley. The Riveaux–Blakes system is listed as nationally significant on the Tasmanian Geoconservation Database and is described as being in Southwest National Park, that is the TWWHA. However, recent mapping demonstrates that the karst extends further downstream from the TWWHA, into part of the ENGO-proposed reserve, both on the north and the south side of the Huon River. The karst includes cultural heritage sites of World Heritage significance.

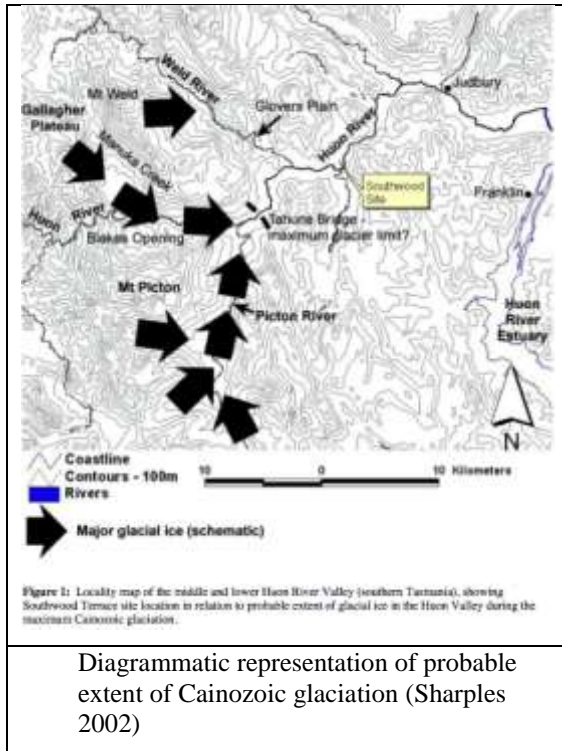
It is understood that the Geoconservation Listed ‘Picton River karst’ extends from within the TWWHA downstream into both the ENGO-proposed reserves and notably into the logged coupe ‘inholdings’ along the Picton River (see below):

The likely direct physical and hydrological contact between the Blake’s Opening and Riveaux karsts suggests that a common tenure and management regime, or sympathetic cross-tenure management regime, would be the appropriate means of managing these adjacent karsts. Irrespective of this potential link, however, the undisturbed nature, significant extent and contents of the Riveaux karst and catchment, and its proximity to the recommended Blake’s Opening TWWHA extension (Section 3.3) means that the karst contributes significantly to karst World Heritage themes of the adjacent TWWHA.  
—Sharples, C (2003)

Karst is also found in the Picton Valley and is listed on the Tasmanian Geoconservation Database in 2008.

## **Glacial**

The internal report by Household et al. (undated but circa 2008), Forestry Tasmania provides substantial evidence of scientifically important glacial (Geoheritage) features that are associated with the karst which contain a definite highly significant cultural heritage site of World Heritage significance.



Evidence of glaciation and glacial outwash deposits has been found in all three valleys and at least three glaciations have been recognised. Evidence of the last and penultimate glaciation is largely confined to the upper mountains and valley heads (e.g. Farmhouse Creek, Picton) and so are mostly within the TWWHA. However, evidence of glacial features assigned to an earlier and more extensive glaciation has been identified in the lower valleys (see Slee 2011) and so extend into the ENGO-proposed lands.

Sharples has identified glacial outwash deposits at the Southwood mill site on the Huon and has tentatively identified potential related features at various sites, notably just north of the Weld–Huon junction.

Recent investigations have revealed cavernous karst in the lower Weld Valley in Eddy Creek catchment, not far above the Weld–Huon confluence (Crackell 2007).

## Cultural attributes

The evidence of Pleistocene human occupation sites in this particular locality is of great significance. This area has a unique suite of attributes that appear linked in time and space. The use of a site during the last glaciation, the downstream limit of which is evident in this locality and in the interaction of glaciation with the karst systems, potentially allow reconstruction of the environment and conditions experienced by humans at that time. The co-location of this suite of features in a tall eucalypt forest is a reminder of the environmental change invoked by climatic warming since the Pleistocene. This may be a classic site which appears to have been habitable during the last glacial but, with climatic warming and increased rainfall, forest vegetation advanced into the landscape just as has been established on the northern steppes of Asia, in Borneo and in New Guinea.

The identified Aboriginal cultural sites in the ENGO-proposed reserve lands in the Huon Valley would make a very real contribution to the integrity of the TWWHA in respect of values already recognised under Criterion (vi):

... archaeological sites including Pleistocene sites, which demonstrate the adaptation and survival of human societies to glacial climatic cycles and periods of long isolation from other communities (e.g. the human societies in this region were the most southerly known peoples on earth during the last ice age). —inscribed values against Criterion (vi) (directly associated with events or living traditions)

## World Heritage

The ‘Three Valleys’ area is critically important to the long-term natural integrity of the eastern margin of the TWWHA.

The precinct has multiple values of World Heritage significance as well as National Heritage significance. These can be summarised as follows:

### **Tall eucalypt forest**

- Contribute to the value and integrity of the World Heritage values of the TWWHA by increasing the **ecological diversity** of the TWWHA, in particular of the globally significant tall eucalypt ecosystem.
- Contribute to the maintenance of natural **ecological processes** of the forests along the eastern margins of the TWWHA, including interaction between tall eucalypt forest and rainforest (the eucalypt–rainforest interaction) and maintenance of regional scale ecological connectivity (tall eucalypt forests).
- Contribute to facilitation of ecologically based **field management** of the TWWHA.

### **Karst**

- Contribute to the value and integrity of the World Heritage values of the TWWHA by increasing representation of the already cited value of karst.

### **Glacial**

- Contribute to the value and integrity of the World Heritage values of the TWWHA by increasing representation of the already cited value of glacial features.

### **Cultural**

- Contribute to the value and integrity of the World Heritage values of the TWWHA by increasing representation of the already cited\* value of Pleistocene human occupation sites.

\* ... archaeological sites including Pleistocene sites, which demonstrate the adaptation and survival of human societies to glacial climatic cycles and periods of long isolation from other communities (e.g. the human societies in this region were the most southerly known peoples on earth during the last ice age).

**NOTE:** The co-location of the karst-glacial-fluvial-cultural features, in a tall eucalypt forest, results in a mutual value adding of the already very significant attributes.

## National Heritage

The National Heritage significance of the Tasmanian Wilderness World Heritage Area will be significantly enhanced by protection of a continuous corridor of tall eucalypt forest ecosystem in the adjacent TV1 lands. In particular:

### **Tall eucalypt forest**

- Contribute to the value and integrity of the National Heritage values of the TWWHA by increasing the **ecological diversity** of the TWWHA, in particular of the tall eucalypt ecosystem.
- Contribute to the maintenance of natural **ecological processes** of the forests along the eastern margins of the TWWHA, including interaction between tall eucalypt forest and rainforest (the eucalypt–rainforest interaction) and maintenance of regional scale ecological connectivity (tall eucalypt forests).
- Contribute to facilitation of ecologically based **field management** of the National Heritage listed TWWHA.

Summary—Weld, Huon, Picton ‘Three Valleys’		
WORLD HERITAGE		
Attribute	Relevant criterion	Value
Tall eucalypt forest	(vii) (superlative natural phenomena)	Contributes to integrity ‘eucalypt tall open forests including <i>Eucalyptus regnans</i> , the tallest flowering plant species in the world;’ (including 9 registered ‘giant trees’.
Tall eucalypt forest	(ix) (Outstanding examples of ongoing evolution)	Contributes to ecological diversity of already cited World Heritage values ‘ <i>pristine tall eucalypt forests;</i> ’
Tall eucalypt forest	(ix)	Contributes to the integrity of tall eucalypt forests in the TWWHA by preserving regional connectivity.(ongoing processes)
Tall eucalypt forest	(x)	Contributes additional value in respect of tall eucalypt forest and, together with other Tall Eucalypt additions, facilitates Tall Eucalypt forest qualifying as an official value against World Heritage Criterion (x).
Karst	(viii) Outstanding examples of stages of earth’s history.	Contribute to the value and integrity of the World Heritage values of the TWWHA by increasing representation of already cited value of karst. (additional glacio-karstic in Huon and karst which extends from TWWHA into HCV lands (Huon and Weld) [‘ <i>karst systems including glacio-karstic features;</i> ’ ‘ <i>karst geomorphology and karst hydrology;</i> ’ (inscribed values)

Summary—Weld, Huon, Picton ‘Three Valleys’		
WORLD HERITAGE		
Attribute	Relevant criterion	Value
Glacial	(viii) Outstanding examples of stages of earth’s history.	Contribute to the value and integrity of the World Heritage values of the TWWHA by increasing representation of already cited value of glacial features. (Huon and Weld, probably also Picton). <i>‘glaciation, including glacial deposits of the Late Cainozoic, Permo-Carboniferous and Precambrian; (inscribed values)</i>
Cultural	(vi) Directly associated with events or living traditions	Contribute to the value and integrity of the World Heritage values of the TWWHA by increasing representation of already cited* value of Pleistocene human occupation sites.
<i>Combination:</i> (Pleistocene cultural site, glacial features, karst and present day tall eucalypt forest)	WH Integrity	The close association of Pleistocene cultural sites, glacial and karst features and the present-day tall eucalypt forest is potentially of great scientific value with potential for researching understanding each component attributes as well as the interaction of each in response to climate change.

**Boundary considerations**



ENGO-proposed reserves are forested lands between the two white lines. The top line is also the boundary of the TWWHA, a contour line that closely coincides with the tree limit. The lower line delimits previous logging but would be only marginally better as a TWWHA boundary than the present (top line) but would at least extend protection downslope into intact forest.

Conservation planning, including boundary delineation is inherently difficult in such an advanced stage of forest exploitation but in the long-term interests of the TWWHA, it is essential that such planning or re-planning is undertaken.

Including the main block of ENGO-proposed additions in the Tasmanian Wilderness World Heritage Area would meet most if not all, of the key conservation objectives in this locality for major improvement to the TWWHA. In particular it would mean better representation of the ecological diversity of the tall eucalypt ecosystem in the TWWHA and contribution to the ecological integrity, including ongoing natural processes, of the tall eucalypt and rainforest communities in this precinct of the TWWHA. The external (eastern) boundary of the ENGO-proposed reserves would be a much more appropriate boundary for the TWWHA, although not without some problems in the interface with commercial forest use.

An option for an appropriate boundary has been developed during the verification process and a kmz file is available. Rather than adopt the eastern boundary of the ENGO-proposed reserves, a more appropriate and defensible boundary has been developed which has the effect of 'give and take' between the proposed ENGO and non-ENGO state forest.

### **Enclave issue**

Notwithstanding that a reasonably appropriate external boundary has been devised, there remains another serious issue, that of the 'inholdings' or enclaves within the external boundaries of the ENGO-proposed reserves.

The largest 'enclaves' are located on the Picton but there is a small one on the access to the Weld, which is probably within the Warra Long Term Ecological Research Reserve. It is apparent that these 'inholdings' were created by excluding previously logged coupes, in some cases possibly now converted to eucalypt plantation. The rationale for proposing this is unknown to the author.

As a long-term arrangement it would be inappropriate to retain these inholdings surrounded by World Heritage Area. Their existence and management for industrial forestry purposes would always represent a threat to the ecological integrity of the surrounding TWWHA by being a potential source of fire, introduced species (such as use of *E. nitens* for plantation). Perhaps the intentions were fine in proposing to exclude these areas of regrowth forest but they fail any reasonable scrutiny on the basis of ecological integrity, boundary appropriateness and manageability for the TWWHA. Accordingly, it is strongly recommended that in addition to the nominated parts of ENGO-proposed reserves (including the proposed 'give-and-take' along the eastern boundary), the forestry inholdings within that external boundary be added to the TWWHA and rehabilitated.

Ecologically based conservation planning and protected area design must look to the very long-term so that the lack of important heritage values in these inholdings in their present ecologically degraded condition is no bar to them being incorporated into the surrounding forest ecosystem and the TWWHA. Over a sufficiently long time scale (generations of forest) current degradation can be expected to progressively lessen, with the area ultimately being fully integrated into the ecology of the surrounding forest.

It should be noted that one large parcel of ENGO-proposed land to the east of the area designated as HCV1 has not been included in the assessment and in the absence of any data to the contrary, this parcel is not recommended for inclusion in the TWWHA.

**NOTE:** This does not mean that it does not have heritage conservation value or heritage significance but based on the apparent absence of any important biodiversity data, it is unlikely to be a candidate area at either World Heritage or National Heritage significance level. This assessment may change once the information contained in other IVG reports is properly integrated into the heritage assessments.

The protection of this large block of land could be weighed up against the need to eliminate the ‘inholdings’ from the section proposed for adding to the adjoining TWWHA.

### **Warra Long Term Ecological Research Reserve**

A substantial proportion of the Warra Long Term Ecological Research Reserve is assessed as having the potential to make a significant contribution to the integrity of the adjoining TWWHA, including some quite specific attributes. Consequently a review will be needed of the opportunities for harmonising the addition of further parts of the reserve to the TWWHA. Some but not all of the research being conducted in the Warra is beneficial and relevant to developing a greater understanding of the Tasmanian Wilderness World Heritage Area (part of Warra is already in the TWWHA). What is not supported is any proposal for any **new** logging and **re-logging** of previously logged areas within the nominated boundary for addition to the TWWHA.

There should be no objection to monitoring and recording natural process recovery in any previously logged areas that fall within the recommended boundaries. Parts of the Warra Reserve will remain outside the proposed new TWWHA boundary and there should similarly be no objection to ongoing research activities on these sections, including logging.

### **Summary of heritage assessment**

1. The ENGO proposals in the Weld–Huon–Picton valleys (‘Three Valleys’) are considered to possess important natural and cultural heritage values that relate particularly to World Heritage values of the adjoining Tasmanian Wilderness World Heritage Area. In particular, these lands contribute a new complementary ‘lowland’ or lower valley manifestation of attributes already within the TWWHA, for example glacial, karst, tall eucalypt forest and rainforest.
2. If added to the Tasmanian Wilderness World Heritage Area, the ENGO proposals would contribute very significantly to the integrity of the TWWHA.

### **Recommendations**

1. Add the ENGO-proposed reserves identified as having World Heritage related values in the Weld–Huon–Picton to the TWWHA using the recommended boundaries.
2. Give special attention to the longer-term objective of removing and rehabilitating the previously logged coupe enclaves within the proposed new boundary of the TWWHA.
3. Give special attention is paid to the Warra Long Term Ecological Research Reserve to ensure that as far as possible ongoing non-destructive research and monitoring continues for that part of the reserve within the proposed boundaries.

## East Snowy Range assessment area—SNE1 (from Weld–Russell watershed in south to Styx–Russell watershed in the north)

Part only of FID 263

### Introduction

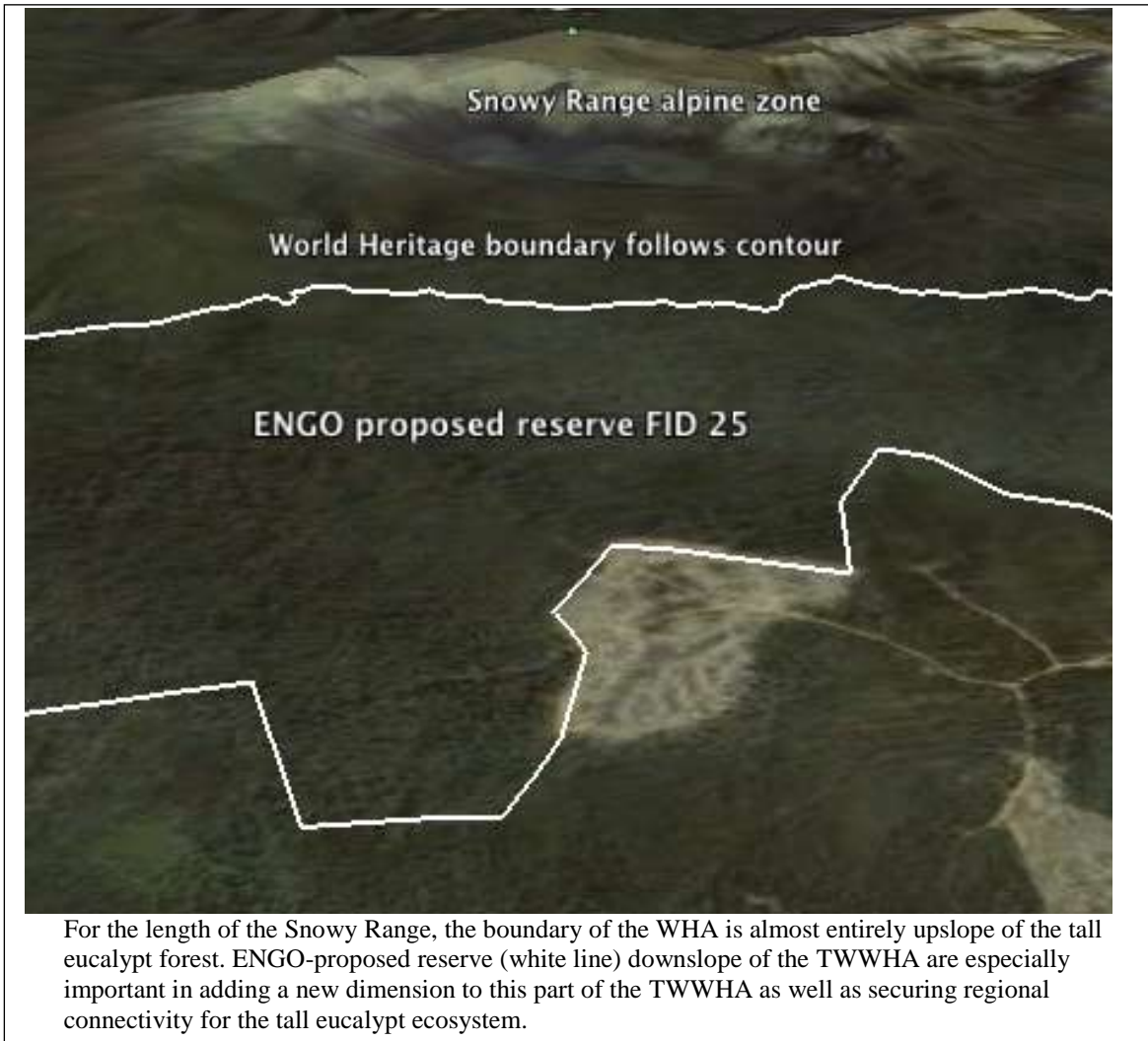
The high elevation contour boundary (about 800 m asl.) raises serious questions about the appropriateness of this boundary as a World Heritage boundary both in terms of capturing the natural vegetation sequence (ecological diversity) and the practicability of managing to a boundary which is not readily apparent in the field.

There has been long held concern about the vulnerability of the alpine communities of the Snowy Range to the impacts of industrial forestry operations on steep slopes immediately below the alpine communities (see recent coupes in satellite image below). Escape of fire from forestry activities is an ongoing threat to the TWWHA and is a particular threat to the alpine environment.



The 'East Snowy' ENGO-proposed reserve (blue) adjoins a section of the TWWHA boundary (green), which is entirely a contour boundary.





The longer-term effect of ongoing logging on the steep slopes downslope of the TWWHA will be to completely change the natural vegetation thereby modifying the natural fire filtering/barrier processes, leading to what Lindenmayer et al. (2011) describes as a 'landscape trap', an irreversible change in an ecosystem. Logging modifies the forest (fuel characteristics) conditions for natural fire and the resultant flammable regrowth eucalypt, being more conducive to crown fire, creates potential new and different uphill pathways for wildfire.

### Context for assessment

The critical context for assessing the ENGO proposals along the eastern fall of the Snowy Range is that they are immediately adjacent to the eastern boundary of the Tasmanian Wilderness World Heritage Area where the current boundary (for its entire length) is on a contour of 800 metres. The boundary truncates the natural altitudinal sequence from tall eucalypt forest on the lower slopes, with a transition through a range of vegetation communities, culminating with the alpine communities that extend most of the 17 km length of the Snowy Range.

## Heritage assessment

**NOTE:** This assessment has been limited to the landscape level due to serious time constraints. Species level biodiversity has not contributed to the assessment, although other IVG reports suggest that the area could be highly significant for biodiversity (see Chapter 4). Landscape level assessment was considered adequate for addressing key issues such as protecting and restoring natural processes and protecting globally significant tall eucalypt forest.

Managing for maintenance of ongoing natural processes in the adjoining section of the TWWHA would be helped considerably if other potentially conflicting land uses were excluded from the downslope forests. Industrial logging has already converted much of the tall eucalypt forest in the lower slopes to logged coupes and/or plantation.

The prospect remains of being able to retain the tall eucalypt forest on at least the upper slopes towards the TWWHA boundary. The forests in the ENGO-proposed lands represent such an opportunity although some logged coupes have already pushed well upslope.

Similarly, maintaining tall eucalypt connectivity in this district would be achievable only if the tall eucalypt forests in the ENGO-proposed lands are protected, thus maintaining a tall eucalypt connectivity corridor between the Weld Valley in the south and the Styx Valley in the north, part of the larger ‘C2C’ regional corridor.

If added to the immediately adjoining Tasmania Wilderness World Heritage Area, the ENGO-proposed reserve lands would contribute to the integrity of the TWWHA, in particular by:

- extending protection of the full natural ecological/vegetation sequence downslope from the alpine environment into the regionally dominant eucalypt forests
- facilitating natural ecological processes, including fire over a greater altitudinal range than is presently the case
- facilitating maintenance of ecological connectivity in the tall eucalypt ecosystem within the (recommended new) boundaries of the TWWHA.

The forests in the ENGO-proposed lands on the upper eastern slopes of the Snowy Range represent an important opportunity to enhance the value and integrity of the TWWHA.

Further, adding these lands provides an opportunity to establish a more appropriate World Heritage boundary than an arbitrary contour line across the face of a mountain range.

**NOTE:** The assumption has been made in this and other instances that when a parcel of ENGO-proposed land has been verified as possessing attributes that make a significant contribution to the integrity of the World Heritage Area, it will make a similar contribution to National Heritage values of the same protected area. Hence the area is equally important for its contribution to World Heritage values and integrity as to National Heritage values and integrity.

Summary—East Snowy Range		
WORLD HERITAGE		
Attribute	Relevant criterion	Value
Tall eucalypt forest	(ix) (Outstanding examples of ongoing evolution)	Contributes to ecological diversity of already cited World Heritage values ‘ <i>pristine tall eucalypt forests;</i> ’

Summary—East Snowy Range		
WORLD HERITAGE		
Attribute	Relevant criterion	Value
Tall eucalypt forest	(ix)	Contributes to the integrity of tall eucalypt forests in the TWWHA by preserving regional connectivity (ongoing processes)
Glacial	(viii)	Contributes to the integrity of the TWWHA (glacial features on Snowy Range extend downslope across boundary)

### Summary of heritage values

The ENGO-proposed additions along the eastern fall of the Snowy Range have been assessed in the context of the immediately adjoining Tasmanian Wilderness World Heritage Area.

First and foremost, the ENGO-proposed reserves on the eastern fall of the Snowy Range are a significant area of tall eucalypt forest and as such add value to the representation of the tall eucalypt ecosystem in the TWWHA. The HCV1 forests, extending some 15 km along the eastern fall of the Snowy Range, together with the immediately adjoining TWWHA represents an outstanding example of the natural ecological transition from the once ubiquitous tall eucalypt forest through to the relatively extensive alpine environment cited in the listing of the TWWHA.

Protecting the ENGO-proposed forests from development would provide an important ecological buffer between industrial forestry land use and the TWWHA.

Protecting this continuous corridor of mainly tall eucalypt forests will make an essential contribution to maintaining regional connectivity in the forest ecosystem (see ‘C2C Corridor’).

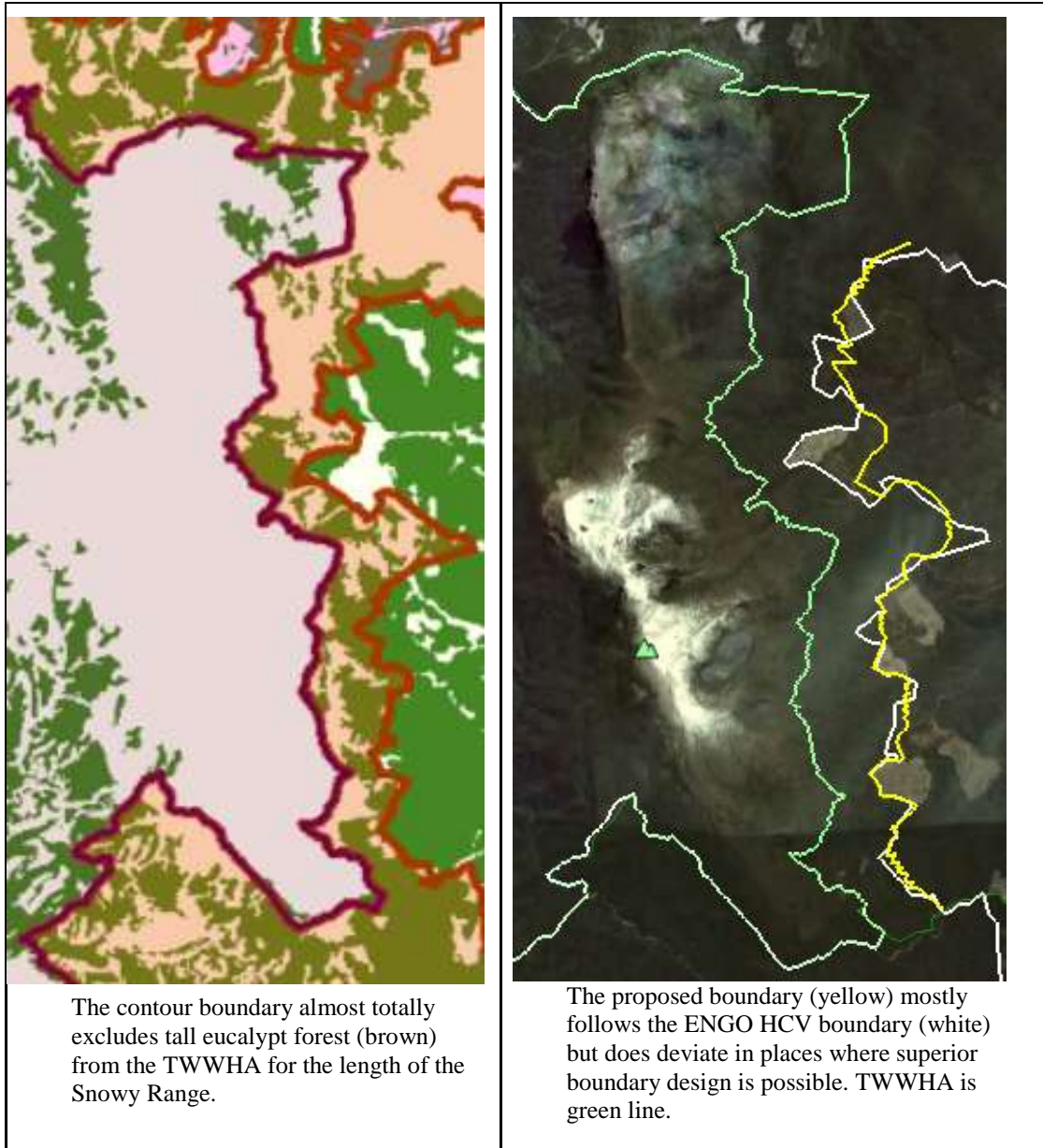
NATIONAL HERITAGE		
Attribute	Relevant criterion	Value
Eucalypt forest including Tall Eucalypt ecosystem	(a) and (d)	Contribution to the integrity of the TWWHA as a place of National Heritage significance (ecological diversity, maintenance of natural processes and regional connectivity)

## Boundary considerations

The primary objective of the boundary relocation on the Snowy Range is to secure a continuous corridor of eucalypt forest for the length of the range. A secondary objective is to adopt a more appropriate sustainable boundary which facilitates ecologically based management and is as far as practicable readily definable on the ground. It is apparent however, given the constraints imposed by commercial forestry interests on the lower slopes of the range that an ideal boundary based on natural features would be elusive. Instead, a boundary has been designed which at least meets the primary objective and can be resolved into a practical boundary.

**96.** Protection and management of World Heritage properties should ensure that the outstanding universal value, the conditions of integrity and/or authenticity at the time of inscription are maintained or **enhanced** in the future.

World Heritage Operational Guidelines 2008



The designed boundary mostly follows the eastern boundary of the ENGO proposals but in several places departs from that boundary where it is apparent that a superior boundary is available.

The boundary designed and recommended for this precinct makes extensive use of man made features such as roads and edges of logging coupes. In several places there is no obvious boundary alignment so these are left with 'zigzag' sections that can be later developed in more detail, consistent with meeting the primary conservation objective.

In several places previously logged coupes have been included inside the boundary where it is apparent that the width of the eucalypt corridor would be compromised.

Providing the overriding objective of the boundary relocation is respected, there is scope for flexibility in boundary fixing, at least at the detail level. Under the circumstances, roads and short sections of straight lines are acceptable boundaries.

The designed boundary is provided separately in the form of a kmz. file.

## Recommendations

1. Recognise all those ENGO-proposed reserves along the eastern fall of the Snowy Range, as identified by yellow edge in the above diagram for outstanding natural heritage value and their potential contribution to the integrity of the TWWHA
2. Recognise that the boundary for protection and addition to the TWWHA agrees with the yellow line in the above diagram but develop detail at field level for those indicative sections shown by zigzag lines.
3. Maintain the principle of connectivity for the tall eucalypt forests for the full length of the Snowy Range.

## Styx River Valley assessment area—SR1 (Tyenna and Styx River catchments)

Part of FID 25

### Introduction

The SR1 assessment area comprises a complex of ENGO proposals designated as either ‘immediate protection’ or ‘interim protection’ within the Styx River catchment and in the adjoining Tyenna River catchment. The overall heritage significance of the ‘Styx’ aggregate area (i.e. SR1) has been assessed and the relative significance of the separate ‘immediate protection’ and ‘interim protection’ indicated where appropriate.

The two catchments represent a logical land unit for considering heritage significance at the landscape level. Similarly, for initial assessment, no distinction was made between the ‘immediate protection’ and ‘interim protection’ lands.

That part of FID 25 north of the Gordon River Road was assessed as part of the Upper Florentine assessment area (see elsewhere in report).

That part of FID 25 extending along the watershed of the Russell and Styx Rivers towards the Wellington Ranges was assessed separately (see West Wellington).

### Context for heritage assessment

The SR1 assessment area is strategically located adjoining and adjacent to the Tasmanian Wilderness World Heritage Area and is also a major node on the main north-south corridor of globally significant tall eucalypt forest extending from central Tasmania to the south coast.

A large permanent Forest Reserve, North Styx Forest Reserve, and two smaller reserves, ‘Big Tree Forest Reserve’ and ‘Tall Trees Forest Reserve’, are embedded in the assessment area, almost completely surrounded by ENGO-proposed reserves. The existence of these reserves and their outstanding heritage values is an important part of the context for assessing the heritage significance of the surrounding HCV lands. The reserves are considered to be of national and international heritage significance in their own right and thus have an important bearing on assessment of the heritage conservation significance of the surrounding ENGO-proposed reserves.

### Heritage assessment

Assessing the natural heritage significance of the ENGO proposed reserves was undertaken at the landscape level and had full regard for all of the forests in the precinct, irrespective of

whether an area was identified as an ENGO proposed reserve or not. While it would be possible to disaggregate the assessed area into its various component parts according to current land tenure, land use history and condition, such a reductionist approach would be of little benefit and would tend to confuse and perpetuate the piecemeal approach which has prevailed to date.

The most important natural heritage values of the Styx Valley forests is most apparent at the landscape level, which, in addition to the ENGO-proposed lands, also includes the several existing permanent forest reserves, namely the 'North Styx', 'Big Tree' and 'Tall Trees' Forest Reserves.

### **Giant trees**

While there are multiple conservation attributes in this assessment area, it is renowned for its tall eucalypt forests, in particular its stands of very tall *Eucalyptus regnans*. One of the three main clusters of registered 'giant trees' in Tasmania is centred on the Styx Valley (the other two are in the lower Florentine–Derwent in the north and the Huon Valley in the south). Of the total of a little over 100 registered giant trees in Tasmania, about 28 are found in the Styx River catchment. An impressive 8 of the 10 tallest recorded trees in Tasmania, read Australia, are found in the Styx valley, in what ENGOs call the 'Valley of the Giants', and elsewhere in the valley.



The Styx–Tyenna assessment area is strategically located adjoining the Tasmanian Wilderness World Heritage Area and is also an integral part of the main corridor of tall eucalypt forest extending from central Tasmania down the eastern edge of the TWWHA to the south coast. A major formal reserve, the North Styx Forest Reserve, forms the core of the assessment area.

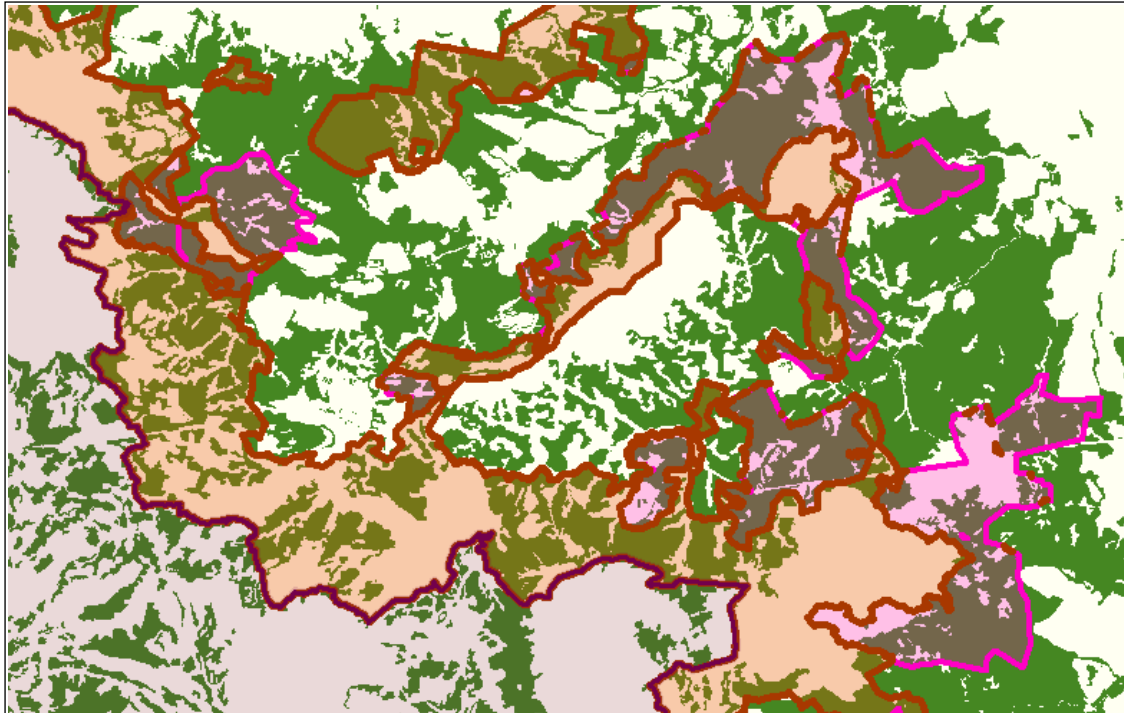
The registered giant trees alone must be regarded as a superlative phenomenon and therefore of definite heritage significance; indeed they are of World Heritage significance given that the tallest eucalypts are in reality the tallest flowering plants in the world.

Of course very tall ‘giant trees’ need to be seen as rather transitory in the longer view of a particular eucalypt forest and some of the tallest trees in the Styx are already entering senescence and will decrease in height as they disintegrate. Notwithstanding, it is very apparent from the diversity of age classes in the Styx that some stands will in future produce very tall trees and likely ones that will qualify to be registered on the giant trees register. That is, the significance of the Styx as a place of world record tall eucalypt trees will likely persist well beyond the life of the existing individual record holders.

### ***Tall eucalypt forest***

The impressive Giant Tree concentration in the Styx valley is also an indicator of the development of tall eucalypt forest communities in the area. As well as hosting some of the tallest trees in the southern hemisphere, the Styx Valley also hosts some outstanding examples of tall eucalypt forest communities, exhibiting a substantial ecological diversity such as a range of ages and stages of forest ecology.





Tall eucalypt forest is extensive through the Styx and Tyenna valleys, being more or less continuous in the lower eastern part of the valley, but more discontinuous upslope and further west as the eucalypt becomes more intimately mixed with rainforest or low eucalypt forest, woodland and moorland. Purple = World Heritage Area, brown = 'immediate protection' and pink = 'interim protection'

The North Styx Reserve includes some particularly impressive stands of very large mature trees over well-developed rainforest together with some adjoining pure stands of rainforest, fully demonstrating the often intimate relationship between the eucalypts and temperate rainforest and rainforest species described in Chapter 1. Younger age classes are also present within and adjacent to the reserve. Together with other forests of the Styx Valley, the North Styx Reserve and associated Tall Trees Forest Reserve represent outstanding examples of the tall eucalypt forest ecosystem.

While the iconic *E. regnans* is a feature of the Styx Valley and tends to be the species of most registered 'giant trees' in the valley, *E. delegatensis* is also well represented and may be found in the form of some very impressive dense younger (mature) even-aged stands.

## Connectivity

At the regional scale, the Styx forests are a major node along the main continuous corridor of globally significant tall eucalypt forests extending from the Upper Derwent south along the Florentine valley, the Styx and on southwards to the Weld, Huon and Picton and reaching their (global) southern limit near the southern most tip of Tasmania.

Because of the sometimes-extreme fire and other natural events in tall eucalypt forests, conservation planning needs to factor in both facilitating natural processes in the forest ecosystem but also ensuring that in the long term, the full genetic and ecological diversity of these forests is maintained. One such conservation strategy, that is very relevant to Tasmanian tall eucalypt forests in and immediately adjacent to the Tasmanian Wilderness World Heritage Area, is the objective of maintaining regional connectivity. The one obvious regional scale connectivity corridor which extends through the full altitudinal range of the tall eucalypts as well as the three main ash eucalypt species, extends from central Tasmania (i.e. Counsel River) south to the south coast (i.e. Cockle Creek) described by the author as 'C2C'.

The Styx River forests are a critical link in that regional corridor and already intensive logging has significantly eroded the connectivity of natural forest communities around the northern end of the Snowy Range. The critical link for connectivity through the Styx valley is the narrow corridor between the end of the Snowy Range and the Styx River. Logging has already significantly impacted on this narrow corridor and in the long term is likely to transform into increasingly intensive logging and plantation. At this point in the history of the TWWHA, the boundary is located upslope of any tall eucalypt forest so there is no tall eucalypt forest within the adjacent section of the TWWHA.

Protecting the ENGO-proposed forests in the Styx would not only make a major contribution to the value and integrity of the TWWHA in relation to tall eucalypt forests but would also help maintain regional connectivity of tall eucalypt forests.

Restoring and protecting the natural sequence of vegetation from the tall eucalypts of the Styx valley, upslope through the rainforests and then the alpine communities on the Snowy Range section of the TWWHA, is important for ensuring that as far as practicable, fires burning upslope from valley eucalypt forests do so via natural pathways through natural vegetation sequences. For example, protecting the rainforests, in particular providing an important natural 'filter' for upslope traverse of fire burning from the eucalypt forest, maintains as far as possible the ecological integrity of the existing TWWHA consistent with the listing of the area against World Heritage Criterion (ix):

(ix) to be outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals; (Criterion (ix) — Operational Guidelines 2008.

From a heritage conservation perspective the objective is neither to prevent all fire nor to facilitate frequent fire; rather the objective is to facilitate natural fire behavior, particularly in the case of naturally occurring fires.

The condition of integrity applying to areas qualifying against Criterion (ix) require that:

Properties proposed under criterion (ix) should have sufficient size and contain the necessary elements to demonstrate the key aspects of processes that are essential for the long-term conservation of the ecosystems and the biological diversity they contain ...  
Para 94:

This is particularly relevant to the Styx and Snowy Range precincts where the 'processes that are essential for the long-term conservation of the ecosystems and the biological diversity ...' of the alpine and rainforest ecosystems of the Snowy Range (alpine ecosystem 'wholly within', rainforest ecosystem 'partly within and partly out' of the TWWHA) are dependent on maintaining natural processes, in particular (as far as practicable) natural fire behavior. Providing maintenance of such processes is simply not achievable if ongoing intensive forestry activities continue to operate immediately downslope of the rainforests/World Heritage boundary and continuously modify the vegetation condition and pattern.

Of particular importance in the Styx and well demonstrated in the North Styx Forest Reserve is the transition from well-developed eucalypt forest through transitional forest with rainforest understorey to pure temperate rainforest with no eucalypt.

The Styx River precinct is sufficiently topographically and ecologically diverse to ensure that to a significant degree, it will be possible to maintain ongoing natural processes and thereby also maintain the natural ecological diversity of the globally significant tall eucalypt-rainforest ecosystem in this precinct.

## Other attributes

### Karst

A dolomite karst system, listed in the Tasmanian Geoheritage Database as the ‘Upper Styx Karst Systems’ [ID 3038] occurs in the upper catchment of the Styx River. The preliminary mapping of the Upper Styx Karst included in the Tasmanian Geoconservation Database reveals this dolomite karst feature is partly within the TWWHA and partly within the ENGO-proposed reserves.

Sharples (2003) refers to the Styx River catchment in the context of the then endorsed proposed additions to the TWWHA.

*Karst* theme and sub-themes: well developed karst in Precambrian dolomite, including the only polygonal karst currently known in Tasmanian Precambrian dolomite.

Finding published details of the Upper Styx Karst proved elusive but it is clear that there is significant mapped karst within the ENGO-proposed lands. Caves are reported within the ENGO-proposed section of the dolomite karst.

Adding the karst sections of the Styx catchment to the TWWHA would contribute to the value and integrity of the Tasmanian Wilderness World Heritage Area. Indeed, combining the identified and potential karst in the ENGO-proposed reserves would greatly enhance the value and integrity of the already impressive karst values of the TWWHA.

Summary—Styx River Valley		
WORLD HERITAGE		
Attribute	Relevant criterion	Value
Tall eucalypt forest	(vii) (superlative natural phenomena)	Contributes to integrity of ‘eucalypt tall open forests including <i>Eucalyptus regnans</i> , the tallest flowering plant species in the world;’ (inscribed values)
Tall eucalypt forest	(ix) (Outstanding examples of ongoing evolution)	Contributes to ecological diversity of already cited World Heritage values ‘pristine tall eucalypt forests;’ (inscribed values)
Tall eucalypt forest	(ix)	Contributes to the integrity of tall eucalypt forests in the WHA by contributing to preservation of regional connectivity between existing and proposed tall eucalypt forest additions (ongoing ecological and evolutionary processes).

Summary—Styx River Valley		
WORLD HERITAGE		
Attribute	Relevant criterion	Value
Tall eucalypt forest	(x)	Tall eucalypt is presently conspicuous by its absence from Criterion (x) in 'inscribed values' Therefore, the tall eucalypt ecosystem contributes a new World Heritage value together with other tall eucalypt forest additions, facilitates tall eucalypt forest qualifying as an inscribed value against World Heritage criterion (x). ' <i>... to contain the most important and significant natural habitats for in-situ conservation of biological diversity ...</i> '
Karst	(viii) Outstanding examples of stages of earth's history	Contribute to the integrity of the World Heritage values of the TWWHA by increasing representation of already inscribed values of karst.

NATIONAL HERITAGE		
Attribute	Relevant criterion	Value
Not specifically assessed because of evidence of higher order World Heritage significance.		The natural attributes in the area contribute to the integrity of the already National Heritage listed Tasmanian Wilderness World Heritage Area.

## Summary of heritage values

In the document 'Tasmanian Forest Agreement Verification: Advice to Prime Minister and Premier of Tasmania, Interim Reserve Boundaries' the attributes of the Styx Valley are described as:

- having World Heritage significance
- having extensive areas of contiguous old growth forest (including with the Tasmanian Wilderness World Heritage Area)
- being a superlative example of the tallest flowering plants in the world (*E. regnans*)
- being a superlative example of tall eucalypt forest (*E. regnans* with transition to *E. delegatensis*) intimately associated with Gondwana cool temperate rainforest

- containing seven of the state's 10 tallest trees (Giant Trees Consultative Committee, 2004)
- being the habitat for threatened species including Tasmanian wedge-tailed eagles, Tasmanian devils and spotted-tailed quolls
- having visual amenity, including from Tourism icons.
  - Tasmanian Forest Agreement Verification: Advice to Prime Minister and Premier of Tasmania, Interim Reserve Boundaries)

That description is considered to be a fair representation of the heritage significance of the Styx Valley.

The tall eucalypt forest ecosystem\* of the Styx Valley, including the registered ‘giant trees’ is considered to represent a superlative example of the tall eucalypt forest–rainforest ecosystem of Australia, in particular outstanding examples of *Eucalyptus regnans*, both as individual trees and as forest stands, and ecosystems juxtaposed with cool temperate rainforest.

\* Including ENGO-proposed reserves and existing forest reserves

The tall eucalypt forests of the Styx are unquestionably of outstanding universal value—World Heritage. The combination of the two existing forest reserves and the HCV1 and HCV2 tall eucalypt forests could conceivably qualify as worthy of independent nomination as World Heritage, based on being a superlative example of a eucalypt forest (Criterion (vii) ‘...to contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance;’

However, the Styx forests take on even greater value and World Heritage significance when considered in the context of the adjoining WHA because of the value-adding contribution these forests would make to the value and integrity of the existing World Heritage Area.

The ecological diversity of the tall eucalypt forest–rainforest ecosystem is presently poorly represented in the TWWHA. Adding the Styx River forests would make a critically important contribution to remedy that deficiency.

If included in the adjoining TWWHA, the tall eucalypt forests of the Styx assessment area would make a very significant contribution to the inscribed World Heritage values of the TWWHA and contribute to its integrity. The ecological diversity of tall eucalypt forest already in the TWWHA would be substantially increased. The Styx forests would also make an important contribution to tall eucalypt forests qualifying against criterion (x) as an inscribed value. (‘... to contain the most important and significant natural habitats for in-situ conservation of biological diversity ...’)—Operational Guidelines 2008



Recommended boundary in Styx and Tyenna valleys. ENGO-proposed reserve lands are tinted yellow. 'Zigzag' sections of boundary require more detailed consideration. **NOTE:** the external boundary embraces the North Styx Forest Reserve as well as several smaller forest reserves.

If protected, the Styx would also make a critically important contribution to protecting and maintaining regional connectivity in the tall eucalypt forests of Tasmania. The 'C2C' represents the largest and longest (160+ km) single tall eucalypt corridor in Tasmania, a substantial part of which is recommended be included in the Tasmanian Wilderness World Heritage Area. **Only then can it be truly claimed that Australia has protected the 'best of the best' of the tall eucalypt forest ecosystem of Tasmania, indeed Australia, in a World Heritage Area.**

### **Modified forest**

The development of logging and timber plantation in the Styx has resulted in a scatter of roads, logging coupes and timber plantations across the landscape. While in general terms it would be desirable to exclude highly modified forest, especially plantation, the scatter of such areas would make it impracticable or undesirable to exclude all such areas. Rather than create a 'Swiss cheese' design protected area, the longer-term view was adopted in the assessment process and boundary design.

In the longer-term, through a process of ecologically determined logging and/or plantation removal, natural rehabilitation of previously logged coupes can be expected to incrementally succumb to the prevailing ecology of the surrounding undisturbed forest. In some instances the process of rehabilitation can and should be accelerated by intervention such as drainage remediation on roads. Where introduced or genetically modified species have been used in plantations, it is essential that intervention attempt to eradicate such introductions. For example, it is understood that non-Tasmanian species *E. nitens* has been introduced into plantations within the ENGO-proposed areas adjacent to the existing TWWHA. In this case intervention would be required to eradicate this vigorous introduced species to avoid invasive spread.

Including some logged or plantation areas in recommended additions to the TWWHA must not be interpreted as accepting logging within a protected area. The more important consideration is longer-term restoration and maintenance of ongoing ecological processes in this landscape.

## Boundary considerations

Notwithstanding the inappropriateness of much of the existing boundary of the Tasmanian Wilderness World Heritage Area, the primary objective of the proposed additions of the Styx to the TWWHA is about contributing important **values**, indeed World Heritage values, to the adjoining TWWHA. However, in delineating the highest heritage value forests, the proposed boundary is not without its problems. The de facto boundaries that would be created by adopting the ENGO-proposed boundaries would be acceptable but some improvements could be made to achieve a final workable boundary, some of which have been taken into account in designing the recommended boundary presented here.

Overall, the recommended boundary is generally much more accessible and definable on the ground than the existing Tasmanian Wilderness World Heritage Area boundary.

In proposing the boundaries to the Styx–Tyenna area, a range of factors were taken into account including:

- high conservation value forest
- catchment protection
- connectivity
- fire management/control
- ready identification in the field
- manageability
- presentation
- logged or plantation.

Parts of the boundary delineation were problematic and so sections indicated by ‘zigzag’ lines are intended to be subject to closer consideration and subject to on-ground realities.

The details of the recommended boundary are available as a kmz file.

## Presentation considerations

Given the existing access roads, the Styx Valley provides a rare opportunity for the public to readily access some of the most outstanding examples of individual trees and outstanding stands of tall eucalypt forest. There are no comparable opportunities in the existing World Heritage Area, and few such outstanding examples of tall eucalypt in the TWWHA, let alone examples that are accessible. Some parts of the Styx are now publicly promoted for tourism, in particular some of the ‘giant trees’.

The TWWHA presently suffers from the double bind of having little of the outstanding tall eucalypt forest and then, most is not readily accessible for public presentation. Both deficiencies could be remedied by adding the Styx River forests to the TWWHA where there is definite potential for further development of public access. This could be an important way of presenting the Tasmanian Wilderness World Heritage Area.

## West Wellington Range assessment area

Part [FID 25]

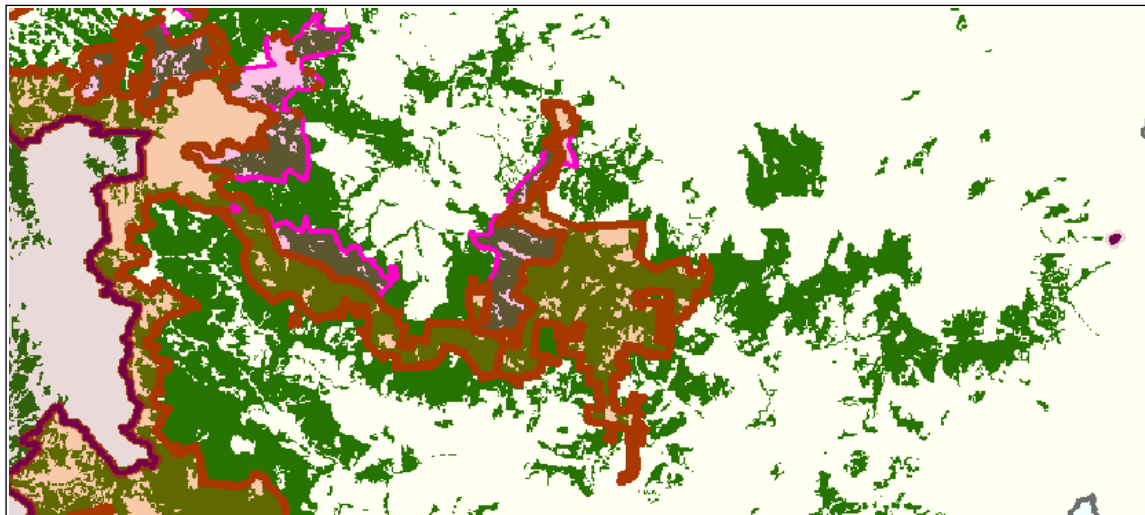
### Introduction

The West Wellington Range assessment area (WW1) comprises a composite elongated block of areas described by ENGOs as HCV1 and HCV2. Although the HCV1 and HCV2 were assessed as a single entity in the first instance, explanatory notes of the relative heritage significance are provided separately.

### Context for assessment

The highly relevant geographic context for the assessment included:

- proximity to TWWHA
- proximity to Wellington Park
- eucalypt forest connectivity to each of the above.



A prominent corridor of tall eucalypt forest extends along the higher elevations of the Wellington Range from the Snowy Range in the west to Mount Wellington overlooking Hobart at the eastern end of the range. The Wellington Range includes a substantial area of tall eucalypt forest as well as providing biological connectivity along a 40 km long corridor. HCV1 (red), HCV2 (pink) and TWWHA (purple) Map: ERIN

### Heritage attributes

The WW1 block is a very significant area of largely intact tall eucalypt forest as well as a few other vegetation communities. Logging within the assessment block is reportedly only a recent development.

The furthest west part of the WW1, where it merges into the Snowy Range and Styx River assessment areas, contains tall eucalypt forest which is an integral part of the main north-south tall eucalypt corridor (C2C) extending from central Tasmania to the southern-most coast. As such it is regarded as contributing to the integrity of the TWWHA and as also contributing to the value of the tall eucalypt forest ecosystem from a conservation perspective.



## Information sources

- Part previously listed on the National Estate Register  
*'Wellington Range Area, Pinnacle Rd, Fern Tree, TAS, Australia'* in Australian Heritage Database. <http://www.heritage.gov.au/cgi-bin/ahpi/record.pl?RNE10949.com>
- ENGO '[West Wellington: High Conservation Value Submission](#)'
- West Wellington Protection Group Facebook <http://www.wwpg.info>

The West Wellington assessment area comprises part of an essentially continuous corridor of tall eucalypt forest extending from the Russell River and Styx valleys in the west (part of the main north south regional corridor of tall eucalypt forests in southern Tasmania) eastwards to and including Mount Wellington, the very prominent mountain range behind the state capital, Hobart. As such the WW1 forests are an obvious consideration in relation to tall eucalypt forest conservation in Tasmania.

The tall eucalypt forest in the 'White Timber' Mountain area reaches a comparable altitudinal limit (circa 800 m. asl.) as found further west on the Snowy Range. However, unlike the forests on the Snowy, the tall eucalypts occupy the highest elevation on this section of the Wellington Range so there is no opportunity to support alpine vegetation communities. The tall eucalypt forest therefore crosses the range from one side to the other, only punctuated by numerous small montane bogs and treeless 'plains' on the plateau surface for example, White Timber Plain.

The eastern-most larger block of around 5,000 ha of diverse forest, including extensive regrowth tall eucalypt forest, is largely intact and is of obvious potential interest for conservation as surrounding lands are increasingly developed. The greater part of the eastern 'bulb' is mapped as tall eucalypt forest (ERIN based on TasVeg 2.0) and therefore potentially plays a significant role in the conservation of the tall eucalypt forest ecosystem. The immediately adjoining Wellington Park greatly enhances the conservation potential of the area.

### NOTE:

There was found to be a significant amount of published and unpublished documentation of specific conservation attributes relating to the Mount Wellington Reserve and the eastern half of the corridor connecting back to the Snowy Range but documentation of the western end of the corridor was limited. Recent documentation by Mallick (2012) indicates that the western corridor, which he refers to as the 'Russell Forests Link', has records of 5 threatened plant species and 6 threatened animal species. Viewed at the landscape level this linking corridor is vitally important in terms of maintenance of connectivity of the tall eucalypt forest ecosystem along the length of the Wellington Range. The tall eucalypt forests which form a near intact continuous corridor connecting from Mount Wellington west to the Snowy Range, and hence the Tasmanian Wilderness World Heritage Area, were assessed as being of considerable natural heritage significance. Although contributing to the ecological integrity of the TWWHA, especially if the regional scale connectivity of intact forest is maintained, it is not appropriate as an addition to the TWWHA but is considered of National Heritage significance and well worth permanent protection complementary to the World Heritage Area.

## Mount Wedge assessment area

FID 18, 19 and 20

## Introduction

The Mount Wedge assessment area comprises mainly areas described by ENGOs as HCV1 and several small areas described as HCV2. They are all part of the larger Lake Gordon enclave in the Tasmanian Wilderness World Heritage Area. It is made up of three parcels of ENGO-proposed reserves [FID 18, 19, 20] generally with a north-westerly to westerly aspect



ENGO HCV lands (white edged, yellow shaded) in the Mount Wedge landscape. TWWHA boundary is green. Mount Wedge summit is light green triangle.

overlooking and draining into Lake Gordon hydroelectric impoundment.

Most of the proposed area is forested but ranges from patches of tall eucalypt through several types of rainforest to some exposed treeless heaths around the summit of Mount Wedge.

In the past there has been a common belief that the heavily logged lands associated with the immediate catchment of the Lake Gordon water pondage should not be included in the Tasmanian Wilderness World Heritage Area. This view has been based on the extent of heavily impacted forest as a result of past logging and the fact that Lake Gordon is an artificial element in an otherwise wilderness landscape.

Although some of the more readily accessible parts of the Mount Wedge land unit have been logged, the greater part of the ENGO proposals are intact forest.

## Context for assessment

The three parcels of ENGO-proposed reserves are part of a much larger 'enclave' inside the external boundary of the Tasmanian Wilderness World Heritage Area. The inholding is centred on the artificial pondage known as Lake Gordon. The ENGO-proposed reserves are part of a larger area of state forest between the TWWHA boundary and Lake Gordon.

The largest ENGO-proposed parcel is traversed by or has an extended frontage onto the Strathgordon Road and is visible from this road.

An important part of the context for assessing the Mount Wedge ENGO-proposed reserves is its close proximity to the Upper Florentine catchment, being separated only by a narrow isthmus of the Adamsfield Conservation Area section of the Tasmanian Wilderness World Heritage Area. This proximity is very relevant in terms of fire management in this landscape and habitat connectivity.

Mount Wedge, a prominent isolated peak of more than 1,000 metres asl. is a well-known destination for day trip hikers from Hobart and is renowned for its panoramic views, including southwards into the TWWHA. It has a walking track managed by Forestry Tasmania.

## Heritage assessment (preliminary landscape level only)

Detailed data was unable to be accessed apart from geoconservation and threatened plant communities. Hence the area has been assessed only at landscape level. Other IVG reports may well reveal important conservation values for this area.

With the exception of the summit area of Mount Wedge, the visual focus of the ENGO-proposed reserves is towards Lake Gordon rather than into the TWWHA. Logging which has occurred has mostly been low in the landscape and adjacent to the Strathgordon Road and of low or no visibility from within visitor frequented areas of the TWWHA.

Mount Wedge is listed on the Tasmanian Geoconservation Database on the basis of its residual capping of dolerite (ID 3070) and for glacial features (ID 3071). Imagery reveals evidence of minor glaciation on the east (Boyd River) and south side (Huon catchment) of the summit of Mount Wedge with a combination of a small terminal moraine (east side) and some incipient lateral moraines on the south side, apparently extending over the TWWHA boundary into dense rainforest slopes.

The forests on the slopes of Mount Wedge are contiguous with the forests of the TWWHA, indeed are integral with those forests, the TWWHA boundary being very much an artificial subdivision of the landscape.

The main conservation attributes of the Mount Wedge proposals are the tall eucalypt forests and associated rainforests. Indeed there is an interesting sequence from the tall eucalypt forests low on the slopes of Mount Wedge, with a transition to rainforest and ultimately to low shrubby sub-alpine scrub on the upper slopes of the mountain—a common transition but here short and readily accessible.

The upper slopes of Mount Wedge have an array of conservation values which are particularly relevant to the immediately adjoining Tasmanian Wilderness World Heritage Area, including the residual dolerite capping (geoconservation significance), glacial landforms and montane heath together with the visual prominence of the mountain viewed from all sides, including from within the TWWHA.

The smaller ENGO-proposed land parcel to the north-west [FID 15] remains mostly forested but about 20 per cent has been recently logged. It is surrounded by roads, stored waters and various tracks and was assessed at the landscape level as not possessing important heritage conservation values. There is a mapped threatened plant community in treeless lands just outside the ENGO proposed boundary.

Summary—Mount Wedge		
WORLD HERITAGE		
Attribute	Relevant criterion	Value
Tall eucalypt forest		Contribution to integrity of the adjoining TWWHA
Rainforest		Contribution to integrity of the adjoining TWWHA

Summary—Mount Wedge		
WORLD HERITAGE		
Attribute	Relevant criterion	Value
Geoconservation values		<i>Glacial</i> : Contribution to integrity of the TWWHA <i>Geoconservation</i> : Contribute to the integrity of the TWWHA

NATIONAL HERITAGE		
Attribute	Relevant criterion	Value
		Not yet assessed but the area south of the Scotts Peak Road would contribute significantly to the integrity of the immediately adjoining National Heritage listed Tasmanian Wilderness World Heritage Area.

## Boundary considerations

The primary consideration in determining the boundary within this precinct is to capture the important heritage values of the rainforest–eucalypt forest complex.

Also to be considered is the potential of that section of the precinct along the Strathgordon Road, which may help provide additional visitor opportunities, and so improve presentation as part of the (new) Tasmanian Wilderness World Heritage Area.

Adding the ENGO-proposed reserves south of the Strathgordon Road to the TWWHA is valid. It would improve the appropriateness of the boundary that is presently partly along a watershed and then inappropriately crosses over the shoulders of Mount Wedge. The Strathgordon Road would be an appropriate boundary for the TWWHA.

Logging has heavily impacted that part of the ENGO proposal north of the Strathgordon Road. Its addition to the TWWHA is problematic and would result in a much less appropriate boundary than the present ridge line/viewshed/watershed. It is not recommended.

## Recommendations

1. Add those ENGO-proposed reserves south of the Strathgordon Road [FID 19] to the TWWHA, adopting the road as a new boundary to the TWWHA.
2. Retain those ENGO-proposed reserves north of the Strathgordon Road as state forest (including small isolated area near lake shore—FID 18 and 20)

## Clear Hill West assessment area

FID 30

## Introduction

The Clear Hill West assessment area comprises an aggregate of four small areas adjoined on three sides by stored waters of Lake Gordon and on the fourth by the Tasmanian Wilderness World Heritage Area. It was decided therefore that logically all of the four parcels of land should be assessed as a single unit but if relevant, the relative merits of component parcels should be separately reported.

## Context for assessment

The aggregate area is all but surrounded by the TWWHA but in reality, it is part of a larger enclave within the external boundaries of the TWWHA. It is adjoined on two of its three sides by the stored waters of the artificial impoundment of Lake Gordon.

The whole of the assessment area is steep hilly land that is visible from many directions, including from within the immediately adjoining section of the TWWHA. Much of the area would be visible from the waters of Lake Gordon and from sections of TWWHA further afield to the west. Clear Hill is visible from many parts of the TWWHA.



Clear Hill West assessment area comprises 'Immediate protection' (dark blue) and 'Interim protection' (light blue) lands and which are essentially surrounded by TWWHA. Map derived from Environment Tasmania website.



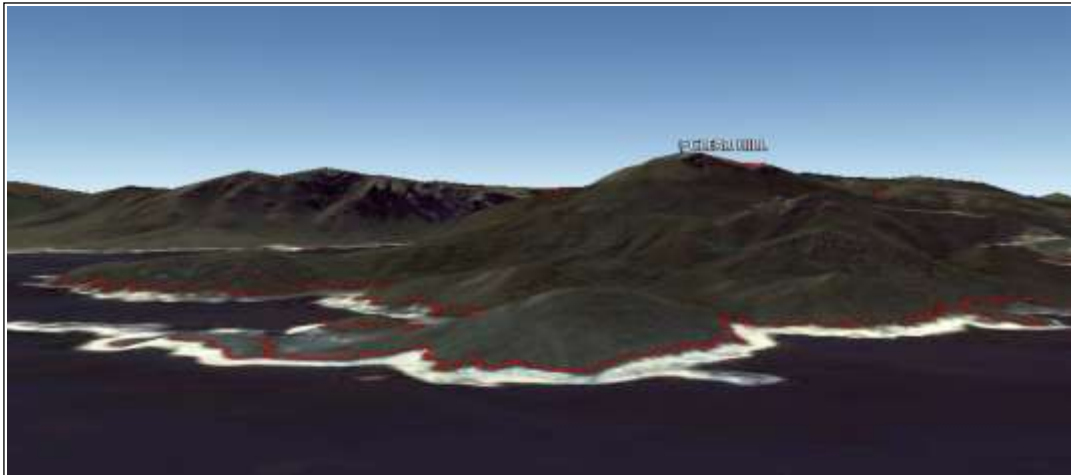
The ENGO-proposed reserve (yellow tint) on Clear Hill is mostly forested and some has been logged.

## Heritage assessment

Time constraints prevented accessing any detailed biodiversity data for the precinct. This assessment therefore does not draw any conclusions on the heritage significance based on biodiversity considerations. As noted in Chapter 4, other IVG reports may well provide useful insights into the area's biodiversity value.

The most obvious heritage attribute identified is visual prominence in an otherwise open and largely treeless landscape.

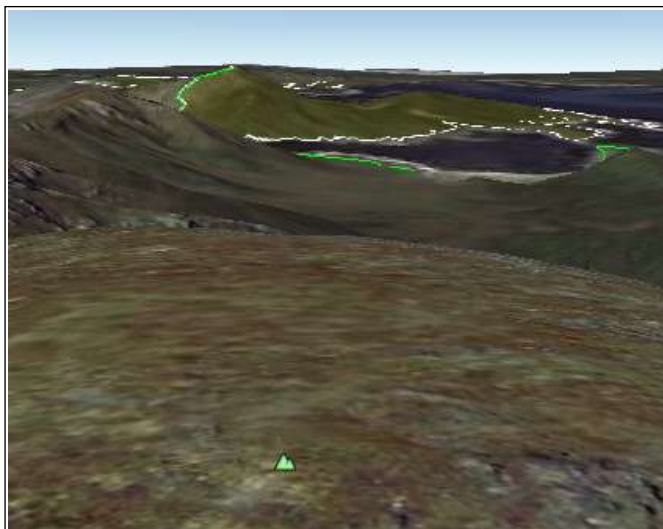
In the context of the surrounding TWWHA, the visual attributes of the Clear Hill West area are not insignificant. Visually, much of Clear Hill is an integral part of the scenic landscape of the adjoining TWWHA, especially from the north and east.



Clear Hill West assessment area comprises the western face and fall from the visually prominent Clear Hill down to the shores of Lake Gordon. The rocky escarpment to the left is in the TWWHA. Image created using Google Earth.

Given that the Clear Hill West assessment area is an integral part of a scenic landscape that is otherwise included in the TWWHA, adding it to the TWWHA would contribute to the

(visual/scenic) integrity of the TWWHA.



Clear Hill West ENGO HCV lands are clearly visible from the southern end of the Denison Range (foreground) in the TWWHA—an integral part of the scenic landscape otherwise substantially within the TWWHA.

Unlike the section of hill slope immediately north of the Strathgordon Road (see Mount Wedge assessment area), which is hidden from most parts of the TWWHA, much of the Clear Hill land is more visible and more closely associated with the outstanding scenic landscape of the Denison Range section of the TWWHA.

The Clear Hill West ENGO proposed reserves contain significant stands of eucalypt forest, including tall eucalypt, albeit an ‘island’ of eucalypt in a landscape otherwise dominated by treeless moorland. Some forest has been logged in recent years. The natural processes operating on the forests of the Clear Hill

area have been significantly truncated by the flooding of the lands to the west so that there are now fewer direct fire approaches.

While the tall eucalypt forests are isolated from other tall eucalypt forest in the adjoining TWWHA, adding the area to the Tasmanian Wilderness World Heritage Area would contribute to the integrity of the TWWHA, at least in respect of the tall eucalypt forest ecosystem.

Addin the Clear Hill area to the TWWHA would contribute to the integrity of wilderness in the TWWHA, as it is an integral part of the wilderness landscape extending north into the Gordon Valley and Denison Range.

Summary—Clear Hill West		
WORLD HERITAGE		
Attribute	Relevant criterion	Value
Scenic landscape	Criterion (vii)	Contributes to the (visual/scenic) integrity of the Tasmanian Wilderness World Heritage Area (wilderness).
Tall eucalypt forest		Contributes to the integrity of the WHA (tall eucalypts).
Biodiversity (species level data not readily available)		Not assessed.

NATIONAL HERITAGE		
Attribute	Relevant criterion	Value
Scenic landscape		Contributes to the (visual/scenic) integrity of the Tasmanian Wilderness World Heritage Area.

Heritage conclusions
<p>In the absence of any detail data being accessed, the key element in the assessment of the heritage conservation significance of the Clear Hill West area is its visual prominence in the landscape. Visually it is an integral part of the essentially natural landscape, which is mostly protected in the Tasmanian Wilderness World Heritage Area.</p> <p>Adding the area to the Tasmanian Wilderness World Heritage Area would significantly contribute to the TWWHA's integrity.</p>

## Boundary considerations

If the whole of the Clear Hill West assessment area were added to the TWWHA, the boundary of the TWWHA would be significantly simplified and threats of visual impacts from forestry activities eliminated. No purpose would be served by adding only parts of the assessment area to the TWWHA.

## Recommendations

1. Add the whole of the Clear Hill West assessment area, to the TWWHA.
2. Phase out logging in the Clear Hill West precinct in favor of permanently protecting the area and withdrawing and rehabilitating the visually scarring road access to the area.





## Upper Florentine assessment area

FID 23 and part of 33

### Context for assessment

The Florentine River valley is one of three valleys with headwaters on the slopes of Mount Mueller—the Florentine, which flows north, the Styx flowing east, and the Weld south-easterly.



The 'Upper Florentine' ENGO-proposed reserve (white edge, yellow tint) with Gordon River section of the WHA to its west and north-west and the Weld River section of the TWWHA to the south-east. Unlike the lower Florentine valley to the north-east, most of the Upper Florentine has not been logged. The area readily accessible, being traversed by the Gordon River Road.

Most of the Upper Florentine assessment area is a broad shallow basin with an extensive karstic limestone basement. The area contains significant areas of karst, including caves.

The vegetation of the Upper Florentine is a complex mosaic of eucalypt, including significant stands of tall eucalypt, eucalypt woodland and moorland. Rainforest is rare but there are

patches of tall eucalypt forest with well-developed rainforest understorey, such as adjacent to the start of the Tims Track.

Unlike most other tracts of tall eucalypt forest adjacent to the eastern side of the TWWHA, the Upper Florentine landscape has low amplitude topography exposed to fire from all directions, particularly from the west. Most other well-developed tall eucalypt stands are located in steep hilly terrain, providing greater protection from fire with many more fire refuges. The Upper Florentine has relatively few topographic derived fire refuges.

Important cultural heritage sites have been recorded in the Upper Florentine.

An important context is the relationship between the Upper Florentine assessment area and the immediately adjoining Mount Field National Park (see below for section of this report on Mount Field National Park precinct).

A tributary catchment, the 'Little Florentine' is already a part of the TWWHA.

## Heritage assessment

The main attributes of the Upper Florentine for consideration in any heritage assessment include:

- tall eucalypt forest
- karst/geoconservation site
- archaeological cultural sites
- scenic landscape.



View across the Upper Florentine (immediate forested foreground) and tributary catchment of the Gordon River section of TWWHA (forested ridge and treeless areas beyond) towards Saw Back Range and prominent peak, The Thumbs. View from The Needles near Gordon River Road. Image: [www.lukeobrien.com.au](http://www.lukeobrien.com.au)

### **Tall eucalypt forest**

The Upper Florentine has been previously recognised for its conservation value, particularly for tall eucalypt forest. Rather than forming extensive stands, the tall eucalypt forest ecosystem in this precinct is represented by a complex mosaic in a matrix of moorland and eucalypt woodland. This includes significant stands of well-developed tall eucalypt forest, mainly of *Eucalyptus delegatensis* and also some *Eucalyptus obliqua* and occasional *Eucalyptus regnans*. The World Heritage Expert Panel convened to report on forests of prospective World Heritage value as part of the Regional Forest Agreement in 1997 reported:

The Panel as another possible best expression of the eucalypt sub-theme identified a large stand of tall, undisturbed eucalypt forest in the Upper Florentine. The Upper Florentine forests are of exceptional diversity. They are also characterised by three dominant overstorey species: *Eucalyptus regnans*, *Eucalyptus delegatensis* and *Eucalyptus obliqua*. The Panel recommended that the Upper Florentine eucalypt forests warrant further investigation as a best global expression of the Eucalypt sub-theme in wetter southern temperate areas (emphasis in original report). —Tasmania–Commonwealth Regional Forest Agreement Background Report Part 1: World Heritage Report: Record of the Tasmanian World Heritage Expert Panel meeting June 1997).

The tall eucalypt forests of the Upper Florentine derive their natural heritage value on several levels; first their intrinsic value as an ecologically diverse mosaic of stands of intact tall eucalypt forest, and second because of their strategic location in the natural tract of tall eucalypt forests which stretch from central Tasmania to the southern-most part of the island.

The forests in the Upper Florentine occupy a distinct landscape unit that contrasts with the main tracts of tall eucalypt in the Styx–Weld–Huon–Picton to the east and south and the adjacent parts (Gordon and Weld catchments) of the existing TWWHA. Parts are likely similar to the once extensive tall eucalypt forests further down the Florentine Valley but which have now been extensively logged and converted to regrowth or plantations. The Upper Florentine forests contrast with the relatively few small stands of well-developed tall eucalypt forest already represented in the adjacent sections of the existing TWWHA to the west (Gordon catchment) and south (Upper Weld).

The mosaic pattern of the tall eucalypt forests of the Upper Florentine, flanked to the east and west by extensive tracts of moorland and buttongrass, is a clear indication of the ongoing and frequent role of fire in this landscape. Any change in climate and/or fire regime here could be critical to the survival of the tall eucalypt forests of the Upper Florentine precinct. Topography provides some fire shadow refuges from natural fire paths from both west and east that offer good prospects for longer-term survival of tall eucalypt in the precinct.

The combination of extensive mid-elevation low amplitude topography and frequent fire in the Upper Florentine results in ecological diversity that differs greatly from that of much of the tall eucalypt forest elsewhere in both the TWWHA (e.g. Upper Coles Creek, Counsel River) and in other ENGO-proposed reserves containing *E. regnans*/*E. obliqua*/*E. delegatensis* tall eucalypt forests (e.g. Styx, Weld, Huon, Picton)

Adding the tall eucalypt forests of the Upper Florentine would make a very important contribution to the ecological diversity and hence integrity of the Tasmanian Wilderness World Heritage Area and so are well worthy of World Heritage recognition (see Chapter 1 of this report).

The Upper Florentine tall eucalypt forests occupy a key location in the natural corridor of tall eucalypt forest extending from central Tasmania to the south coast of the island. As such it is a key link to maintaining and protecting a regional ‘connectivity corridor’ which the author refers to as ‘C2C’—a forest corridor from the vicinity of the Counsel River in the north to Cockle Creek in the south. The Upper Florentine tall eucalypt forests are in a critical location in that regional corridor, the remaining intact stands occupying a ‘choke’ or narrow isthmus section in the corridor, pinched by fire paths from both east and west. Similarly, protecting and maintaining ecological connectivity at the regional level, of necessity including the Upper Florentine, would make an important contribution to the ecological sustainability of this distinctive forest ecosystem. It was also make an important contribution to the World Heritage value of the TWWHA.

In conclusion, the tall eucalypt forests of the Upper Florentine, as part of a complex mosaic of natural vegetation, have high heritage conservation value, especially in the context of the total distribution of tall eucalypt forest in Tasmania and in the context of the existing adjoining Tasmanian Wilderness World Heritage Area.

## **Karst**

The Florentine River valley floor and some side slopes comprise an extensive basement of limestone with significant areas on the valley floor exhibiting karst formation, including numerous caves.

The Junee–Florentine karst is developed in an extensive belt of Ordovician limestones that underlie the major portion of the Florentine Valley. Limestone also extends into the neighbouring Tyenna River valley, approaching the township of Maydena to the southeast ('Junee area'). The total area of limestone and potentially karstic terrain is in the order of 18,500 ha. —Eberhard 1998

The karst of the Florentine valley is very extensive across the broad valley floor, extending from the Upper Florentine in the south and to within a few kilometres of Wyld's Craig in the north. Much of the valley floor has been extensively and intensively developed for industrial forestry such that much of the karst is no longer in a natural condition or a natural setting.

Some particularly noteworthy karst features are known and have been documented. Parts of the Florentine River catchment have been subject to stream capture by underground streams which divert waters eastwards into the Junee River, flowing under Mount Field National Park to discharge in the Tyenna valley. Similarly, some areas of karst in the eastern side of the valley have been traced to flow underground westwards to the main stream of the Florentine River.

Some 14 km of underground stream captures surface flow in the Florentine Valley and is ducted underground by river caves to the Junee Cave in the Tyenna Valley.

The Junee River catchment provides a spectacular illustration of the enigmatic nature of many karst drainage systems, with approximately half of the river catchment above Junee Cave located beyond an apparent drainage divide between the Florentine Valley and the headwaters of the Tyenna River ... The total catchment of the Junee River is now thought to be in the order of 5,500 ha. About half of this catchment lies within the apparent catchment of the north-flowing Florentine River, although the Junee River itself flows southwards as a tributary to the Tyenna River. Flow velocities recorded during many of the water-tracing experiments were extremely rapid and provide an indication of the degree of conduit integration within the Junee River aquifer. —Eberhard 1998

Those sections of the Florentine Valley mapped as being captured underground by the Junee River cave system appear to be wholly within that part of the ENGO-proposed reserves adjacent to the western boundary of Mount Field National Park and are further dealt with under the Mount Field assessment area.

The documented karst within the ENGO-proposed reserves in the Upper Florentine would make a particularly valuable contribution to the integrity of the karst values of the existing Tasmanian Wilderness World Heritage Area. In particular the catchment of the Junee River cave system represents an outstanding example of subterranean stream capture which would make an important contribution to the integrity of the karst of the TWWHA. These karst areas also have a number of associated documented important archaeological sites (see below) and represent particularly important sites of significant (and shared) natural and cultural heritage value.

## **Archaeological cultural sites**

The Florentine Valley has already made an impressive contribution to archaeological research of the Tasmanian Aboriginal use of the landscape. Sites include:

- Nanwoon Cave (now known as Nanwood)—located adjacent to the Florentine River in the centre of the Upper Florentine forests, is a highly important archaeological cultural site of World Heritage significance (Jones et al. 1987)

- Nunamira (previously known as Bluff Cave) is located adjacent to the Florentine River and is a confirmed Pleistocene (ice age) site with the oldest occupation level dating back some 30,000 years.
- Tiata Mara Kominya (Beginners Luck Cave) has been subject to archaeological research revealing this to be a most important archaeological site and hence of cultural heritage importance.

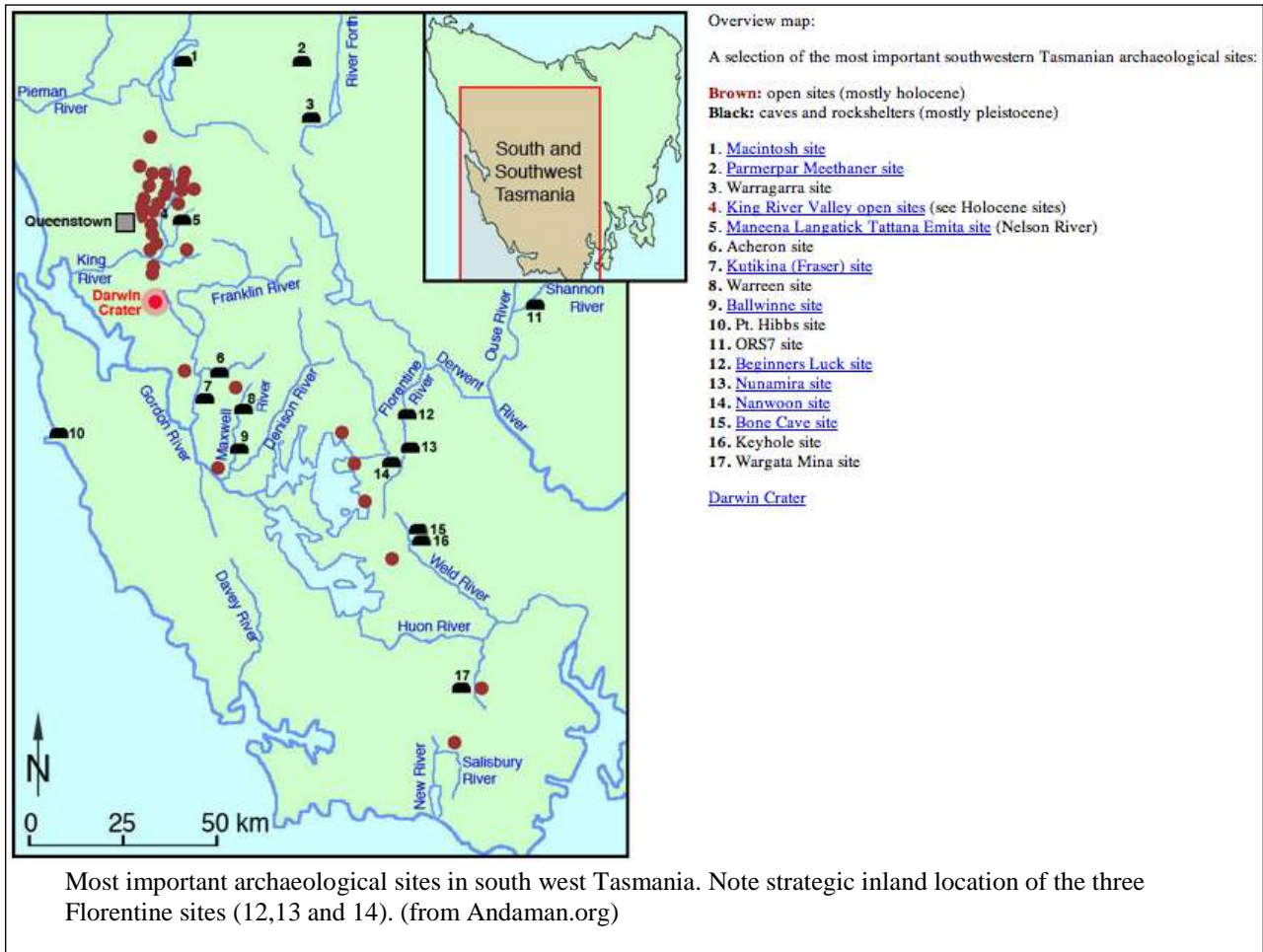
Nanwood (Nanwoon) Cave site is confirmed as being within the ENGO-proposed reserves. Among the Pleistocene archaeological sites of Tasmania, Nanwood yielded the first human remains—a fragment of skull. Circumstantial evidence suggests a date of more than 12,000 years with a date of 16,000 years obtained for some near surface bone.

Nunamira (Bluff) Cave is located 800 metres east of a parcel of ENGO-proposed reserve in the Upper Florentine, some 1,600 metres from the existing boundary of the TWWHA.

The presence of the distinctive tool types and impactite raw material from the Darwin Crater on the western side of the TWWHA raw materials and tool types at Nunamira (Bluff Cave) links it into a network of human activity centered on south-west Tasmania during the Pleistocene period (Cosgrove 1989). Nunamira makes an important contribution to the integrity of the cited Pleistocene human occupation sites already protected in the TWWHA. Indeed, linking it directly with the Darwin Crater makes an important contribution to the TWWHA.

Tiata Mara Kominya (Beginners Luck Cave) was originally thought to be a site of cohabitation of macro fauna and Tasmanian Aboriginal people. Subsequent more precise dating, however, established that the macro fauna material was circa 40,000 years and predated local Aboriginal occupation of the site. As such, the cave is both a significant archaeological site and a fossil site. Its addition to the Tasmanian Wilderness World Heritage Area would contribute to the integrity of the area's boundaries, in particular in relation to human occupation sites and (sub) fossil sites.

The combination of the karst attributes and known archaeological sites in the Upper Florentine strongly suggests that this area requires much more attention and archaeological investigation. The precinct is potentially important for providing more evidence of the climatic influence on both macro fauna and Aboriginal occupation during and after the Pleistocene. It is possible that a significant heritage precinct exists, extending from at least Tiata Mara Kominya in the north to Nanwood in the south.



## Recommendations

### **Archaeological sites in the Florentine Valley**

The suite of archaeological sites in the Florentine Valley is of sufficient national and international significance to warrant their permanent protection. The following recommendations are made.

1. Add the ENGO-proposed reserves, including the Nanwood archaeological site to the TWWHA.
2. Design conservation precincts and permanently protect the Nunamira and Tiata Mara Kominya sites.
3. Add the Nunamira site to the TWWHA (physical linking is desirable but not essential but could be achieved by reconfiguration of the ENGO-proposed reserves just 600 metres to the west).
4. Conduct a comprehensive archaeological survey of the Florentine River, in particular along and adjacent to the river, particularly between the Nanwood and Nunamira sites.

### **Scenic landscape**

Apart from the hilly prominence of Mount Tim Shea in the east, most of the ENGO proposed reserves are of relatively low topography and so do not exhibit the spectacular landforms of some of the surrounding landscape. However, the Upper Florentine is an appealing landscape to view from those surrounding high points such as Mount Tim Shea, The Needles, The

Thumbs and particularly from Mount Field National Park. Accordingly the Upper Florentine contributes to the scenic landscapes—see for example the image above where the low relief foreground (Upper Florentine) provides the contrast for the treeless plain and rugged Thumbs range beyond.

<b>Summary—Upper Florentine</b>		
<b>WORLD HERITAGE</b>		
<b>Attribute</b>	<b>Relevant criterion</b>	<b>Value</b>
Tall eucalypt forest	(vii) (superlative natural phenomena)	Contributes to integrity of ‘eucalypt tall open forests including Eucalyptus regnans, the tallest flowering plant species in the world;’ (inscribed values). Additionally, this locality provides contributory evidence of ‘the syndrome of a fire dependent forest above a fire intolerant forest’ being a ‘superlative natural phenomena’.
Tall eucalypt forest	(ix) (Outstanding examples of ongoing evolution)	Contributes to ecological diversity of already cited World Heritage values ‘pristine tall eucalypt forests;’ (inscribed values —OV)
Tall eucalypt forest	(ix)	Contributes to the integrity of tall eucalypt forests in the TWWHA by contributing to preservation of regional connectivity between existing and proposed tall eucalypt forest additions. (ongoing ecological and evolutionary processes)
Tall eucalypt forest	(x)	Tall eucalypt is presently conspicuous by its absence from Criterion (x) in ‘inscribed values’ Therefore, the tall eucalypt ecosystem contributes a NEW World Heritage value together with other tall eucalypt forest additions, facilitates tall eucalypt forest qualifying as an official value against World Heritage Criterion (x). ‘... to contain the most important and significant natural habitats for in-situ conservation of biological diversity ...’
Tall eucalypt forests	(viii) ‘...outstanding examples representing major stages of earth’s history,....’	It should be noted that at a generic level, all of the tall eucalypt forests contribute to the likelihood that tall eucalypt forests as a class can meet Criterion (viii). The contribution is not necessarily recognisable at the site specific level.
Karst	(viii) Outstanding examples of stages of earth’s history	Contribute to the integrity of the World Heritage values of the TWWHA by increasing representation of already cited value of karst.

Summary—Upper Florentine		
WORLD HERITAGE		
Attribute	Relevant criterion	Value
Archaeological sites	(iii) 'demonstrating the sequence of human occupation at high southern latitudes during the last ice age'. OV  (vi) '...Pleistocene sites, which demonstrate the adaptation and survival of human societies to glacial climatic cycles...' OV	Contribute to the value and integrity of the World Heritage values of the TWWHA by increasing representation of already cited* value of Pleistocene human occupation sites.  *(Criteria (iii) and (vi))

NATIONAL HERITAGE		
Attribute	Relevant criterion	Value
Not specifically assessed because of evidence of higher order World Heritage significance.		The natural and cultural attributes in the area contribute to the integrity of the already National Heritage listed Tasmanian Wilderness World Heritage Area.

### Heritage summary

The Upper Florentine ENGO-proposed reserves comprise a landscape that contains a number of natural and cultural heritage attributes that are particularly relevant to the adjoining Tasmanian Wilderness World Heritage Area. The complex mosaic of natural forests and moorland, which includes significant stands of well-developed tall eucalypt forest, would add important new ecological diversity to the TWWHA, thereby contributing to the area's value and integrity. The tall eucalypt forests would contribute to recognising new values against Criterion (viii) and Criterion (x).

Similarly, the karst areas and archaeological sites would make a significant contribution to the value and integrity of the TWWHA.



Overall, the Upper Florentine ENGO-proposed reserves include values, which in the context of the adjoining TWWHA, are of World Heritage significance.

## Boundary considerations

**NOTE:** The area referred to in this report as 'Upper Florentine' merges with the ENGO proposed reserves dealt with under 'Mount Field' (north east) and 'Styx River' (south east). Adding the whole of the ENGO-proposed reserves in the Upper Florentine to the Tasmanian Wilderness World Heritage Area will substantially consolidate the TWWHA and have a major impact on the boundary, converting the existing very narrow corridor (the Adamsfield corridor) into a broader link between the Weld River section in the south and the Gordon River section in the north. Overall this will greatly improve and simplify the boundary although this will be offset to some degree by the necessity to adopt a 'point-to-point' boundary across the valley floor of the Florentine.

A particular boundary improvement resulting from adding the ENGO proposed reserves is to eliminate the current inappropriate TWWHA boundary south of the Gordon River Road. Operational field management would benefit from having a road frontage on the Gordon River Road rather than an ill defined boundary cutting across the landscape and in places following contours.

**NOTE:** The boundary across the Florentine resulting from adoption of the proposed ENGO boundary could be adjusted at the detail level to improve on-ground definition. However, it should be noted that this report recommends more detailed analysis of the karst and archaeological attributes in the area, which may need further adjustment. The intention is to at least include the Nunamira (previously known as Bluff Cave) archaeological site and to explore the practicability of also including Tiata Mara Kominya (Beginners Luck Cave) (Pleistocene site with the oldest occupation level dating back some 30,000 years) in the TWWHA.

**NOTE:** Including in the TWWHA these site-specific features in a modified landscape does not necessarily require physical linking to the TWWHA.

It is important that the narrow strip of ENGO proposed land up the western boundary of Mount Field National Park is at least added to the park and in turn, included in the TWWHA, as it ensures greater surface protection of the catchment of the outstanding Junee Cave (see Mount Field section).

## Recommendations

1. Recognise that the whole of the 'Upper Florentine' ENGO proposed reserves, in the context of the adjoining Tasmanian Wilderness World Heritage Area, is of World Heritage value and significance (note the link with the recommendations for the Mount Field National Park).
2. Add the whole of the 'Upper Florentine' ENGO proposed reserves to the adjoining Tasmanian Wilderness World Heritage Area (note the link with the recommendations for the Mount Field National Park).
3. Recognise the Nunamira and Tiata Mara Kominya archaeological sites outside the ENGO-proposed reserves as being of at least national cultural heritage significance and consider the feasibility of their inclusion in the TWWHA.
4. Conduct a comprehensive archaeological survey of the Florentine River, in particular along and adjacent to the river, particularly between the Nanwood and Nunamira sites.

## Gordon Range assessment area—Florentine—Gordon watershed

FID 32 and 34 (was FID 26, 27 respectively)

### Introduction

The Gordon Range (GR1) assessment area comprises two parcels of the ENGO proposed reserves [FID 32 and 34] on the Gordon Range—Tiger Range, mostly within the Coles Creek and Florentine River catchment. The Coles Creek catchment flows directly into the Upper Coles Creek section of TWWHA.

Much of the GR1 in the Coles Creek catchment has been coupe logged in recent decades.

The southern most ENGO-proposed block [FID 32] is entirely within the Florentine catchment and appears not to have been logged.



The ENGO-proposed reserves (white edged) have been assessed together with the intervening section of state forest in the Gordon River catchment. The intent of the recommended TWWHA boundary (yellow line) is to follow the prominent ridge-line comprising the Coles Ck-Florentine watershed in the north and in the south the Gordon-Florentine watershed.

## Context for assessment

The TWWHA boundary in this precinct is an artifact of past flawed protected area boundary determination. Instead of using scientific and management principles and logically following the watershed it deviated into the Gordon River catchment around areas of commercial forest. Although much of that forest in Richea Creek catchment on the Gordon fall has now been logged, there is a need to reconsider for the longer term, the appropriateness of the boundary and the heritage significance of the land involved.

The southern ENGO block is within about 600 m of an important archaeological site on the Florentine River and hence need to include that site in the context of assessment—see earlier section on Upper Florentine.

Some visibility questions arise because of the public use of the adjacent Vale of Rasselas (Gordon River Valley) and the Denison Range.

## Heritage assessment

### World Heritage

Notwithstanding that most of the ENGO-proposed land is mapped as tall eucalypt forest, most of the northern block [FID 34] has been clear fell logged in recent years. Its main heritage value depends on its longer-term contribution to the values and integrity of the immediately adjoining TWWHA and recommended additions. It:

- contributes to maintenance of integrity of catchment and other natural processes within the TWWHA
- contributes to ecological integrity by maintaining connectivity of the tall eucalypt forest ecosystem within the TWWHA ('C2C' tall eucalypt forest ecosystem corridor).



Location of Nunamira Cave archaeological site on the Florentine River relative location to ENGO reserve parcel [FID 32] (white edge)

The southern ENGO-proposed block [FID 32] in the Florentine catchment is intact tall eucalypt forest and can make a useful contribution to maintaining regional connectivity in the tall eucalypt ecosystem. Although its position in the corridor of tall eucalypt forest is important to connectivity, which in turn is important to the integrity of the TWWHA, the issue is more about protecting the forest rather than being included in the TWWHA.

There is some logic in adopting the well-defined Gordon-Tiger range as the most appropriate boundary for this section of the TWWHA (see 'Boundary considerations' and 'Recommendations'). Further consideration of the future of the Nunamira Cave archaeological site, however, has some bearing on the future of [FID 32]

### National Heritage

The area was not specifically assessed for National Heritage significance given the evidence of the importance of the assessment area relative to the TWWHA. At the landscape level, it is unlikely to have any ‘stand-alone’ value of particular significance, the real importance being the contribution that parts of the area can make to the integrity of the TWWHA, especially in terms of catchment integrity and visual protection. Its protection would complete catchment protection of Richea and Upper Coles Creek, the latter being a very high value part of the TWWHA.

Summary—Gordon Range [FID 26,27]		
WORLD HERITAGE		
Attribute	Relevant criterion	Value
Tall eucalypt forests	(vii), (ix), (x)	Contribution to long-term protection and maintenance of regional connectivity represented by the ‘C2C’ tall eucalypt corridor.
Tall eucalypt forests	(viii) ‘..outstanding examples representing major stages of earth's history,....’	It should be noted that at a generic level, all of the tall eucalypt forests contribute to the likelihood that tall eucalypt forests as a class can meet Criterion (viii). The contribution is not necessarily recognisable at the site-specific level.
Catchment integrity/natural processes	(ix) ‘.. outstanding examples representing significant ongoing ecological and biological processes...’	Key contribution to protection of Upper Coles and Richea Creek catchments otherwise already protected in the TWWHA.

NATIONAL HERITAGE		
Attribute	Relevant criterion	Value
Completion of catchment protection		Contribution or enhancement of natural integrity of National Heritage listed TWWHA.

### Summary of heritage value

**NOTE:** The assessment area comprises ENGO-proposed reserves together with an adjoining small section of non-ENGO state forest (see also reference to Nunamira Cave archaeological site in Upper Florentine section above).

The northern parcel of the assessed area is considered to have no particular ‘stand-alone’ heritage significance at the landscape level except for its importance for the long-term

contribution that it can make to other recognised natural heritage values of the Tasmanian Wilderness World Heritage Area:

- as tall eucalypt forest, albeit regenerating, it makes a significant contribution to maintaining regional connectivity of tall eucalypt forest, in particular, contributing to connectivity between the Upper Florentine and the Lower Florentine.
- as a catchment(s) flowing directly into the TWWHA, it can make an important contribution to the integrity of the existing National Heritage and the TWWHA.

The southern parcel in the Florentine catchment [FID 32], which comprises tall eucalypt forest, does have some in situ heritage significance. This relates primarily to the contribution that it can make, together with other forests to the north and south, to maintaining regional connectivity in the tall eucalypt ecosystem and hence in the long-term maintenance of the ecological integrity of tall eucalypt ecosystem in the TWWHA. However, providing this stand of forest is protected, there is no immediate need for it to be included in the TWWHA (see section on Boundary considerations below). The future of this parcel of forest is also linked to the subject of protection of the nearby Nunamira Aboriginal Archaeological site (see Upper Florentine section above).

## Boundary considerations

GR1 is particularly important for boundary improvements to the TWWHA as well as its contribution to catchment integrity.

The northern parcel of the ENGO-proposed reserves [FID 34] is an anomaly in the eastern boundary of the TWWHA. It is located mostly in the Coles Creek catchment, including in the very head of Upper Coles Creek and so it drains directly into a very high value section of the TWWHA (outstanding example of *E. regnans* tall eucalypt forest). The watershed of the Gordon Range and, further south, the Tiger Range, is a very logical permanent boundary to the TWWHA in this precinct.

Adopting the watersheds as a new and more appropriate boundary of the TWWHA would require:

- protecting approximately 75 per cent of the northern ENGO block
- protecting about 375 ha. of mostly previously logged tall eucalypt forest (state forest)\* to the immediate south.

This could be ‘offset’ by rescinding that part of the northern parcel in the Florentine catchment.

The proposed new boundary is illustrated in yellow edge in the diagram above at the start of the Gordon Range section. A shape file is available.

The southern parcel of ENGO proposed block in the Florentine catchment does have significant heritage conservation values, contributing to the regional connectivity of the tall eucalypt ecosystem. However, its future needs to be reviewed in the context of the recommended protection of the important Nunamira archaeological site 600 metres to the east. The archaeological site could potentially be linked to the TWWHA by reconfiguring the ENGO-proposed reserves to orient east-west (see recommendations relating to the Nunamira Archaeological site. The site could be retained in state forest but added to the TWWHA.

## Recommendations

1. Adopt the Gordon–Florentine watershed as the most appropriate TWWHA boundary in this locality.
2. Permanently protect only that part of the ENGO block FID 34 west of the Gordon–Florentine watershed.

3. Permanently protect that part of state forest between the ENGO-proposed reserves and west of the Gordon–Florentine watershed.
4. Rescind the northern most parcel of ENGO proposed reserves east of the Gordon-Florentine and retain in state forest (as offset to 3 above).
5. Add the lands in 2 and 3 to the adjoining TWWHA.
6. Consider the future of the southern ENGO block [FID 32] of ENGO land in the context of the proposed protection of the nearby Nunamira archaeological site. One option is to physically link the two by extending ENGO FID 32 to embrace Nunamira.

## Mount Field assessment area

FID 24, 26, 28, 31, 33, plus various public reserves

### Introduction

The Mount Field assessment area comprises Mount Field National Park together with a series of adjoining separate ENGO proposed blocks including a block of forest along the southern and western boundary of Mount Field National Park and blocks on the northern side of the park. The ENGO proposed reserves in the Upper Florentine (west side of park) are also related to the ENGO proposed reserves on the park's southern boundary.

### Context for assessment

It is apparent that the intent of the ENGO-proposed reserves for protection is to add to or enhance Mount Field National Park.



Mount Field assessment area comprises several blocks of ENGO forest on the southern boundary of the park and on the northern side of the park. The lands on the western boundary are dealt with in the Upper Florentine section. (dark blue='Immediate protection'. Light blue='Interim protection'.

One of the apparent anomalies of the TWWHA is the omission of Mount Field National Park from the World Heritage nomination, possibly because of physical separation from the TWWHA. Mount Field is a high value component of the conservation estate and could readily qualify as a valuable part of the TWWHA; indeed with the proposed addition of the Upper Florentine to the TWWHA, Mount Field National Park would be physically linked to the TWWHA.

Mount Field National Park has a number of very significant documented heritage attributes that justify it being considered for addition to the TWWHA. The ENGO-proposed reserves were therefore assessed in that context as well as for any in situ heritage values.

An important context for assessing the western and southern group of

ENGO-proposed reserves is subterranean features, a major riverine cave system that flows from the Florentine valley west of the park, under the park, to emerge outside the park at Junee Cave.

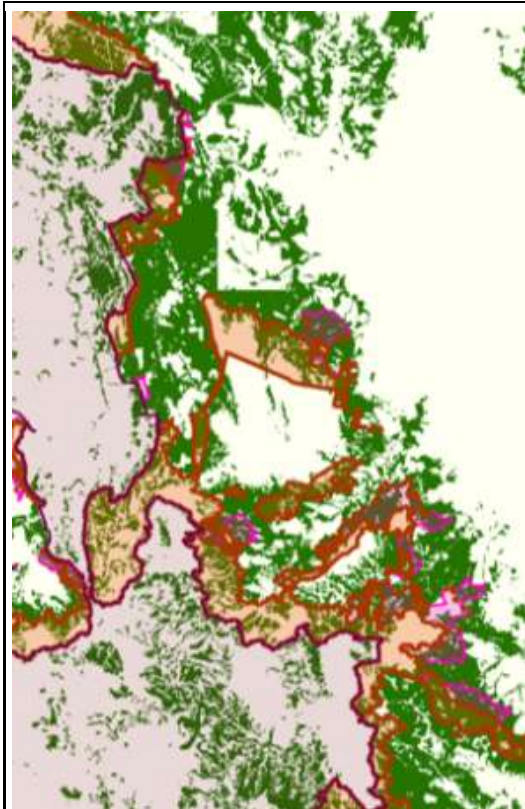
## Heritage assessment

Time constraints prevented a detailed search of databases so no species level biodiversity attributes were assessed.

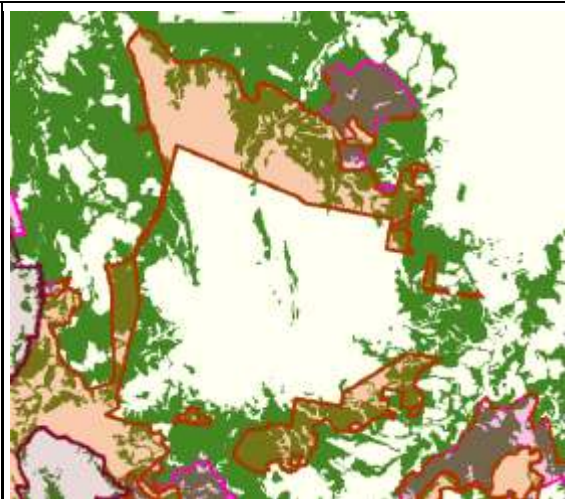
Two major natural attributes were considered key to assessing heritage value of these ENGO-proposed reserves; the tall eucalypt forest and the karst and associated cave attributes. Glacial features and biodiversity are of particular importance for Mount Field National Park.

### *Tall eucalypt forest*

The southern suite of ENGO-proposed reserves comprise mostly well-developed tall eucalypt forests with some rainforest gullies forming a forested fringe along the southern boundary of the park. Upslope the forest gives way to mostly low woodland and treeless areas just inside the park boundary.



At the regional scale, a major corridor of tall eucalypt forest is recognisable and extends from central Tasmania (upper Derwent) southerly to the south coast. In the vicinity of Mount Field National Park the corridor bifurcates, one strand of corridor extending around each side of the high rocky mesa occupied by the national park.



Detail. The ENGO-proposed reserves on the south and north side of Mount Field National Park form part of a continuous strip of wet eucalypt forest around the south, eastern and northern sides of the park. Protection of the ENGO-proposed reserves would contribute to maintaining tall eucalypt forest connectivity in the region. The ecological diversity of the park would be significantly enhanced.

As well as their in situ value as remnant tall eucalypt forest, these forests also derive heritage significance in other ways. These include being an integral part of a significant tall eucalypt corridor around the eastern side of Mount Field National Park, and linking to the ENGO-proposed reserves on the north side of the park. As such the tall eucalypt forest in the southern ENGO-proposed reserves make a significant contribution to maintaining that eastern corridor.

### **Karst**

The Junee River Caves system is of special heritage conservation significance. This major cave system heads in the Florentine Valley to the west of Mount Field National Park, receives water via numerous cavernous sinkholes in the Florentine catchment, including in the park, flows under Mount Field National Park, exiting at Junee Cave which is located in a small public reserve surrounded by ENGO-proposed reserves. The cave system is at the very least of national significance with Eberhard claiming the system contains Australia's deepest and longest caves. If added to the Tasmanian Wilderness World Heritage Area, would make a major contribution to the values and integrity of the TWWHA, greatly adding to the already cited karst and cave values.

The Junee Cave aquifer is one of the most extensive and hydrologically complex karst systems in Australia. —Department of Primary Industries, Parks, Water and Environment, Tasmania

*Table 2. Major caves in the Junee–Florentine karst ranked according to depth and length. These include many of the deepest and longest caves in Tasmania. Niggly Cave is currently the deepest explored cave in Australia.*

Deep caves	Depth (m)	Long caves	Length (m)
Niggly Cave	375	Growling Swallet	12 000
Ice Tube – Growling Swallet	360	Threefortyone-Rift Cave	7 000
Khazad-Dum	333	Niggly Cave	3 250
Cauldron Pot	305	Serendipity	2 940
Serendipity	278	Porcupine Pot	2 531
Rift Cave-Threefortyone	249	Khazad-Dum	1 774
Tassy Pot	238	The Chairman	1 216
Owl Pot	225	Burning Down The House	1 200
Niagara Pot	222	Cauldron Pot	1 071
Sesame	207	Tassy Pot	854
Flick Mints Hole	204	Sesame	800
Porcupine Pot	202	Owl Pot	786
The Chairman	197	Junee Cave	775
Peanut Brittle Pot	186	Frankcombes Cave	774
Udensala	181	Niagara Pot	611

—Eberhard 1998

### **Glacial**

A major part of the landscape of Mount Field National Park shows evidence, sometimes quite graphically, of multiple glaciations in the form of glacial landforms and periglacial features. These features have been described by Lewis (1922, 1923) and Fish & Yaxley (1966).

Residual dolerite capping on the massif allows relative dating of the surrounding glacial deposits, (Kiernan 1983) contributing to the international significance of area in the study of glacial history (DASETT/Govt. of Tasmania 1989 p.33).



The Junee-Florentine karst covers an area of about 18,500 ha and contains more than 580 documented cave entrances, including many deep and long caves (Eberhard 1994, 1996), making it one of the most important cave systems in Australia. Niggly Cave (375 m), which is located inside the park, is probably the current deepest explored cave in Australia. Other important caves are Junee Cave (at Junee Cave State Reserve), Beginners Luck, Welcome Stranger, Frankcombes Cave, Cashions Creek Cave and Growling Swallet. Many of the caves are part of a much larger system which water tracing has shown to be linked to an underground stream network that is the source of the Junee River at Junee Cave. The western part of the park and the Junee Cave State Reserve are located within the karst catchment and contain numerous significant karst features of high geoconservation value. State forest adjacent to the park and reserves also contains significant caves and karst features, including caves linked to the Junee River system.

The Australian Karst and Cave Management Association recommended at its 1992 national conference that the Junee-Florentine karst system should be included in the park. The Australian Speleological Federation supported this proposal.

—Clarke 1997a. (Mt. Field National Park management plan)

In his landmark report ‘A Review of the Geoconservation Values of the Tasmanian Wilderness World Heritage Area’ Sharples made particular comment on the geoconservation significance of the Mount Field National Park and associated lands, which is worth quoting here:

Mt Field National Park lies a few kilometres outside the TWWHA, from which it is separated by state forest. However, the National Park contains aesthetically outstanding glacial landforms which were amongst the first glacial landforms recognised in Tasmania (Lewis 1922, 1923), and which strongly contribute to the World Heritage *Glacial and Glacio-fluvial Landforms* sub-theme of the nearby TWWHA under criteria (i) and (iii) (UNESCO 1999).

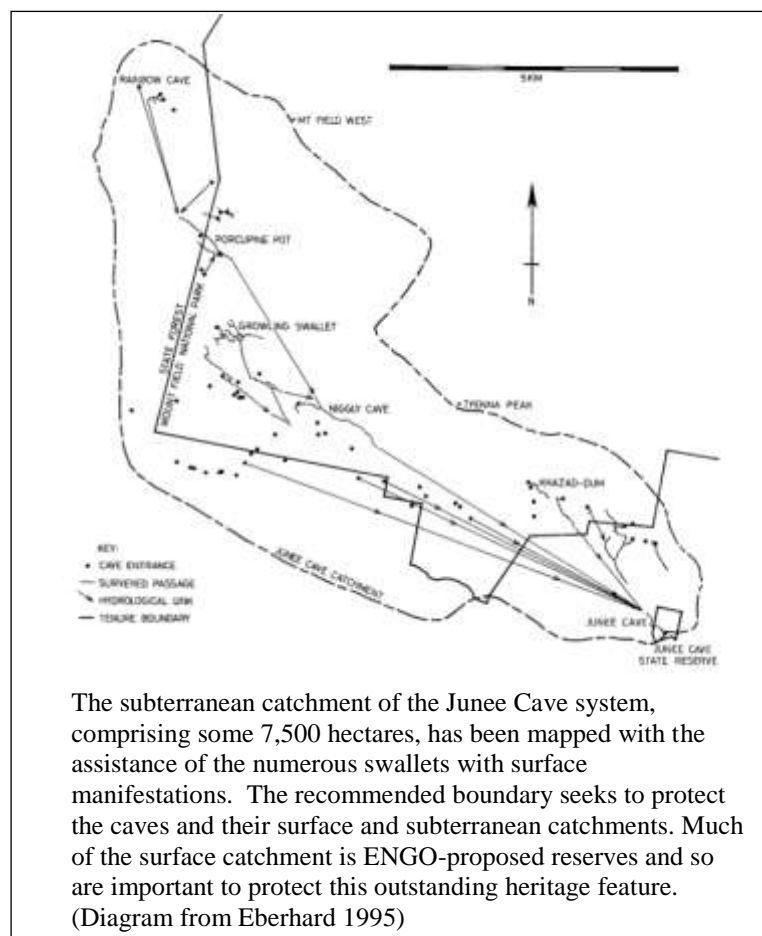
The National Park also contains part of one of the most extensive and well-developed Ordovician limestone karsts in Tasmania, the Junee River Karst including Australia’s deepest known cave, Niggly Cave at 375 metres deep (Eberhard 1994). See Figure (15). This karst crosses into adjoining state forest, where a management zoning scheme is in place to protect the most critical parts of the Junee River Karst system (Eberhard 1994). The large scale of development and diversity of its other karst attributes makes this karst highly significant under the World Heritage karst themes (Section 3.2.2). In particular, glacio-karst phenomena are well developed in the Junee River Karst, due to interaction with the Mt Field glacial processes (Eberhard 1997a, Kiernan *et al.* 2001), and these contribute significantly to the Glacio-karstic Phenomena World Heritage sub-theme in the adjacent TWWHA.

Although Mt Field National Park and the Junee River Karst system are not contiguous with the TWWHA boundary, they are only a few kilometres away and contain highly significant karst and glacial features that relate and **contribute strongly to the World Heritage values of the TWWHA**, and which thus warrant sympathetic management with the TWWHA karst and glacial values. —Sharples 2003 (emphasis added)

Considered as a single entity, the Mount Field assessment area comprising Mount Field National Park together with:

- Marriot Falls Reserve
- Junee Cave Reserve
- Lady Binney Forest Reserve
- ENGO proposed reserves adjoining to north, south and west of Mount Field National Park.

The ENGO proposed reserves contain outstanding natural heritage values which would make a very significant contribution to the values and integrity of the TWWHA; in particular contribution to karst, glacial and tall eucalypt forest values. They are associated with Mount Field National Park are an integral part of the larger assessment area, taking their high conservation significance from being part of that larger block.



Summary—Mount Field		
WORLD HERITAGE		
Attribute	Relevant criterion	Value
South precinct		
Tall eucalypt forest	(ix) (Outstanding examples of ongoing evolution)	Contribution to tall eucalypt regional connectivity (Part of C2C corridor)
Karst	(viii) (Outstanding examples of stages of earth's history)	Important contribution to integrity and value of karst in TWWHA (but see Mount Field aggregate area.)
North precinct		
Tall eucalypt forest	(ix)(Outstanding examples of ongoing evolution)	Contribution to tall eucalypt regional connectivity (Secondary strand of C2C corridor)
Tall eucalypt forest	(x) important and significant natural habitats for in-situ conservation of biological diversity	An important contribution to ecological diversity in the form of tall eucalypt forest extending onto the dolerite capping – appears to be rare in TWWHA. Here over a gradual gradient grading into alpine vegetation.
Tall eucalypt forests	(viii) ‘..outstanding examples representing major stages of earth's history,....’	It should be noted that at a generic level, all of the tall eucalypt forests contribute to the likelihood that tall eucalypt forests as a class can meet Criterion (viii). The contribution is not necessarily recognisable at the site-specific level.
Mount Field Assessment ( <b>aggregate</b> ) area (National park, ENGO-proposed reserves, public reserves) Glacial, biodiversity, tall eucalypts, karst attributes.		This area contains multiple World Heritage values and would make an important contribution to values and integrity of TWWHA.  The tall eucalypt forests contribute to meeting criterion (vii) ‘superlative natural phenomena’, (ix) ‘outstanding examples of ongoing evolution’, (x) in-situ conservation of biological diversity and likely also a contribution to the generic qualification of tall eucalypt forests as meeting Criterion (viii). (See section on tall eucalypts)

NATIONAL HERITAGE		
Attribute	Relevant criterion	Value
Glacial, biodiversity, tall eucalypts, karst		The combination of the park, adjoining ENGO-proposed reserves and associated public reserves represents an area of truly of outstanding conservation value and that if added to the TWWHA would contribute significantly to World Heritage values and contribute very significantly to the integrity of the National Heritage listed values of the TWWHA.

### Heritage summary

The ENGO-proposed reserves adjoining or adjacent to the north, south and western boundaries of Mount Field National Park were assessed both individually and as part of an aggregate core, which also included:

- Mount Field National Park
- Lady Binney Forest Reserve
- Junee Cave Reserve
- Marriots Falls Reserve.

Individually and collectively these lands have multiple attributes and were assessed as having significant National Heritage value and if added to the Tasmanian Wilderness World Heritage Area would very significantly contribute to the values and integrity of the TWWHA (which of course is also National Heritage listed).

In particular, the complete Junee cave system was assessed as an outstanding piece of natural heritage that retains a high level of natural integrity. Protection of the ENGO-proposed reserves in the west and south precincts, together with Lady Binney Reserve, would effectively complete protection of the catchment and ensure long-term natural integrity.

#### Heritage summary—Mount Field assessment area

**World Heritage:** Assessed in context of the adjacent TWWHA, Mount Field National Park, together with select parts of the ENGO-proposed reserves and several existing public reserves, would, as an addition to the WHA, contribute very significantly to the values and integrity of the WHA. Contributes value and integrity against Criterion (vii), (ix) and (x) and possibly to (viii).

**National Heritage:** Meets criteria (b) and (c) as National Heritage.

**Outstanding Heritage Feature:** The outstanding feature of the southern Mount Field precinct is undoubtedly the Junee cave complex. This feature would readily meet National Heritage standard as a 'stand-alone' area, especially including the important biodiversity associated with the caves.

Adding Mount Field National Park and associated ENGO-proposed reserves would make a very significant contribution to the values and integrity of the TWWHA.

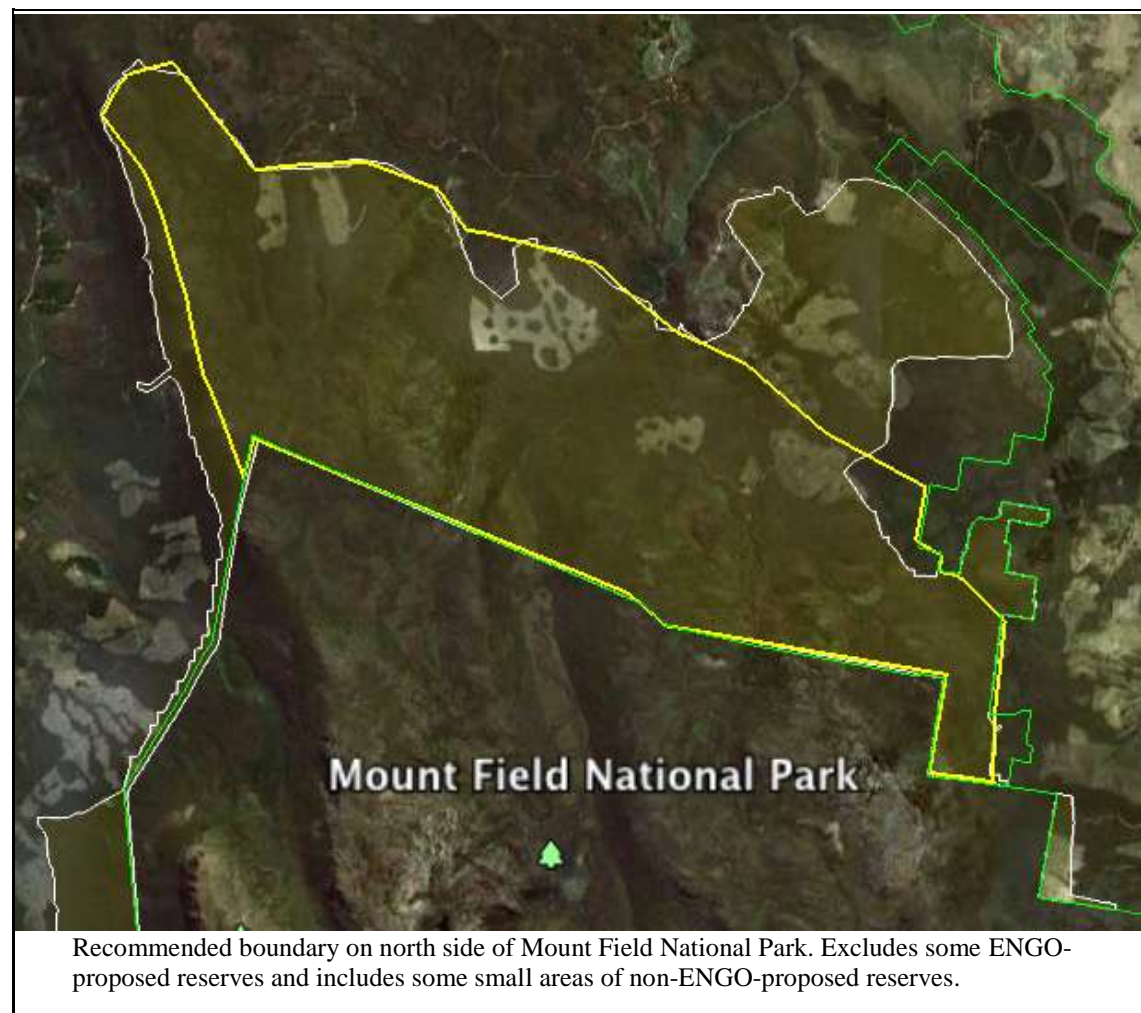
A major part of the ENGO proposed reserves immediately adjoining or adjacent to Mount Field National Park, is an integral part of the Mount Field landscape and ecosystem and collectively were assessed to be of natural heritage significance.

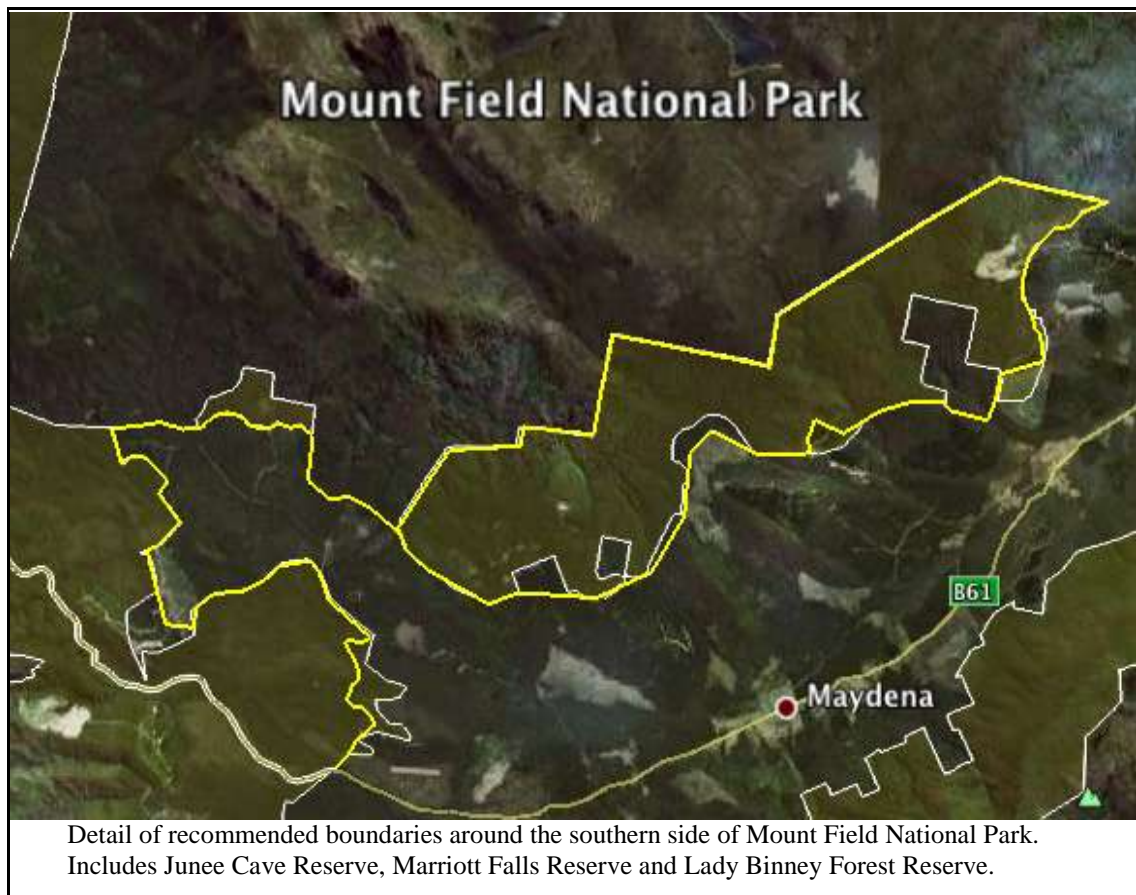
### Boundary considerations

A boundary for protection purposes has been delineated for the Mount Field precinct. The following factors were important in determining an appropriate boundary:

- location of surface features of Junee cave system
- catchment protection of the Junee cave system.
- connectivity of eucalypt forest
- Use of natural features where possible.

A precise boundary option is presented and recommended.





On the north side of the park selection of a boundary was more determined by the extent of the intact forest areas and landscape features. The existing park boundary, a straight line cutting across the topography, is far from ideal but then finding a superior boundary was not easy. The boundary illustrated is indicative only and can be refined in more detail providing the general intent is followed.

**NOTE:** The ENGO-proposed reserves to the north-east have been deleted from consideration so the boundary either follows the ENGO boundary or cuts through ENGO-proposed reserves.

On the southern side of Mount Field National Park, the recommended boundary approximately follows the boundary of the ENGO-proposed reserves but also includes some areas of non-ENGO land including Marriott Falls Reserve, Junee Cave Reserve and Lady Binney Forest Reserve and several very small slivers of state forest.

## Lower Florentine assessment area

FID 35, 37, 38

### Introduction

The conservation value of the lower Florentine (LF1) derives from the mainly intact tall eucalypt forests immediately adjoining the TWWHA as illustrated in the diagram below. These forests are relicts of a once very extensive tract of tall eucalypt forest extending the length of the Florentine Valley and up the adjacent Upper Derwent valley much of which has been subjected to intensive forestry harvesting and plantation development.



## Context for assessment

The ENGO-proposed reserves in the Lower Florentine immediately adjoin the Tasmanian Wilderness World Heritage Area. The TWWHA is a critically important context for assessing the heritage significance of the ENGO-proposed reserves.

A most important part of the context of the forests of the Lower Florentine is that they are part of a continuous corridor of mainly intact tall eucalypt forest extending the length of the Florentine valley and then up the Derwent valley. That part of the corridor to the south-west and the north are largely within the TWWHA whereas the intervening section is entirely within the ENGO-proposed reserves in state forest.

The tall eucalypt forests in this precinct are essentially the largest relict forest on the fringes of the once very much more extensive tract of tall eucalypt forest that extended the length of the Florentine

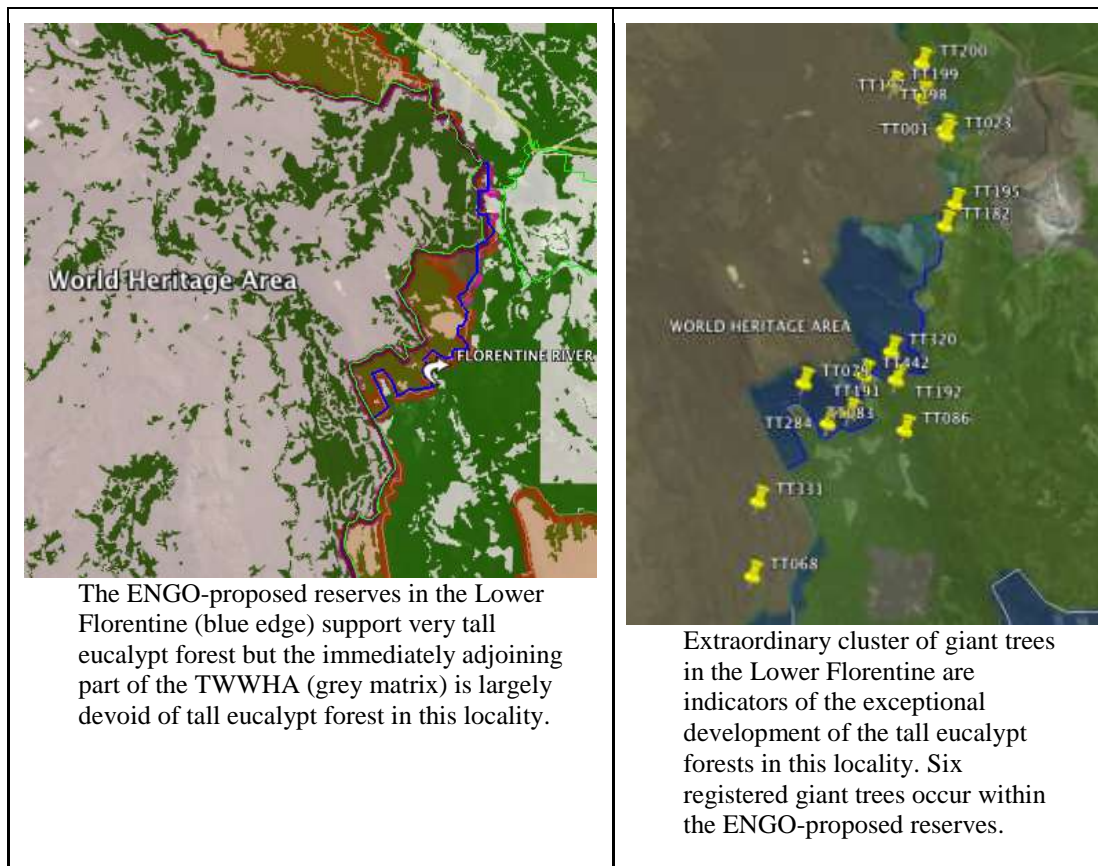
valley but which is now largely clear-felled and intensively managed as eucalypt plantation.

## Heritage assessment

That section of the TWWHA adjoining and upslope of the tall eucalypt forests in the ENGO-proposed reserves by contrast are largely devoid of tall eucalypt forest, being predominantly extensive treeless areas. See diagram below.

### *Tall eucalypt forest*

Given the increasingly intensive industrial timber production being undertaken across the floor of the Florentine valley, the remaining largely intact stands of tall eucalypt forest in the ENGO-proposed areas are increasingly important for conservation. Not only are they outstanding examples of their class but also represent a key component necessary to maintain regional connectivity in the tall eucalypt forests of Tasmania. The ENGO forests represent a critical ecological link between the tall eucalypt forests of the Upper Derwent and the remnant corridor up the western side of the Florentine valley for example Upper Coles Creek to Upper Florentine.



Much of the forests in the ENGO-proposed reserves are outstanding examples of their class. Like so much of the eastern boundary of the TWWHA, the best development of the tall eucalypt ecosystem is located just outside the TWWHA. The existing contour boundary of the TWWHA effectively excluded tall eucalypt forest, which is concentrated at elevations below that contour.

Of the more than 100 individual trees registered on the Giant Trees Register for Tasmania, there are three distinct clusters of such trees, one being the lower Florentine, an indication of the superlative form of the tall eucalypt forests in the precinct. Of the registered trees in the Lower Florentine cluster, eight are already in the TWWHA, including two in Upper Coles Creek. A further seven are located in the ENGO-proposed reserves. There is potential for some additional giant trees to be discovered in the old growth forests in the ENGO-proposed reserves.

The giant trees are superlative features in their own right but are also an important indicator of these forests being superlative examples of their type.

The forests of the ENGO-proposed reserves are strategically located to provide critically important regional connectivity between the tall eucalypt forests of the Upper Derwent to the north and the remnant tall eucalypt forests along the western margin of the Florentine valley and adjoining Gordon catchment. (see diagram of tall eucalypt forests above) The tall eucalypt forests are an integral part of the 'C2C' Tall eucalypt corridor between central Tasmania and the south coast.

The tall eucalypt forests of the ENGO-proposed reserves [FID 35,37,38] have outstanding heritage significance both in terms of the superlative features they contain (very tall eucalypt forest, giant trees) and in terms of the very real contribution that they would make to the integrity of the tall eucalypt forest values of the Tasmanian Wilderness World Heritage Area.



Adding the forests in the ENGO-proposed reserves to the immediately adjoining TWWHA would very significantly contribute to the natural integrity of the TWWHA and are therefore definitely of world heritage significance.

### **Karst**

The karst system of the Florentine Valley is one of the most extensive tracts of karst in Australia, extending along the length of the valley floor and lower slopes of the tributary valleys of the Florentine River including into the ENGO-proposed reserves immediately to the south of Wylds Craig [FID 35]. The karst features of the Florentine have been extensively documented by Eberhard (1996).

Two relevant karst units mapped by Eberhard include HSZ 12 and MSZ 12 (Eberhard 1996). HSZ 12 is located wholly within the ENGO proposed reserves and is regarded as an important area for karst conservation, particularly being located in unlogged tall eucalypt forest.

HSZ 12: 'This zone is the best surviving example in the Florentine Valley of a sizeable area exhibiting significant karst development that has not been extensively disturbed due to past logging within some part of its catchment. This integrity greatly enhances its conservation value, providing representation of both landforms and land forming processes under essentially natural conditions.' —Eberhard 1996

The mapped northern and north-eastern boundary of HSZ 12 appears to be coincident with the boundary of the TWWHA. Notwithstanding that HSZ 12 is not a feature that is 'partly in and partly out of the TWWHA, it undoubtedly would contribute to the integrity of the already inscribed karst values of the TWWHA.

A large proportion of the once extensive tall eucalypt forest on karst in the Florentine Valley

- **HSZ12: Heath Creek area.** This area contains the major concentration of karst features in the Coles Creek Area. Of particular note are numerous sinkholes including some unusually large examples, the only known example of a mound spring in the Junee-Florentine karst, and a number of significant caves. The hydrology of this area is complex, involving both surface and subterranean drainage; some sinkholes are hydrologically enigmatic and appear to function as estavelles. High Sensitivity zoning for this area reflects both the density of karst features and the existence of landform types that are rare or otherwise unusual in Tasmania. Some karst features are expressed in colluvium mantling the limestone and would be particularly susceptible to damage during forest operations; in general, the potential for forest operations to affect natural sedimentation regimes and hydrological parameters would appear to be relatively high. Steep slopes within the upper catchment raise the further possibility of landslips and water quality changes impinging on karst features and processes, even if timber harvesting is confined above the contact at the top of the limestone. This zone is the best surviving example in the Florentine Valley of a sizeable area exhibiting significant karst development that has not been extensively disturbed due to past logging within some part of its catchment. This integrity greatly enhances its conservation value, providing representation of both landforms and landforming processes under essentially natural conditions. The zone boundary takes into account the apparent extent of limestone outcrop and the catchment of the karst hydrological subsystem associated with Heath Creek, as suggested by mapping by Drysdale (1992).

—Eberhard 1996

has been subjected to logging and road construction and associated impacts such as siltation. Particularly noteworthy therefore is that it complements the Weld Valley section of the existing TWWHA in terms of being an uncommon example of karst within well developed intact tall eucalypt forest.

Adding the proposed ENGO parcel (FID35) to the TWWHA, including this northerly limit of the Florentine valley karst (rated overall nationally significant in the Tasmanian Geoconservation Database) in an old growth, tall eucalypt forest is considered to make an important contribution to the value and integrity of the already inscribed World Heritage karst values of the TWWHA.

Another nearby small karst area worthy of mention is MSZ12 described by Eberhard as:

MSZ12: a limestone hill on Lower Coles Road. This hill exhibits a well-developed karst landform assemblage including caves, sinkholes and karren. Some features have been affected by past logging, resulting in damage to karren and some unnatural sedimentation of the un-named cave TL54. Coles Creek flows underground along the margin of this hill. Medium Sensitivity highlights the need for detailed planning prior to further forest operations in this area'.

Although not within the ENGO-proposed reserves, one of the recommended boundary options for this precinct is to include MSZ12 and associated lands within the TWWHA, thereby providing greater protection for ongoing natural processes in the karst and tall eucalypt ecosystem in the precinct (see proposed boundaries).

Summary—Lower Florentine		
WORLD HERITAGE		
Attribute	Relevant criterion	Value
Tall eucalypt forest	(vii) (superlative natural phenomena)	Contributes to integrity 'eucalypt tall open forests including Eucalyptus regnans, the tallest flowering plant species in the world;' Includes 6-7 registered 'giant trees'.
Tall eucalypt forest	(ix) (Outstanding examples of ongoing evolution)	Contributes to ecological diversity of already cited World Heritage values 'pristine tall eucalypt forests;'
Tall eucalypt forest	(ix)	Contributes to the integrity of tall eucalypt forests in the TWWHA by preserving regional connectivity.
Tall eucalypt forests	(viii) '..outstanding examples representing major stages of earth's history,....'	It should be noted that at a generic level, all of the tall eucalypt forests contribute to the likelihood that tall eucalypt forests as a class can meet Criterion (viii). The contribution is not necessarily recognisable at the site specific level.
Tall eucalypt forest	(x) important and significant natural habitats for in-situ conservation of biological diversity	Contributes to local ecological diversity in the form of tall eucalypt forest extending from valley floor to altitude upper limit.
Karst		Contributes to integrity of karst in TWWHA (karst under tall eucalypt in a pristine catchment)

NATIONAL HERITAGE		
Attribute	Relevant criterion	Value
Tall eucalypt forest	(d)	The ENGO forests in the Lower Florentine readily demonstrate the 'principal characteristics' of tall eucalypt forests.  ['(d) the place has outstanding heritage value to the nation because of the place's importance in demonstrating the principal characteristics of:  (i) a class of Australia's natural .... places; or  (ii) a class of Australia's natural... environments)']
Tall eucalypt forest	'(e)	The concentration of very tall eucalypts as indicated by the number of registered 'giant trees' in the vicinity makes this an outstanding example of the very tallest of the eucalypt species in Australia. The very existence of the 'Giant Tree' register is evidence of that tall eucalypt trees are 'valued by a community or cultural group'.  ['(e) the place has outstanding heritage value to the nation because of the place's importance in exhibiting particular aesthetic characteristics valued by a community or cultural group';]

## Summary of heritage assessment

The tract of mainly intact forest represented in the Lower Florentine ENGO-proposed reserves contain forest that is a superlative example of its class. It contains trees that are of exceptional tallness, including six to seven\* specimens on the Tasmanian Giant Tree Register. (\* one shows as being on a boundary of the ENGO-proposed reserves.)

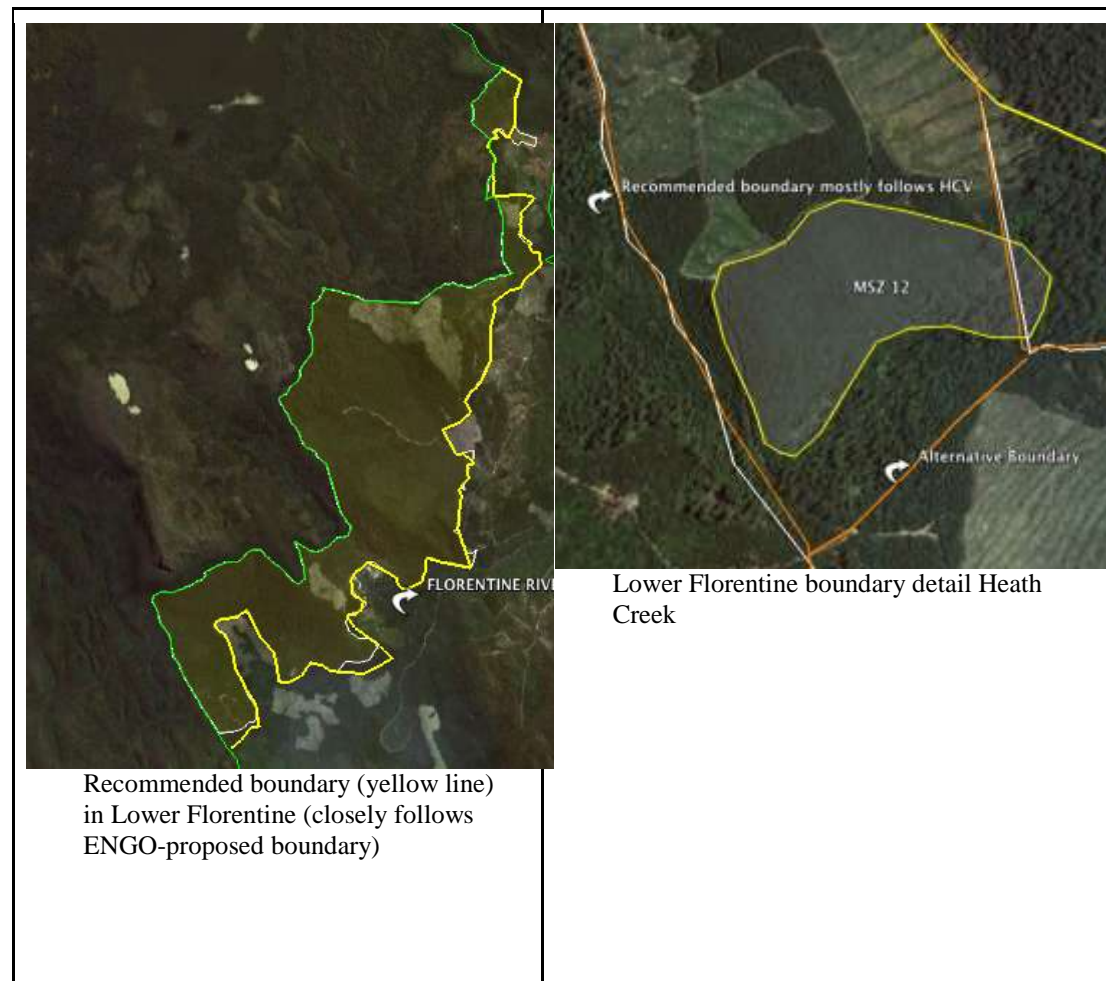
The forest would significantly contribute to the integrity of the TWWHA especially in terms of representation of the tall eucalypt forest ecosystem, the most outstanding development of eucalyptus-dominated vegetation. The area is therefore considered to be of both World Heritage and National Heritage significance.

The ENGO-proposed reserves of the Lower Florentine also make an important contribution to maintenance of regional connectivity in the tall eucalypt forest ecosystem, part of the 'C2C' tall eucalypt corridor between central Tasmania and the south coast. The 'C2C' tall eucalypt corridor has been assessed as making a highly significant contribution to the integrity of the TWWHA, especially in terms of ensuring maintenance of natural processes and maximizing capture of the ecological diversity of the tall eucalypt forest ecosystem.

## Boundary considerations

That section of boundary of the TWWHA immediately adjoining the ENGO-proposed reserves in the Lower Florentine comprise mostly a relic of when the original national park boundary was assigned to a contour. That contour closely accords with the upslope/altitudinal limit of tall eucalypt forest in the precinct. The primary objective of recommending alteration

to the boundary of this section of TWWHA is to capture important natural heritage values, namely outstanding examples of tall eucalypt forest, in particular fine stands of *Eucalyptus regnans* and significant areas of karst.



The proposed new boundary has been drawn to achieve that objective but at the same time end up with a more sensible and sustainable boundary.

The ENGO-proposed reserves include some recently logged coupes and it is considered that these logged areas should never-the-less be included in any protection to ensure as far as possible a consolidated block of forest that facilitates both ongoing natural processes in the protected lands in the longer term and a well defined appropriate boundary conducive to field management of this important tract of forest.

The recommended boundary is illustrated in the adjacent diagram. The recommended boundary generally follows the boundary of the ENGO-proposed reserves but with some minor but important variations. The boundary detail is available as a shape file.

**NOTE:** One potential departure from the ENGO-proposed reserve boundary is in the Heath Creek catchment, in the western part of the ENGO-proposed reserves. One option for a superior boundary but which involves a significant area of non-ENGO-proposed reserves, including clear felled areas, is illustrated in the diagram below. This boundary option has the advantage of:

- a significantly shorter TWWHA boundary (2 km shorter)
- includes Karst area MSZ 12 (further contributing to the integrity of the TWWHA)
- increases area for future rehabilitation of tall eucalypt forest.

- better facilitates maintenance of ongoing natural processes.

If this boundary option is adopted, care should be taken to make sure that Folletts Swallet karst feature on Coles Creek is included.

#### **Summary heritage assessment**

The ENGO-proposed reserves in the Lower Florentine are assessed as being of both National and World Heritage significance because of the important contribution they can make to the integrity of the immediately adjoining Tasmanian Wilderness World Heritage Area both in terms of tall eucalypt forest values and karst values.

Adding the ENGO-proposed reserves, adopting the recommended boundary would add value to the World Heritage Area (tall eucalypt forest and karst) and greatly improve the appropriateness and field management aspects of boundary of the Tasmanian Wilderness World Heritage Area.

As a minimum, the MSZ 12 karst should be permanently protected within the state forest.

### **Recommendations**

1. Recognise the ENGO-proposed reserves in the Lower Florentine assessment area for their outstanding natural heritage significance.
2. Protect the lands delineated in the diagram above and add to the adjoining Tasmanian Wilderness World Heritage Area.
3. Consider adopting the alternative shorter boundary across the Coles Creek tributary valley (see Boundaries).

## Upper Derwent assessment area

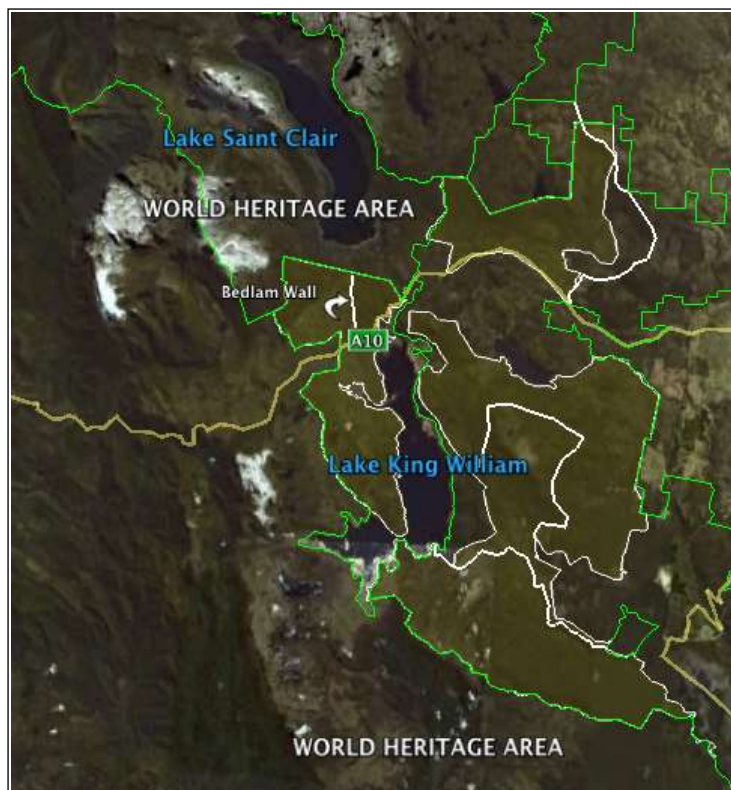
FID 44, 48, 55

### Introduction

The Upper Derwent assessment area (UD1) comprises a cluster of ENGO-proposed reserves, including designated as ‘Immediate protection’ and ‘Interim protection’ in the Upper Derwent (see diagram 1 below). Most is forested, including significant areas of tall eucalypt forest. A treeless area in the north-west is a naturally treeless area, part of the Navarre Plain.

### Context for assessment

The UD1 area is mostly upland landscape ranging to more than 1,000 metres and as such includes the climatic limit of tall eucalypt forest in the region.



The Upper Derwent assessment area comprises a diverse collection of land parcels in a highland landscape, ranging from tall eucalypt forest to treeless moorlands and blanket bogs.

The assessment area includes the managed stored waters of Lake King William, part of a glacial lake basin which is used for diversion of water for hydro power generation. A water race extends along the eastern side of the Derwent to deliver water to the Taraleah power station.

Heritage assessment and associated delineation in this precinct is complicated by the complexity of intact and modified or artificial landscape features. In particular, Lake King William is problematic given that when it is full to capacity it looks every bit a part of an outstanding scenic landscape but when drained looks particularly ugly with exposed bare ground and dead trees. A series of power lines, water races and

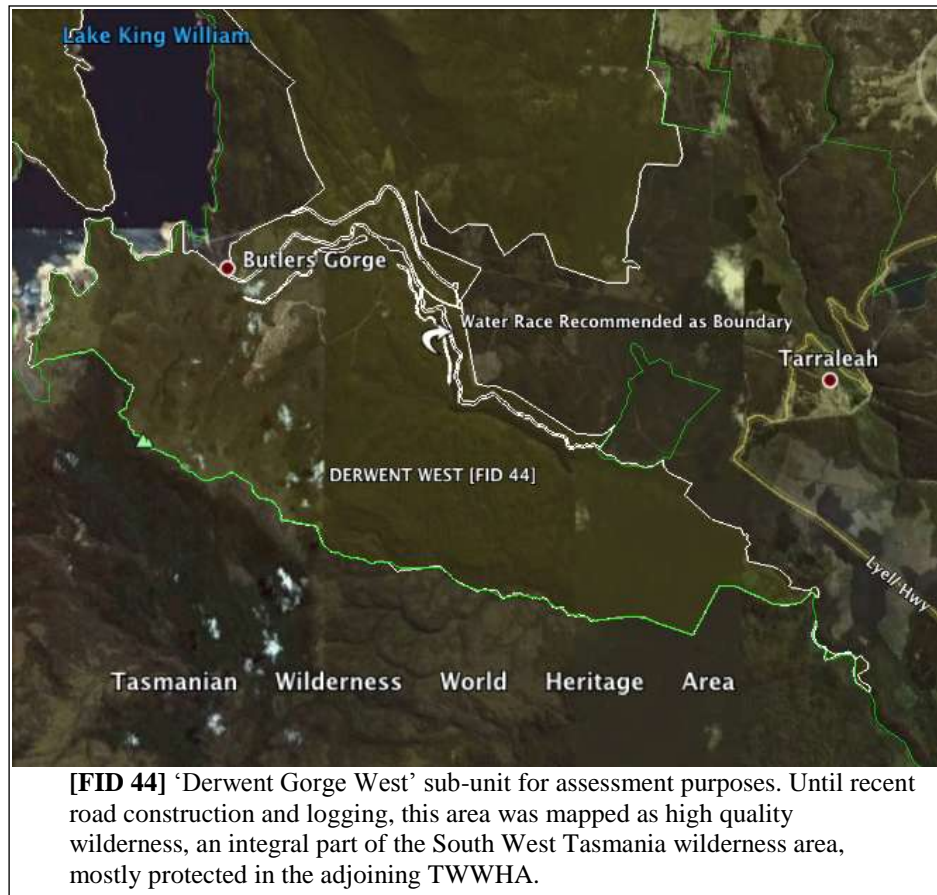
more recently logging and associated roads in pristine forests further detract from the visual attributes of the area.

It was decided that notwithstanding the geographic cluster of the ENGO-proposed reserves, there was merit in conducting the initial assessment for each of several landscape sub-units. Those adopted were:

- Derwent Gorge west (south of Butler’s Gorge dam)
- Navarre Plain—Lake William west

- Wentworth Hills
- Clarence River (northern side of Lyell Highway).

Assessing heritage significance focussed on the tall eucalypt forest ecosystem. The forests of UD1 are at the northern end of a more or less continuous belt of tall eucalypt forest that extends southwards adjacent to the TWWHA, to the southern-most coast of Tasmania.



## Derwent Gorge West sub-unit [FID 44]

### Heritage assessment

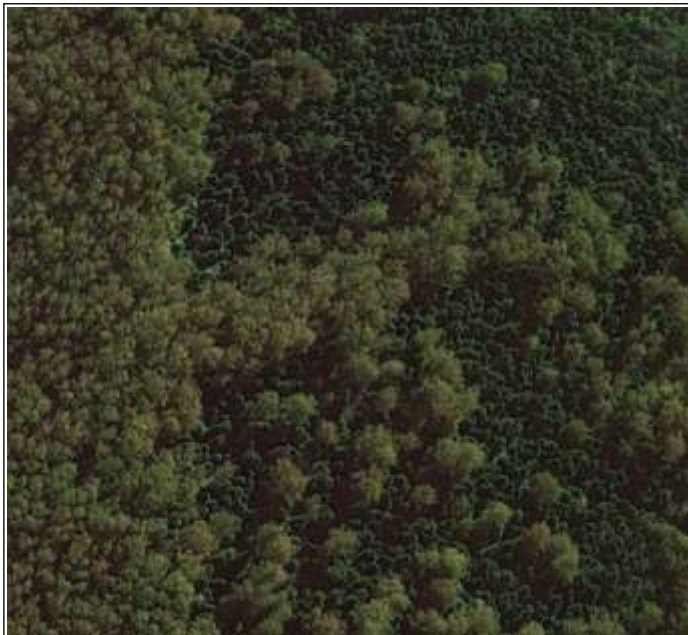
The most important natural attribute of this sub-unit is the eucalypt forests, in particular the tall eucalypt forest formation.

Considered in the context of the major tract of tall eucalypt forest extending from this locality to the south coast of Tasmania, the forests in the Upper Derwent are particularly significant. They demonstrate comprehensively the transition from the well-developed tall eucalypt forests in the lower Florentine-Derwent to the higher elevation and colder landscapes of the Upper Derwent. The mixed eucalypt species forests of the lower Florentine give way to pure stands of *Eucalyptus delegatensis* at higher elevations and in colder habitats. As such they represent a significant component of the total ecological diversity of the tall eucalypt forests of southern Tasmania.

The tall eucalypt forests of the Derwent Gorge West sub-unit need to be recognised as an ecologically integral part of the single tract of forest, which extends from the lower Florentine/Tarraleah area. This tract represents one of the largest, if not largest, continuous



tract of (mostly\*) intact tall eucalypt forest in Tasmania. The ‘Upper Derwent’ tract of tall eucalypt forests is partly within the Tasmanian Wilderness World Heritage Area and partly outside [FID 44].



Transition forest between tall eucalypt forest and well developed rainforest in the Upper Derwent. In wetter sites, the rainforest continues below the canopy of the tall eucalypt forest. —Google Earth imagery.

\* Apart from several selectively logged coupes in the ENGO-proposed reserves.

Although mapping indicates a significant tract of forest in the Weld where tall eucalypt forest is a substantial component, the Weld forest is ecologically very different to that of the Upper Derwent. The Weld may be characterised as an archipelago of eucalypt forest in a sea of rainforest whereas the Upper Derwent, on very different topography and geology, is more a continuous tract of tall eucalypt forest intersected by occasional gully stands of rainforest and a gradation of rainforest understorey, from well-developed at lower elevations to absent at higher elevations. (500–900 m. asl.)

Whereas there are numerous sites in tall eucalypt forest

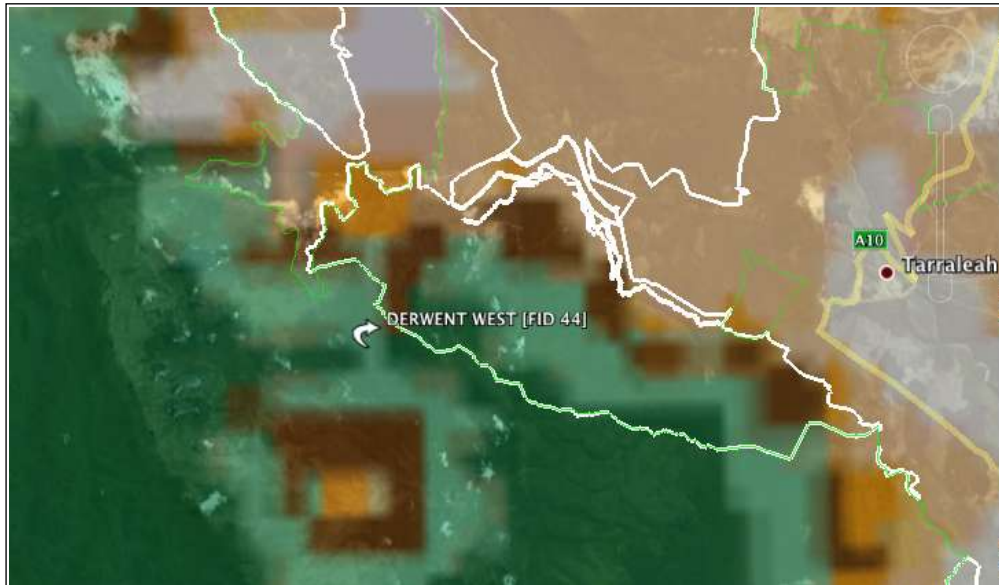
further south that show the transition from lowland tall eucalypt forest to rainforest and/or alpine communities on steep gradient slopes, the Upper Derwent demonstrates the transition to montane and alpine communities over an extended low gradient slope. This culminates in treeless communities including sedgeland and buttongrass.

From the Lower Florentine forests where the tall eucalypt forests are very tall growing (including ‘giant trees’) and often intimately associated with rainforest at around 500 m. asl, there is a transition up the Derwent. This passes through increasing elevation with a decrease in rainforest and rainforest understorey towards dominance by *E. delegatensis* and increasingly, forest with sparse understorey. This culminates in pure stands of *E. delegatensis* at around 900 m. asl.

Unlike much of the other tall eucalypt forest in ENGO-proposed reserves in the ‘Southern Forests’ region, the tall eucalypt forests were, until recently, part of the continuous tract of mapped high quality wilderness that extends to the west coast of Tasmania. Only with the recent advent of roading and selective logging has the wilderness quality been eroded. With cessation of logging and some rehabilitation, this outstanding tract of tall eucalypt forest could again be restored to wilderness condition. Adopting the Derwent River gorge as the boundary of the TWWHA would further enhance the prospects of ongoing ecological processes being maintained throughout this great tract of forest.

The largely intact tract of tall eucalypt forest on the western side of the Derwent Gorge, including that part already protected in the adjoining TWWHA, embedded as it is in the edge of the largest tract of temperate wilderness in Australia, represents an outstanding example of tall eucalypt forest ecosystem and is clearly of National and World Heritage significance.

If the tall eucalypt forests of the Derwent Gorge West [FID 44] were added to the adjoining TWWHA, they would make a very important contribution to the natural integrity of the TWWHA.



Prior to opening of logging roads and logging in the past decade, the whole of the Derwent West block [FID 44] was mapped as high quality wilderness (Wilderness mapping 1996). as per currently adjoining wilderness in the TWWHA. Cessation of roading and logging in this block, accompanied by limited rehabilitation, the wilderness qualities could be readily restored and provide the wilderness (dark green) in the TWWHA a clearly defined permanent boundary on the Derwent River Gorge.

Rehabilitating this tract of otherwise high quality wilderness would not only contribute to the extent of wilderness protected in the TWWHA but would contribute greatly to maintaining ongoing natural processes. If the Derwent Gorge is adopted as a boundary, these forests would be likely to have greater prospect of buffering from human activities, such as escaped fire, than any of the other stands of tall eucalypt forest along the eastern edge of the TWWHA. It should be noted that the TWWHA is listed against Criterion (ix) ‘... to be outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, ... communities of plants and animals;’ and that ‘pristine tall eucalypt forests’ are listed against this criterion.

Undoubtedly the best way to ensure ‘ongoing ecological and biological processes’ is to maintain such forests in as close to a wilderness condition as possible. The option still exists for the forests in the Upper Derwent, most especially in the ENGO-proposed reserves, to be rehabilitated and maintained in a wilderness condition.

## Heritage summary

The still largely intact tract of tall eucalypt forest in the Derwent Gorge West sub-unit is undoubtedly an outstanding example of its type. This tract is an integral part of a larger single tract of tall eucalypt forest that extends south-east, through the TWWHA and into the ENGO-proposed reserves of the Lower Florentine.

A very important consideration is that until quite recently these forests were mapped high quality wilderness, an integral part of the South Western Tasmania wilderness. Very little effort would be required to restore the wilderness quality. The combination of the prospective wilderness and the outstanding tall eucalypt forest is important in assessing the heritage conservation value of the area. It makes it doubly significant as a prospective addition to the adjoining Tasmanian Wilderness World Heritage Area. The area is definitely of national and global heritage significance.

If added to the TWWHA, the ENGO-proposed reserves comprising the Derwent Gorge West [FID 44] would make a very important contribution to the integrity (tall eucalypt forest, wilderness) of the TWWHA.

## Boundary consideration

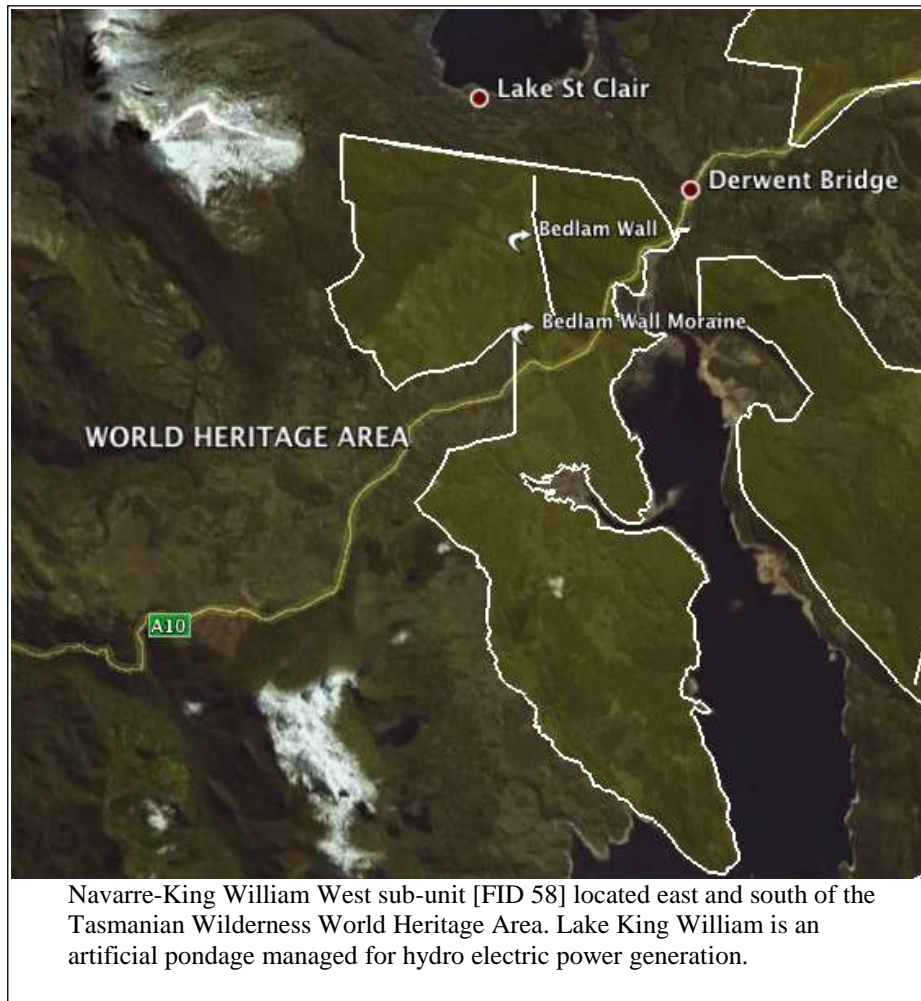
By far the most logical and appropriate final boundary for the Tasmanian Wilderness World Heritage Area in this precinct is the well-defined Derwent River Gorge. At the detail level, the technical boundary is recommended to follow the Tarraleah water race so as to provide field management of the TWWHA with jurisdiction over the river corridor.

## Navarre Plain–Lake King William West sub-unit [FID 58]

### Heritage assessment

#### *Glacial*

The Navarre Plain locality is defined by the extensive evidence of past glaciations and includes a number of important glacial features of definite heritage significance. Kiernan has researched in detail the Cainozoic glaciation of the Lake St Clair area (1992). A suite of glacial landforms associated with the southern end of Lake St Clair glacier include a series of recessional moraines adjacent to the shore of Lake St Clair (south of visitor centre), Bedlam Wall, an ice gouged ‘headland’ formation, a lateral moraine associated with the Bedlam Wall and a scatter of moraines and outwash debris running southwards on what now forms part of the Navarre Plain, crossing the Lyell Highway and extending downstream to the Lake King William basin.



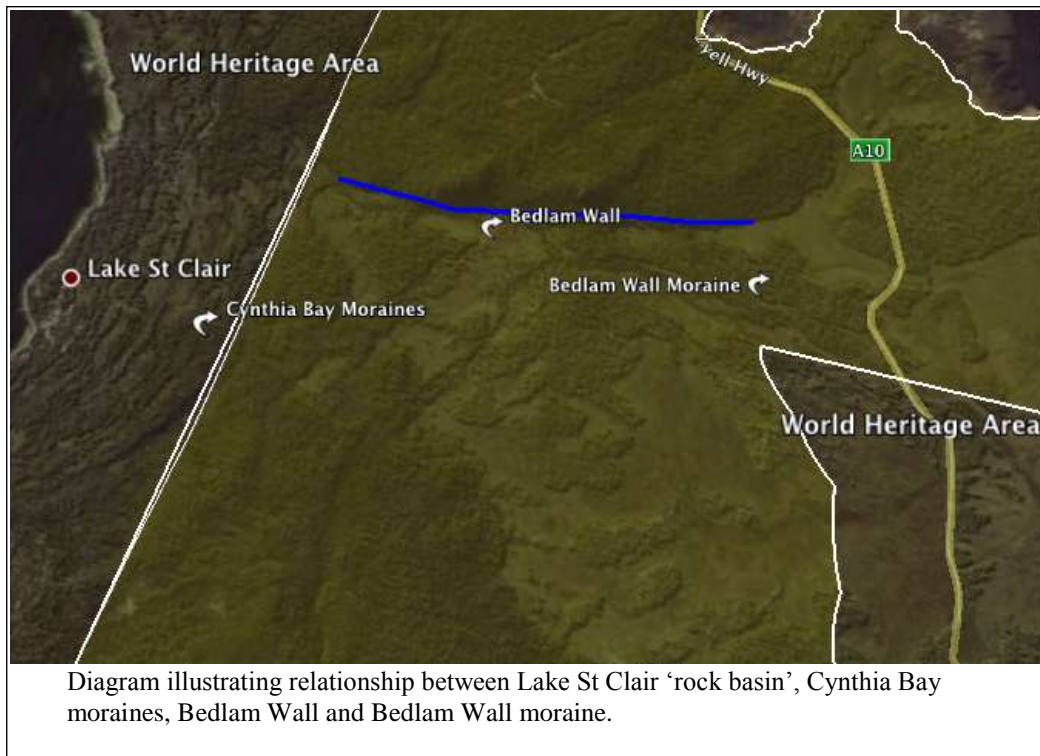
### Cynthia Bay Moraines

An important glacial formation is the Cynthia Bay Moraines adjacent to Cynthia Bay at the southern end of Lake St Clair, a glacially gouged rock basin. Kiernan describes the origin of the moraines.

Cynthia Bay moraines—an impressive array of at least 25 terminal moraine ridges and latero-terminal moraines bounds the southern shoreline of Lake St Clair. The southernmost of these moraines is located 1 km from the lake shore and is believed to represent the terminus of the Derwent Glacier during the late Last Glacial Stage. These narrow and steep moraines do not exceed 10 m. —Kiernan 1992

The Cynthia Bay moraines are listed in the Tasmanian Geoconservation Database (ID 2709). The Cynthia Bay Thule-Baffin moraines were assigned as having Representative and Outstanding significance at world level on the Tasmanian Geoconservation Database (Dixon & Duhig 1996,

The Cynthia Bay moraines, just south of the Lake St Clair visitors centre, are mostly within the existing Tasmanian Wilderness World Heritage Area but do extend southwards just across the boundary (based on LIST map—Geoconservation overlay) into ENGO-proposed reserve [FID 58]



### Bedlam Wall and Bedlam Wall Moraine

The Bedlam Wall is a glacially eroded landform created by lateral gouging of a 'headland' hill, itself a hill that has been overridden by an earlier glaciation. The 'wall' was created by glacial ice moving south from the Lake St Clair rock basin. Associated with this erosional feature is a depositional feature known as the Bedlam Wall moraine, a lateral moraine described by Kiernan as follows:

Bedlam Wall moraine—The steep flanks of the Bedlam Wall ridge south of Lake St Clair have generally precluded the preservation of deposits but a lateral moraine extends along its foot at 830–840 m. At the northern end of the ridge it is overlain by 1 m of angular dolerite talus derived from a rock rib. The moraine can be traced southwards for nearly 2 km. An outwash plain down stream of the moraine can be traced up valley inside the moraine limit.

The Bedlam Wall moraine marks a phase during which the Derwent Glacier terminated c. 3 km south of Lake St Clair, close to the site of the present Derwent Bridge settlement.  
—Kiernan (1992)

The 'moraine ridges, till and glacio-fluvial outwash sediments' referred to by Sharples as being within the then proposed additions to the TWWHA derive from glacial sources on Mount Gell and extend beyond that addition into the ENGO-proposed reserve [FID 58], conjoining the features associated with the Lake St Clair glacier and similarly extend to the Lake William basin.

**Navarre Plains** (addition to Franklin – Gordon Wild Rivers National Park)

This proposed extension area has previously been recommended for inclusion in the TWWHA (DPWH 1990).

*Glacial and Glacio-fluvial Landforms* sub-theme

This area contains numerous moraine ridges, till and glacio-fluvial outwash sediments relating to at least two phases of Late Cainozoic glaciation (Kiernan 1985, Fig. 7.2; 1991c). These features contribute significantly to the World Heritage value of this sub-theme.

—in Sharples 2003 A Review of the Geoconservation Values of TWWHA

The whole of the Navarre—King William West sub-unit is within the footprint of Cainozoic glaciations and presents extensive evidence of glaciation in the form of depositional glacial landforms and one erosional feature (Bedlam Wall). Much of the Navarre Plain and area approaching Lake William is outwash plains, mostly from glaciation from the Lake St Clair basin but also a mix of outwash from Mount Gell and Mount King William I glaciers to the west.

Properties proposed under criterion (viii) should contain all or most of the key interrelated and interdependent elements in their natural relationships. For example, **an ‘ice age’ area** would meet the conditions of integrity if it includes the **snow field, the glacier itself and samples of cutting patterns, deposition and colonization (e.g. striations, moraines, pioneer stages of plant succession, etc.)**; ... (Para 93 of Operational Guidelines 2008—emphasis added)

Adding the whole of the Navarre—King William West sub-unit to the Tasmanian Wilderness World Heritage Area would make a significant contribution to the integrity of the TWWHA, in particular to the already cited glacial values.

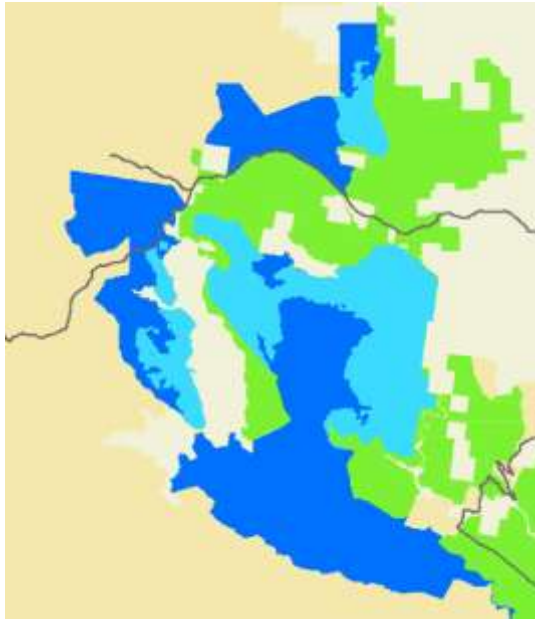
### ***Scenic beauty***

Although the overall landscape of the Navarre—King William West sub-unit is one of a subdued topography, this contributes to its significant scenic beauty. The extensive treeless plains and open snow gum woodland contrast with the surrounding forested and mountainous landscape and is the only part of the TWWHA where this environment is readily accessible by road. The numerous image postings on Google Earth for this precinct are testimony to the aesthetic appeal of this distinctive landscape.

An important ‘presentation’ consideration is that the extensive areas of treeless landscape provide visitors with the opportunity experience views of some of the nearby mountains otherwise denied by the forested environs of the Lyell Highway. Good views of Mount King William I and Mount Gell are made possible by the treeless landscape of the Navarre Plain landscape.

### **Heritage summary**

The glacial landforms of the Navarre-King William West sub-unit extend over much of the area and are directly related to the Tasmania Wilderness World Heritage Area, all being parts of various glacial footprints which have their source in the TWWHA. As such the glacial landforms would make a significant contribution to the integrity of the TWWHA.



ENGO-proposed reserve cluster (dark= 'Immediate protection' and light blue= 'Interim protection) in the Upper Derwent. The TWWHA is shown in cream yellow (left and upper)

Much of the sub-unit is at least an integral part of a significant scenic landscape shared with the adjoining parts of the TWWHA, the existing TWWHA boundary cutting right across some of the treeless plains. Any development of the Navarre Plain landscape would therefore directly detract from the scenic values of the adjoining part of the TWWHA. Adding the Navarre-King William West sub-unit would make a significant contribution to the integrity of the TWWHA (see also Boundary Considerations).

Given that the Derwent Bridge Lake St Clair precinct has been developed as an important visitor and presentation node for the World Heritage Area, there are several road frontage parcels of land that may be perceived to be a part of the TWWHA landscape but in reality are not part of the site. For example, the visually impressive Navarre Plain on the north side of the Lyell Highway is only partly within the TWWHA and unprotected lands extend to within a few hundred metres of the Lake St Clair visitor centre. It is recommended that the balance of this geomorphic (glacial moraine) and scenic entity be included in the TWWHA.

The mosaic of forest, snow gum woodland and buttongrass plains on the western side of Lake King William, are closely associated with the Navarre Plain landscape and is recommended for including in the TWWHA.

The Navarre-King William West sub-unit of the ENGO-proposed reserves [FID 58] would make an important contribution to the integrity of the TWWHA, especially to the integrity of glacial landforms and scenic beauty.

## Recommendation

1. Add the ENGO-proposed reserves contained in the Navarre-Lake William West sub-unit [FID 58] to the Tasmanian Wilderness World Heritage Area. (That part of the area north of the Mount Lyell Highway is the most critically important but adding the area south of the highway is justified on a combination of values, consolidation of protection, boundary rationalisation and simplified field management.)

## Clarence River sub-unit [FID 66]

To the east of Derwent Bridge, the Clarence River sub-unit [FID 66] of ENGO land is bounded on two sides by the Tasmanian Wilderness World Heritage Area (west and north), on the south by the Lyell Highway and the east by an extensive tract of state forest.

Most of the sub-unit is naturally vegetated with a mosaic of eucalypt forest, *Leptospermum* woodland and treeless moorland and the occasional patch of grassland. Parts have been subjected to some form of selective logging in recent years. The overall condition is one of a natural landscape with natural vegetation.

## Heritage assessment

A stand of *Eucalyptus cordata* is mapped in the south-west corner of the Clarence River sub-unit but reference to Nicolle et al. (2008) failed to give sufficient information to establish any special conservation significance.

Immediately adjoining the ENGO-proposed reserve is Clarence Lagoon, a permanent freshwater lake immediately inside the TWWHA. The TWWHA boundary follows the water's edge on the southern side of the lake meaning that some of the immediate catchment of the lagoon is not in the TWWHA but in the ENGO-proposed reserves. Clarence Lagoon is listed as critical habitat for the Clarence Galaxias *Galaxias johnstoni* (Fulton 1978), nationally listed as endangered. The species understandably occurs in the Clarence River downstream of Clarence Lagoon, hence within the ENGO-proposed reserves. The only other known habitat of this species are five or six small lagoons in the immediately surrounding lands, including the Wentworth Hills Lagoon in ENGO-proposed reserves some 13 km south.

All populations of Clarence galaxias are essential to the species' long-term viability and require protection and management. —Threatened Species Listing Statement

Several of the six known 'important habitats' of the *G. johnstoni* are located near but just outside the ENGO-proposed reserves, including Dyes Marsh and Rivulet, Tibbs Plain Marsh, unnamed marsh north of Clarence Lagoon and the unnamed marsh north east of Skullbone Plains. The latter two sites appear to be located on private land part of which is recommended for inclusion in the TWWHA to protect the catchment of Clarence Lagoon and to shorten the boundary of the TWWHA.

Populations of Clarence galaxias found in the unnamed lagoon north of Clarence Lagoon occur on land owned by Northern Forest Investments (land parcel number 0876). The natural barrier protecting the marsh near Skullbone Plains from trout immigration also occurs on land owned by Northern Forest Investments (land parcel number 0880) (Threatened Species Listing Statement). The recommended boundary would embrace this one 'important habitat', which is not on public land.

The alternative boundary recommended would protect most of the important habitat of this endangered species. Adding the modified ENGO-proposed reserves would contribute to the integrity of the TWWHA, particularly in respect of the endangered *Galaxias johnstoni*.

Separate consideration might be given to the case to include the important habitat east of Skullbone Plains in the TWWHA or other appropriate form of protection and management.

The critical threatening process for the Clarence Galaxia is the introduction of brown trout. While habitat protection is important for the future of the species, it is more critical to effectively monitor and manage to limit feral fish from being introduced.

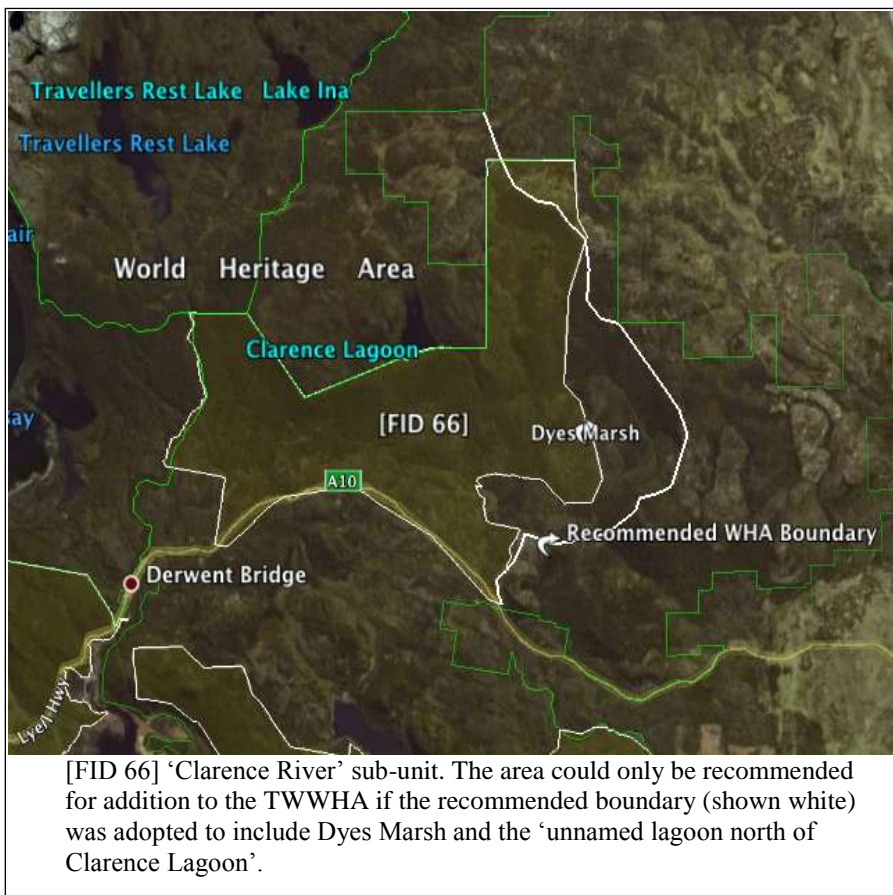
Apart from the *G. johnstoni*, no other specific natural attribute, biological or geological, was identified within the Clarence River sub-unit.



## Boundary consideration

The recommended boundary, if the Clarence River sub-unit is added to the World Heritage Area, embraces Dyes Marsh and Rivulet—other ‘important habitat’ of the endangered *Galaxias johnsoni*. The eastern recommended boundary mostly follows natural features and would be appropriate as a final boundary to the Tasmanian Wilderness World Heritage Area.

The southern boundary follows that of the proposed ENGO reserve, which is the Lyell Highway. Independent of whether lands on the opposite side of the highway are protected and added to the TWWHA, the highway is a very appropriate boundary. Ideally, the parcel of land immediately west of the ENGO-proposed reserves should be included in the TWWHA to consolidate protection in this precinct—although this block does appear to be privately owned.



## Wentworth Hills sub-unit [FID 54]

### Context for assessment

The Wentworth Hills sub-unit [FID 54] is separated from but adjacent to the TWWHA. Central to the ENGO-proposed reserves is the prominent range known as the Wentworth Hills, including a landmark bluff known as D’Arcy’s Bluff visible from the Lyell Highway. Elevation ranges from about 700 m. to 1155 m. above sea level on the highest point of the Wentworth Hills.

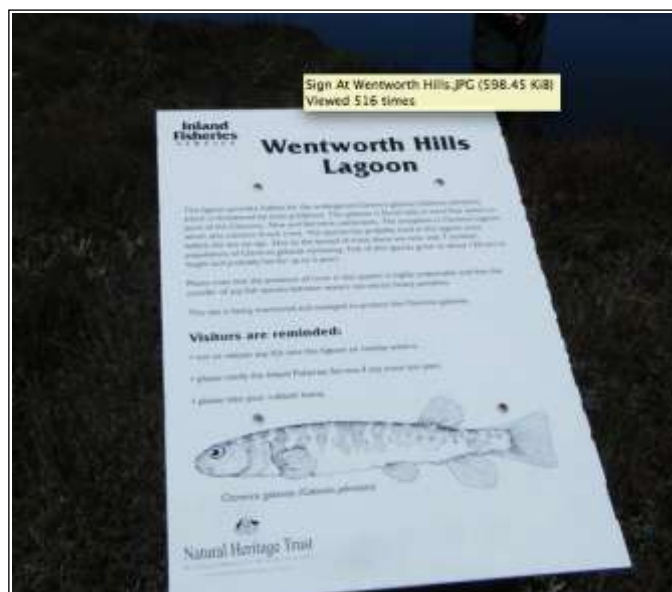
The area borders Laughing Jack Lagoon—an artificial pondage managed for electricity generation.

The greater part of the Wentworth Hills sub-unit is naturally vegetated, including some mainly isolated stands of tall eucalypt forest (probably *E. delegatensis*), open eucalypt forest, woodland, scrub and some smaller areas of alpine shrubland and heath. Most of the precinct is in a natural condition but several patches have recently been subjected to logging.

## Heritage assessment

### Biodiversity

Several small, threatened plant communities are mapped on the slopes of the range, particularly the north-east slope. None appear to be of critical conservation value given the limited size and the wider occurrence of the communities for example, ‘Freshwater aquatic sedgeland and rushland’.



Sign at lagoon on Wentworth Hills identifying the importance of the lagoon to the endangered Clarence Galaxia. [www.bushwalk.com](http://www.bushwalk.com)

Wentworth Hills Lagoon, appears to be a small glacial tarn high up on the Wentworth Hills and is one of six listed ‘important habitat’ for the endangered Clarence Galaxia, *Galaxia johnstoni* (Fulton 1978).

This species is nationally listed as endangered and its most important habitat is Clarence Lagoon but another five or six nearby small lagoons are also regarded as important habitat.

‘All populations of Clarence galaxia are essential to the species’ long-term viability and require protection and management’ (Parks and Wildlife Tasmania).

Given that almost all of the known important habitat of this

endangered fish species is either within the TWWHA or within or adjacent to the ENGO-proposed reserves and the species is on the EPBC endangered species list, the area is considered to be of at least national significance. Given the adjacent TWWHA, adding the lagoon to the area would contribute to the integrity of the TWWHA, specifically, protect that part of the habitat of the species that extends outside the TWWHA.

### Tall eucalypt forest

A discontinuous scatter of stands of tall eucalypt forest lie on the lower slopes of the Wentworth Hills, more concentrated on the south-western fall of the range.

The conservation value of the tall eucalypt forest is here primarily about their context in a colder environment near the altitudinal limit of the formation, if not the species. Rather than interfacing with rainforest as at lower altitudes, here the tall eucalypt is in an essentially eucalypt dominated landscape including formations and species of lower tree height. They share this context with the forests across the Derwent Gorge in the West Derwent sub-unit.

### **Scenic beauty**

The Wentworth Hills contributes to the overall scenic attributes of the Upper Derwent but probably its greater attribute is as a site for viewing the outstanding scenic landscape, especially to the west, much of which is in the TWWHA. See image below.



View from Wentworth Hills looking towards King William Range, Lake King George in foreground. The Wentworth Hills provide an excellent point from which to view the expansive and outstanding scenic beauty of the Tasmanian Wilderness World Heritage Area and associated landscape. If all of the Upper Derwent ENGO-proposed reserves (middle and foreground) and a piece of non-ENGO state forest (ridge near lake) were added to the TWWHA, all of the lands in this view would be in the TWWHA—apart from the waters of the artificial pondage of Lake King William which is not recommended. Image by ‘Iluvswtas’ [www.bushwalk.com](http://www.bushwalk.com)

There is no doubt that the Wentworth Hills sub-unit comprising ENGO-proposed reserves is an area worthy of protection. This would bring many conservation benefits including protecting the habitat of endangered animal species (Clarence Galaxias), a diverse forest and woodland habitat at relatively high elevation and some scenic values.

### **Heritage summary of Wentworth Hills**

Apart from the contribution that the Wentworth Hills Lagoon would make to the ecological integrity of the TWWHA, no globally significant values were identified in the Wentworth Hills sub-unit.

Wentworth Hills has good potential as a stand-alone protected area but in its present delineated form it would be hard to justify its addition to the TWWHA.

Adding the Wentworth Hills would benefit the TWWHA only if the following state forests were considered as additions to the TWWHA:

- between the ENGO-proposed reserve and Lake William
- between the ENGO-proposed reserves and the Lyell Highway.

A consolidated block of protected land of this configuration would have definite contributions to make to the integrity of the TWWHA and as well could provide an appropriate permanent boundary to the TWWHA.

### Recommendations

1. Permanently protect at least the area of the Wentworth Hills designated by ENGOs for ‘Immediate protection’ and manage in a way that is complementary to the TWWHA.
2. Make a consolidated addition to the TWWHA comprising:
  - Wentworth Hills [FID 54]
  - state forests between FID 54 and north to the Lyell Highway (exclusive of Laughing Jack Lagoon)
  - state forest north of Lyell Highway as per recommended boundary for the ‘Clarence River’ sub-unit [FID 66].

Summary—Upper Derwent		
WORLD HERITAGE		
Attribute	Relevant criterion	Value
Biodiversity Galaxia johnstoni endangered fish species	Criterion (x) (‘...contain the most important ... habitats for in-situ conservation of biological diversity, including those containing threatened species....’ )	Habitat of endangered species—important habitat in TWWHA but extending outside.  Contribution to integrity of TWWHA (habitat of endangered fish species)
Glacial (Bedlam Wall and associated moraines of the Derwent Glacier extending outside TWWHA boundary.)	(viii) (geological and geomorphological processes)	Contribution to the integrity of the Tasmanian Wilderness World Heritage Area (an ‘ice age’ area would meet the conditions of integrity if it includes the snow field, the glacier itself and samples of cutting patterns, deposition and colonization (e.g. striations, moraines, pioneer stages of plant succession, etc.) Condition of Integrity, Para 93 Operational Guidelines

Summary—Upper Derwent		
WORLD HERITAGE		
Attribute	Relevant criterion	Value
Tall eucalypt forest	Criterion (vii) '..contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance;'	Contribution to the integrity of the Tasmanian Wilderness World Heritage Area (additional dimension provided by pure stands of tall eucalyptus <i>E. delegatensis</i> .)
Tall eucalypt forest	(ix) '....to be outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water,.....communities of plants and animals;'	Contribution to the integrity of the Tasmanian Wilderness World Heritage Area (pristine tall eucalypt forest in a wilderness environment)
Tall eucalypt forest	Criterion (x) (biological diversity)	Contribution to the integrity of the Tasmanian Wilderness World Heritage Area (additional ecological diversity of tall eucalypt forest ecosystem)
Tall eucalypt forests	(viii) '..outstanding examples representing major stages of earth's history,....'	<p>It should be noted that at a generic level, all of the tall eucalypt forests contribute to the likelihood that tall eucalypt forests as a class can meet Criterion (viii). The contribution is not necessarily recognisable at the site-specific level.</p> <p>The forests of the Upper Derwent in particular have the potential to help provide an expanded understanding leading to meeting of Criterion (viii)</p>

Summary—Upper Derwent		
WORLD HERITAGE		
Attribute	Relevant criterion	Value
Wilderness values	Criterion (vii) '... contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance;'	Contribution to the integrity of the Tasmanian Wilderness World Heritage Area (wilderness values that are an extension of the world heritage wilderness in the adjoining TWWHA)  [Notwithstanding that recent road construction and logging in the area west of the Derwent River Gorge, much of the area remains in a condition consistent with being mapped in 1996 as high quality wilderness. Rehabilitation to wilderness condition could be readily achieved]

NATIONAL HERITAGE		
Attribute	Relevant criterion	Value
Biodiversity—Galaxia johnstoni endangered fish species	(b) '... uncommon, rare or endangered aspects of Australia's natural ... history'	An endangered fish species with important habitat partly within TWWHA (National Heritage) and partly outside. Species listed on EPBC Act list. National significance.

## Summary of heritage values

(See also under separate sub-units above)

The natural attributes of the cluster of ENGO-proposed reserves in the Upper Derwent [FIDs 43, 44, 54, 58, and 66] contain a variety of natural attributes, some of which are of definite heritage significance at both the national and global level.

- Derwent Gorge West sub-unit [FID 44]: Most outstanding of identified heritage values is that of the combined tall eucalypt forests and wilderness values on the western side of the Derwent Gorge [FID 44], potentially making a very important contribution to the value and integrity of the Tasmanian Wilderness World Heritage Area. This area is strongly recommended for addition to the TWWHA.
- The Navarre Plain–Lake King William West sub-unit [FID 58]: The Navarre Plains and associated lands on the western side of Lake King William contain important glacial and scenic values, together with presentation considerations, of direct relevance to the

adjoining TWWHA and if added to the TWWHA, could be expected to contribute significantly to the integrity of the TWWHA.

- Clarence River sub-unit [FID 66]: The ‘Clarence River’ area north of the Lyell Highway contains some important habitat of an endangered species (Clarence Galaxia) and would make a valuable contribution to the TWWHA. However, as an addition to the TWWHA its contribution to the integrity of the area would be significantly greater if it included some additional state forest and some private land to more effectively protect habitat of the Clarence Galaxia. See boundary recommendation. The Clarence River locality is not critical to the TWWHA but deserves closer scrutiny and protection.
- Wentworth Hills sub-unit [FID 54]: The ENGO-proposed reserves in the ‘Wentworth Hills’ precinct have a range of conservation attributes including some values of national and global significance. Although adding the area, including the Wentworth Hills Lagoon, would technically contribute to the integrity of the TWWHA, adding the area with the ENGO-proposed reserve boundaries is not recommended. The Wentworth Hills ENGO-proposed reserves could only be recommended for adding to the TWWHA if two additional parcels of state forest (the area between Wentworth Hills and Lake King William and the Tibbs Plain Marsh between Wentworth Hills and the Lyell Highway) were available for a consolidated addition.

## Boundary considerations

The existing boundary in the Upper Derwent part of the Tasmanian Wilderness World Heritage Area, extending from Counsel River in the south to east of Derwent Bridge includes a number of anomalies and inconsistencies that deserve fixing in this latest process, in line with identifying important heritage values.

The disposition of the natural heritage values in the Upper Derwent assessment area presents some difficulties in designing appropriate boundaries for the Tasmanian Wilderness World Heritage Area. This is particularly the case on the eastern side of the Derwent River where the occurrence of the endangered fish species *Galaxia johnstoni* is restricted to a series of small lagoons and marshes scattered across the Upper Derwent landscape.

While the ENGO-proposed reserves east of Lake King William and south of Lyell Highway have been assessed and found to contain values of National Heritage significance and potentially some values that would technically add to the integrity of the TWWHA, the resultant boundaries are less than ideal and in some cases not appropriate. It is recommended that priority be given to adopting a well-defined and sustainable boundary and to separately deal with protecting any identified heritage values east of the river (Wentworth Hills). Protection needs east of the Derwent should address the important habitat of the Clarence Galaxia and the significance of the Wentworth Hills area—both as a part of the scenic landscape viewed from within the TWWHA and the value of the hills as a vantage point for viewing the outstanding expansive vista over the TWWHA and stored waters of Lake King William.

- Derwent Gorge West [FID 44]: Adding the mostly forested lands west of the Derwent River Gorge to the TWWHA is strongly recommended. In principle, the gorge represents an appropriate final boundary for this section of the TWWHA, both in terms of field definition and maintaining natural condition (wilderness) and ongoing natural processes. The recommended boundary is the water race/canal parallel to the river. See diagram above.
- The Navarre Plain–Lake King William West sub-unit [FID 58]: The whole of this sub-unit [FID 44] is recommended for adding to the TWWHA. The eastern ‘external’ boundary of the ENGO-proposed reserves is endorsed as an appropriate boundary for the TWWHA.

- Clarence River sub-unit [FID 66]: The area could only be recommended for adding to the TWWHA if the recommended boundary was adopted to include Dyes Marsh and the 'unnamed lagoon north of Clarence Lagoon' (see under Clarence River sub-unit). The recommended boundary would be an appropriate permanent boundary for the TWWHA.
- Wentworth Hills sub-unit [FID 54]: This area is only recommended for inclusion in the TWWHA if land use is consolidated (see under Wentworth Hills sub-unit above). If that approach is adopted, the external (eastern) boundary of the ENGO-proposed reserves [FID 54] would be an appropriate permanent TWWHA boundary but would require design for 'harmonising' with any boundary on the opposite (north) side of the Lyell Highway (See Clarence River sub-unit).



CHAPTER 4

West Coast



## Chapter 4

### West Coast

ENGO-proposed reserves associated with West Coast section of the TWWHA

#### Introduction

In the West Coast ‘province’ of Tasmania there are many features and values of heritage conservation significance, many of which are directly relevant to the Tasmanian Wilderness World Heritage Area. Indeed many such areas should have been included in the TWWHA but for their having been identified as having significant mineral prospects.

Notwithstanding the mineral prospectivity, the important heritage conservation values need to be protected and appropriately managed to the maximum extent possible. Some areas containing high heritage conservation value have been placed in reserves of various forms, most particularly in Regional Reserves that have provision for mineral prospecting and mining.

This section of the report briefly addresses the heritage conservation significance of the various parcels of ‘ENGO HCV’ lands in the West Coast province, which are directly relevant to the existing Tasmanian Wilderness World Heritage Area. The ENGO-proposed reserves have clearly been identified and delineated in the context of the numerous adjoining and adjacent public reserves. The heritage significance and relevance of the ENGO-proposed reserves to the existing World Heritage in many cases only makes sense when seen in the context of the adjoining and adjacent reserves. Accordingly, as well as assessing the significance of each ENGO parcel of land, the relevant associated public reserves have been identified on both map and by name (see below).

Notwithstanding the identified mineral prospectivity in some of these lands, recommendations are made for those areas of outstanding heritage conservation value to be added to the TWWHA. Whether any or all of these lands are available for permanent reservation and thence inclusion in the TWWHA is a matter for government. It is important in the shorter term to at least recognise that these lands have valuable heritage conservation values, including values of World Heritage significance.

Some of the best Australian expressions of ‘refugia’, ‘relict’ and ‘rainforest’ themes were considered by TPLUC (1997a) to be within the TWWHA. They placed the Tasmanian examples among several other Australian rainforest sites of international significance. They note also that the Mt Dundas–Mt Read rainforests, adjacent to the TWWHA, are exemplary. —Balmer et al. 2004

With increasing knowledge of the disposition of high mineral potential, there should be opportunities to upgrade the conservation reservation of at least select areas. For example, the outstanding but vulnerable glacial landscape of the Lake Beatrice Conservation Area and surrounding Tyndall Regional Reserve are of outstanding heritage conservation value and can be readily argued as worthy of adding to the TWWHA.

It should be noted that many of the reserves in the West Coast between the Pieman River in the north and Elliot Bay in the south have previously been identified for their heritage values and as prospective additions to the TWWHA. Some of the recommendations in this section may well repeat previous recommendations. The important thing in the shorter term is to recognise

that, notwithstanding the mineral prospectivity of these areas, they also contain some outstanding heritage values, including some of the most spectacular scenic landscapes of Tasmania (e.g. Tyndall Range, Lake Beatrice, West Coast Range).

### ***Relationship of West Coast province to Tarkine***

The West Coast province dealt with in this section of the heritage verification is directly adjacent to the region referred to by the ENGOs as 'The Tarkine'. This area has been proposed as a national park and is currently being evaluated by the Australian Heritage Council to establish if the area qualifies as a National Heritage Area.

### **Heritage assessment of ENGO-proposed reserves**

Individual ENGO-proposed reserves are briefly assessed for heritage values and an indicative level of significance provided. For at least the smaller ENGO-proposed reserve lands, their heritage conservation value comes from context, being an integral part of a larger aggregate of lands. Most smaller parcels were clearly identified on the basis of their relationship to existing reserves and were usually assessed in that context.

#### ***FID 90***

### **Context for assessment**

Small area on north-east boundary of Mount Heemskirk Regional Reserve. The heritage significance of this parcel can only be assessed in the context of the adjoining much larger reserves of essentially intact natural lands.

### **Assessment**

Mostly forested. Some significant disturbance in western half. Eastern half appears to be intact.

No identified geoconservation values.

Contributes to connectivity between Mount Heemskirk and Meredith Range Regional Reserves.

### **Recommendations**

1. Add to Mount Heemskirk Regional Reserve.
2. Consider Mount Heemskirk Regional Reserve, together with other adjacent reserves such as Meredith Range Regional Reserve, for adding to Tasmanian Wilderness World Heritage Area.

#### ***FID 92***

Small area of steep, forested land along the Murchison Highway south of Renison Bell mine (straddles Murchison Highway).

Includes part of mine site water storage pond and a spur logging road. Possible mapping error —parcel may be intended to be all on eastern side of road

No identified geoconservation or biodiversity attributes located.

Data deficient.

### **Recommendations**

1. Review conservation significance.

**FID 85**

Very small area on south-eastern boundary of Mount Heemskirk Regional Reserve—indeed appears to straddle boundary. Possible mapping error? No identifiable heritage conservation attributes.

**Recommendation**

1. Review original mapping and objective.

**FID 88**

A very mountainous forested area south west of Rosebery.

Forest that is 90 percent intact. Ten percent is a highly degraded landscape of massive benching and debris spill. (Mount Hamilton–Hercules Mine)

FID 88 is adjacent to a small but very important Lake Johnson Nature Reserve.

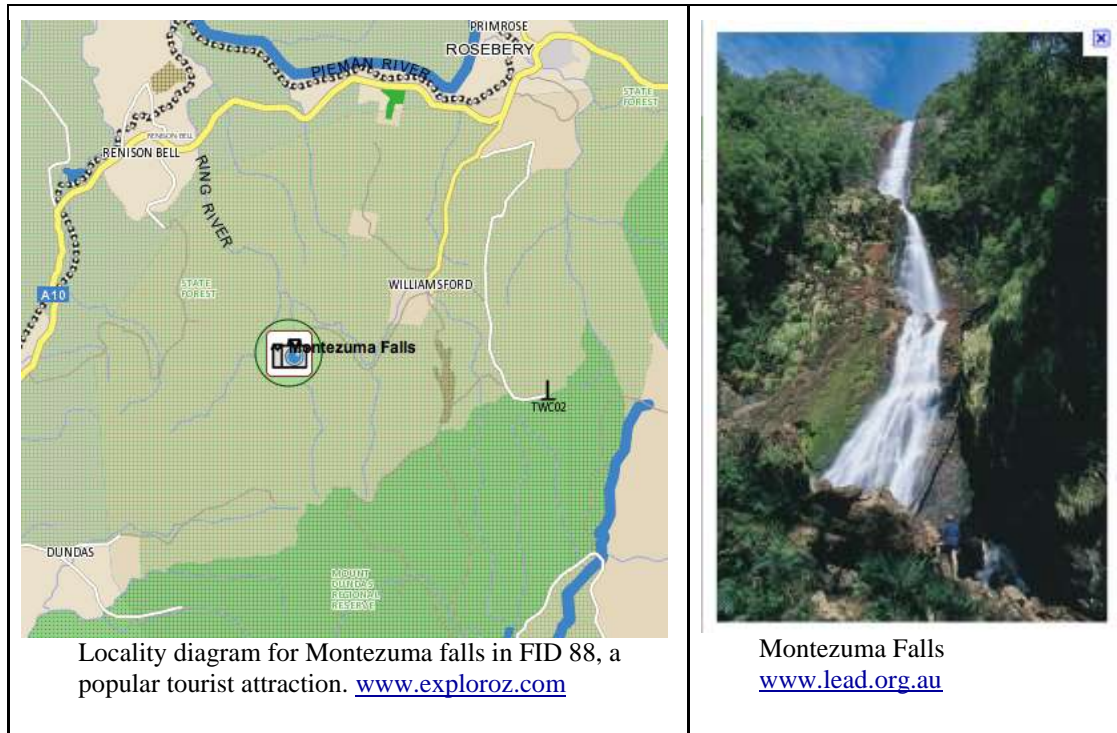
A threatened vegetation community, King Billy Pine *Athrotaxis selaginoides* rainforest, part of a much larger tract of this community in the adjoining Mount Dundas Regional Reserve and the Mount Murchison Regional Reserve, extends into the eastern part of FID 88 although much of this has been damaged by past mining.

A significant feature of FID 88 is Montezuma Falls, one of the more impressive waterfalls in western Tasmania.

One of the region's top attractions is Montezuma Falls—at 104 metres, one of Tasmania's highest waterfalls.

The three-hour round trip walk to Montezuma Falls begins just ten minutes south of Rosebery and is regarded as one of the easiest and most rewarding walks on the West Coast, taking tourists through open and park-like rainforest, along the route of the historic North East Dundas Tramway, right to the base of the falls.

Along the way, tourists can enjoy beautiful flora including leatherwood, myrtle, sassafras, giant tree ferns and eye-catching fungi, and may also catch sight of native wildlife, including several species of birds. — [www.lead.org.au](http://www.lead.org.au)



## Heritage assessment

Data and time limitations prevented this parcel of land from being comprehensively investigated. However, some observations can be made about the potential heritage conservation significance.

The greater part of FID 88 is forested, primarily with *Nothofagus cunninghamii* rainforest with ridge top communities of *Acacia melanoxylon* and *Leptospermum* sp.

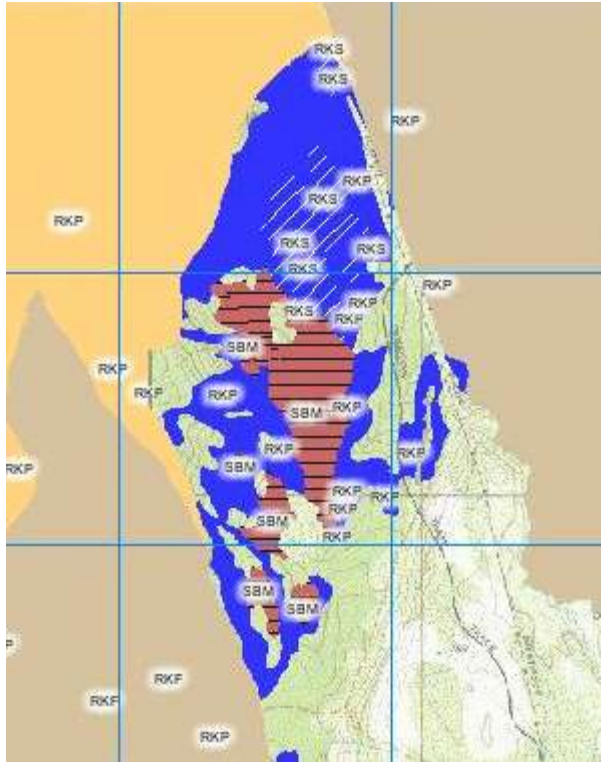
Some cultural heritage values appear to be within the site in the form of the remains of the historic Dundas Railway built in the 1890s. This deserves closer investigation. Preliminary investigation suggested this to be of some particular significance in the history of mining in the region. A 2 ft. gauge railway in such difficult terrain and constructed in the 1890s may be of national heritage significance.

The area contains a significant occurrence of King Billy Pine forest community of high heritage conservation value, a forest type officially classified within Tasmania as a threatened plant community.

## Summary of attributes

Preliminary investigation indicates the presence of both cultural and natural heritage values of likely national significance. The remains of the Dundas Railway are worthy of further investigation and assessment. The King Billy Pine forest community in the east of the block is of conservation significance, the community being recognised within Tasmania as 'threatened'.

Directly adjoining the Mount Dundas Regional Reserve, a case clearly exists for adding FID 88 to that regional reserve.



Almost the whole of FID 89 is threatened plant communities. As well, it occupies a strategic location for securing connectivity between threatened communities of King Billy pine in the two adjoining reserves—Mount Dundas and Mount Murchison Regional Reserves.

## Recommendations

1. Protect FID 88 and add to Lake Johnson Nature Reserve.
2. Further investigate FID 88 (less mined area) and adjacent lands, including Lake Johnson Nature Reserve, to establish the case and feasibility for adding these lands to the Tasmanian Wilderness World Heritage Area.

## FID 89

### Introduction

FID 89 is located between and adjoins Mount Dundas and Mount Murchison Regional Reserves, both reserves are of very high heritage conservation value.

### Heritage assessment

Almost the whole of FID 89 is threatened plant communities (King Billy Pine *Athrotaxis selaginoides* and *Banksia marginata* wet scrub) and so is of high heritage conservation value. These values are therefore readily verified.

FID 89 is strategically located between two regional reserves and a nature reserve, each of very high conservation value. As such it potentially provides a critical link for securing ecological connectivity between those three reserves, two of which have significant stands of King Billy Pine *Athrotaxis selaginoides* and the third globally important Huon pine. FID 89 is of definite

natural heritage conservation value and if added to the TWWHA, would contribute significantly to the integrity of the TWWHA.

## Findings

FID 89 is of definite high heritage conservation value. It is an integral part of a tract of land with high heritage values and which is worthy of permanent protection and addition to the TWWHA.

## Recommendations

1. Permanently protect FID 89, as a minimum, adding it to one of the two adjoining Regional Reserves.
2. Investigate in more detail FID 89 and adjacent lands, including Lake Johnson Nature Reserve and FID 88 (exclusive of area grossly disturbed by mining) to establish the case and feasibility for adding these lands to the Tasmanian Wilderness World Heritage Area.

## Tyndall Range assessment area

FID 80

### Introduction

FID 80 occupies a well-defined major terrace in the landscape, bordered in the west by the deep 'V' shaped gorge of the Henty River and in the east by the steep glaciated western face of the Mount Geikie section of the West Coast Range. To the east FID 80 adjoins Tyndall Regional Reserve and to the west the Mount Dundas Regional Reserve.

### Heritage assessment

FID 80 has multiple geoconservation values listed on the Tasmanian Geoconservation Database:

- Central Plateau Terrain (global significance)
- Central Highlands Cainozoic Glacial Area (national significance)
- Tyndall Range Glacial Features (national significance)
- Hamilton Moraine (lower extension).



FID 80 (centre) is strategically located between two major Regional Reserves of High Conservation Value and so is critical to providing ecological connectivity between the two reserves. The dark brown area is Lake Beatrice Conservation

Area. Diagram from LISTMap.

FID 80 contains a major stand of the threatened plant community, King Billy Pine *Athrotaxis selaginoides* and as such is of definite natural heritage conservation value. The stand occupies a lower elevation topographic position complementary to the more extensive higher mountain habitat in the region.

FID 80 is a part of the Tyndall Range, which is highly regarded as one of the most spectacularly glaciated mountain ranges in Tasmania. The range is listed as a geoconservation site of continental significance (i.e. nationally significant).

## Finding

FID 80 was found to contain natural heritage conservation value of definite national significance.

Also FID 80 is strategically located between two major regional reserves, each of very high heritage conservation value and therefore critically important for maintaining ecological connectivity between the two major reserves of very high heritage significance. The addition FID 80 and the two adjoining reserves to the adjoining TWWHA would contribute very significantly to the integrity of the adjacent TWWHA.

## Recommendation

1. Formally protect the whole of FID 80. It is strongly recommended that it be given nothing less than nature reserve status.
2. Consider adding FID 80 and adjoining and adjacent regional reserves and conservation areas (e.g. Lake Beatrice) to the Tasmanian Wilderness World Heritage Area.

## Dundas associated assessment area

FID 59, 61, 62, 64, 67, 69, 79, 81

## Introduction

This assessment area embraces a suite of ENGO-proposed reserves in the one district and directly associated with Mount Dundas Regional Reserve. This reserve of 38,820 ha. is an area of apparent high heritage conservation value and is a potential addition to the Tasmanian Wilderness World Heritage Area. The conservation value of the Mount Dundas Regional Reserve provides an important context for assessing the heritage values and significance of the various ENGO-proposed parcels along its boundary.





Locality diagram showing various reserves, the larger (highlighted edge) is Mount Dundas Regional Reserve

## Context for heritage assessment

Some of the best Australian expressions of 'refugia', 'relict' and 'rainforest' themes were considered by TPLUC (1997a) to be within the TWWHA. They placed the Tasmanian examples among several other Australian rainforest sites of international significance. They note also that the Mt Dundas–Mt Read rainforests, adjacent to the TWWHA, are exemplary. —Balmer et al. 2004

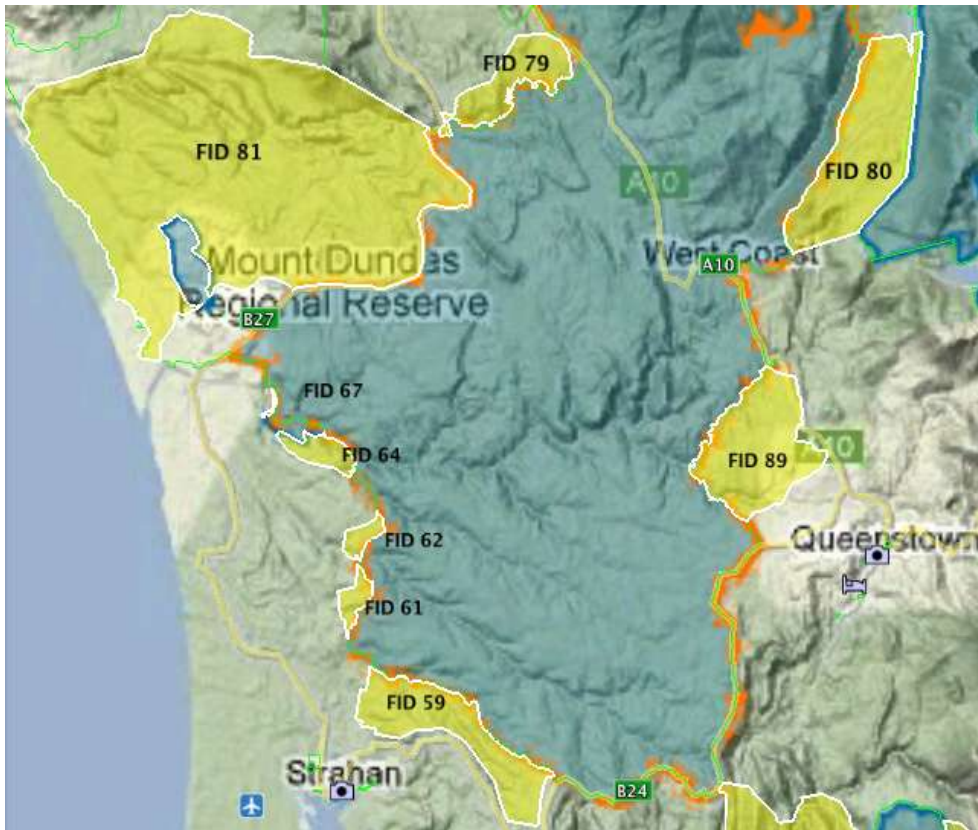
### ***Mount Dundas Regional Reserve***

This large reserve of rugged hills of mostly rainforest, wet scrub and some moorland remains in an essentially intact condition. Unlike many other parts of the West Coast region, the only form of development activity identified is one minor four-wheel drive track in the north.

The Mount Lyell Highway forms its southern boundary. The reserve provides an important part of the natural landscape for travelers along this section of highway.

Mount Dundas Regional Reserve has been recognised for its conservation significance, particularly for its rainforests namely:

Some of the best Australian expressions of 'refugia', 'relict' and 'rainforest' themes were considered by TPLUC (1997a) to be within the TWWHA. They placed the Tasmanian examples among several other Australian rainforest sites of international significance. **They note also that the Mt Dundas–Mt Read rainforests, adjacent to the TWWHA, are exemplary.**



Various ENGO HCV lands (yellow) adjoining Mount Dundas Regional Reserve.

Key Gondwanan genera are *Nothofagus* and the coniferous genera *Athrotaxis*, *Phyllocladus*, *Lagarostrobos*, *Microstrobos* and *Microcachrys*. To satisfy the conditions of integrity, the region must have a boundary that encompasses the taxonomic range of the species, provide habitat of sufficient area to enable natural evolutionary and ecological processes to continue and provide the best examples of that species or process (Table 3.1). The assessment of whether the boundary is sufficient to satisfy conditions of integrity is to some extent subjective. Only 10,970 ha of *Nothofagus gunnii* remain extant in Tasmania, of which nearly 70 percent is within the TWWHA, satisfying the condition of integrity (Robertson & Duncan 1991). **The largest stands, and arguably therefore the most superlative examples, of the species are currently outside the TWWHA boundary on Mt Murchison, Mt Dundas and the Tyndall Range.** However, these stands are not in secure reserves and are subject to mineral exploration. —Balmer et al. 2004

Awareness of the conservation significance of the Mount Dundas Regional Reserve is an important part of the context for assessing the heritage value of the suite of ENGO-proposed reserves along the boundary of the reserve.

### **FID 81**

Of the series of ENGO-proposed reserves along the boundary of the Mount Dundas Regional Reserve, one in particular, FID 81, deserves separate consideration. All others are dealt with as a group.

FID 81, the larger of the ENGO-proposed reserves adjoining the reserve is wholly naturally vegetated, being a mix of *Nothofagus* rainforest, *Eucalyptus nitida* wet forest and some patches of moorland. It contains only one small patch of threatened plant community, about 20 ha. of King Billy pine in the north.

Badger River Forest Reserve of 370 ha. has FID 81 on three sides.

Most of FID 81 is already in informal reserve on state forest, perhaps accounting for the intact native vegetation throughout most of the area (probably some burning of the blanket bog/moorland on the southern edge adjacent to the Zeehan Strahan Road).

It has considerable geoconservation values, including some fragile landforms.

Identified Geoconservation values include:

- Little Henty Raised Last Interglacial beaches
- Henty Dunes (regional)
- Macquarie Harbour Graben (national significance)
- Deeply Entrenched River Gorges on the Henty Surface (sub-regional)
- Zeehan Region Strike Ridges and Valleys (regional)
- Professor Plateau Erosion Surface Remnant (sub-region)
- Western Tasmania Blanket Bogs (global significance).

The main heritage significance comes from the existence of an intact transect from the strike ridges of the inland through to intact sandy estuary and beaches, including ‘fossil’ beaches from the last interglacial. The combination of these geoconservation attributes, the intact vegetation and the natural buffering of the coastal sand dunes from encroachment by vehicles, greatly complements that of the adjoining Mount Dundas Regional Reserve. If added to that reserve, FID 81 would contribute greatly to the ecological and geoconservation integrity of that reserve and further enhance the significance of the Mount Dundas Regional Reserve as a potential addition to the Tasmanian Wilderness World Heritage Area.

Only one Aboriginal site has been recorded within FID 81 (TAS12578).

## Finding

FID 81 is of definite high heritage conservation value and if considered in the context of it adjoining the Mount Dundas Regional Reserve, would be of at least national significance.

Mount Dundas Regional Reserve, together with FID 81 and Badger River Forest Reserve, would, if added to the adjacent Tasmanian Wilderness World Heritage Area, contribute significantly to the integrity of the TWWHA.

Protecting the natural vegetation of the area would help to maintain the natural landscape associated with the Strahan–Zeehan Road and so contribute to presentation of the natural landscape or, if added to the TWWHA, contribute to the presentation of the TWWHA.

## Recommendation

1. Formally protect ENGO reserve FID 81 either by:
  - adding to Mount Dundas Regional Reserve or
  - reserving as nature reserve.

## Other ENGO-proposed parcels adjoining Mount Dundas Regional Reserve

FID 64, 67

Both parcels are fully forested, mainly rainforest.

No specific conservation attributes were discovered in the literature. Their main value would appear to be as boundary improvements to the Mount Dundas Regional Reserve.



Henty Forest Reserve (hatched) adjoins Mount Dundas Regional Reserve. FID 67 and 64 adjoin to the north and south-east.

Significant opportunity exists to improve the integrity of the boundary by including the Henty Forest Reserve between FID 64 and FID 67. Together the three areas contribute to protecting the Henty River corridor, helping to protect the wilderness and wild river values of the river.

### **FID 59, 61, 62**

All three areas are already reserved as informal reserves managed by Forestry Tasmania.

Mostly forested with forest communities ranging from *Nothofagus* temperate rainforest in valleys and lower slopes to *Acacia melanoxylon* on some ridges and *Eucalyptus nitida* wet forest and woodland on the western (fire) side of the rainforest.

No threatened plant communities recorded. No geoconservation values recorded

The Mount Dundas Regional Reserve, together with these three parcels of ENGO-proposed reserves is of high heritage conservation value and would rate at least national significance. In addition these three parcels make an important contribution to the boundary of the adjoining Mount Dundas Regional Reserve.

FID 59, a larger parcel, is particularly important for consolidating the boundary of Mount Dundas Regional Reserve as it more closely aligns the boundary with the Lyell Highway and so extends the visual protection along that road.

## **Conclusion**

Mount Dundas Regional Reserve is an area of outstanding conservation value of such significance to be worthy of inclusion in the Tasmanian Wilderness World Heritage Area. The

various ENGO-proposed reserves adjoining Mount Dundas Regional Reserve all contribute to the value and integrity of the reserve as a potential formal conservation reserve.

The following combination is of global heritage significance worthy of adding to the adjoining World Heritage Area:

- Mount Dundas Regional Reserve
- Nine ENGO-proposed reserves, including FID 81
- Tyndall Regional Reserve and Lake Beatrice Conservation Area.

## Recommendations

1. Recognise the outstanding heritage conservation value of Mount Dundas Regional Reserve (national significance).
2. Recognise the important contribution that FIDs 59, 61, 62, 64, 67, 69, 79 and 81 make to the heritage value and significance of the adjoining Mount Dundas Regional Reserve.
3. Consider adding FIDs 59, 61, 62, 64, 67, 69, 79, 81 into Mount Dundas Regional Reserve.
4. Consider adding Mount Dundas Regional Reserve and associated other reserves to the Tasmanian Wilderness World Heritage Area.

### **FID 52**

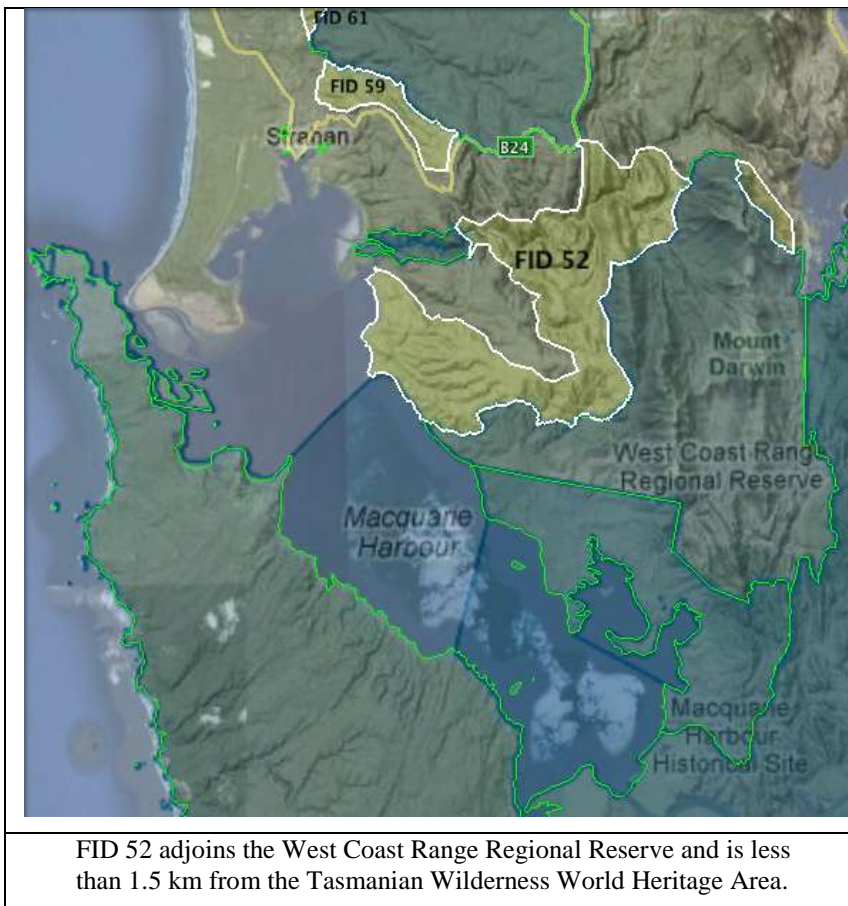
(including West Coast Wilderness Railway)

## Introduction

FID 52 is adjacent to but not immediately adjoining the Tasmanian Wilderness World Heritage Area being separated by just 1 km by the West Coast Range Regional Reserve. FID 52 is also immediately adjacent to the Mount Dundas Regional Reserve, separated only by the Lyell Highway.

## Context for assessment

FID 52 is made up of steep mountain landscape on the western fall of the West Coast Range. It is in the King River catchment, which drains west into Macquarie Harbour. Most of FID 52 is fully vegetated although it is understood that parts have been subjected to selective logging of Huon pine in historic times.



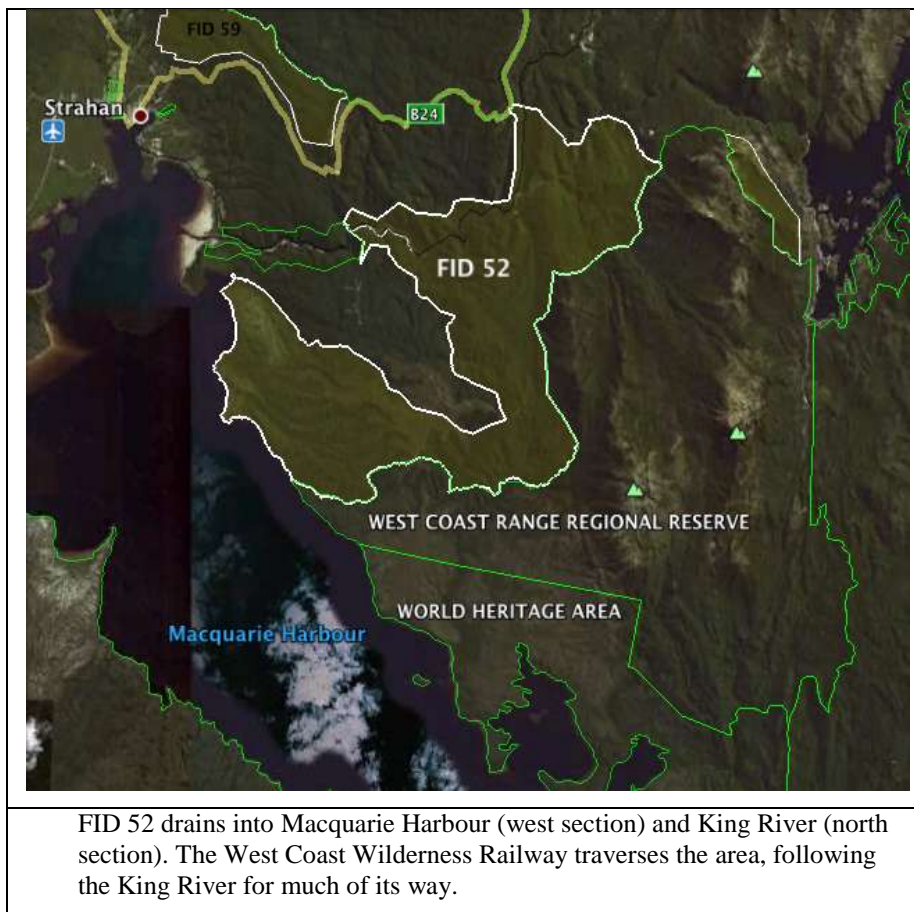
FID 52 is traversed by the historic West Coast Wilderness Railway that connects Queenstown to Strahan and is a popular tourist attraction.

Apart from the railway, it contains only a few four-wheel drive tracks that access the moorland in the south-west.

More than half of the area is forested, mostly with *Nothofagus* forest and King Billy pine but also some areas of *Eucalyptus nitida* towards Macquarie Harbor.

Much of the higher slopes and dissected plateau in the western arm of the area is moorland.

## Assessment



**Geoconservation:** Several geological features extending into the area are listed on the Tasmanian Geoconservation Database (TGD) including:

- The Macquarie Harbour Graben of Geographical Significance. Significance is ‘Continent’, ‘*Statement of Significance:* Possibly the clearest example of a late-stage trailing margin rift structure in Australia. Contains neotectonically significant features (including terraces and evidence for reactivation of Devonian structures) listed as separate sites.’ (TGD) Assessed: national significance.
- West Coast Range, geographical significance continental (national)
- Macquarie Graben Fluvial Geomorphic Systems, geographical significance, global significance.

### **Threatened plant communities**

FID 52 contains a group of stands of King Billy pine, *Athrotaxis selaginoides*, a listed threatened plant community. See below.

The cluster of forest stands of King Billy pine is very significant given the relative natural protection afforded by the mostly surrounding rainforest.

### **Cultural heritage**

The West Coast Wilderness Railway connects Queenstown to Strahan and is a popular tourist attraction. It is undoubtedly also of important historical value and hence of cultural heritage significance.

Protection of FID 52 would greatly complement the railway and help to protect the scenic landscape through which the railway passes. If FID 52, together with the West Coast Range Regional Reserve is added to the Tasmanian Wilderness World Heritage Area, the West Coast Wilderness Railway would represent a good opportunity for enhancing the presentation of the World Heritage Area. In 2005 the railway was awarded the National Engineering Heritage Award for the achievement in successful reconstruction in this difficult terrain. (*The Newsletter of National Engineering Heritage Australia*, July 2006).

## Finding

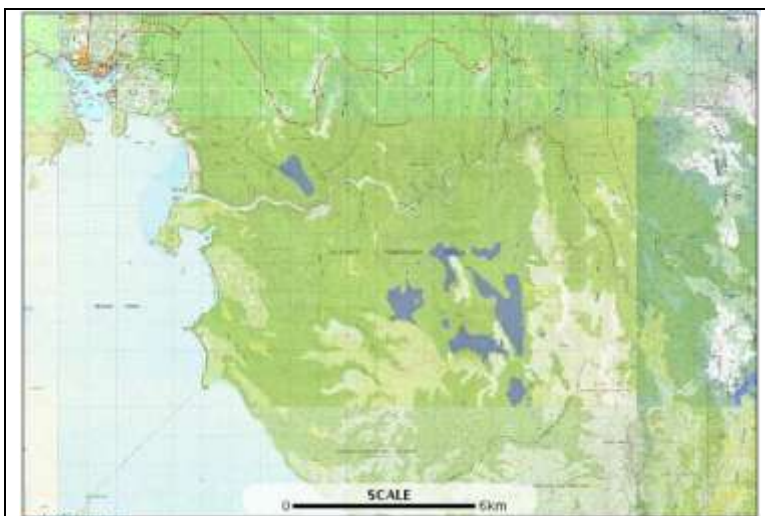
FID 52 has significant natural and cultural heritage values, including stands of King Billy pine *Athrotaxis selaginoides* and a number of significant geoconservation values. Considered as an integral part of the landscape in the West Coast Range Regional Reserve, the combination is of at least national heritage significance and, if added to the adjoining TWWHA, would make an important contribution to the integrity of the TWWHA. FID 52 is of high heritage conservation significance.

## Boundary considerations

Adding FID 52 to the adjoining West Coast Range Regional Reserve would improve the boundary of that reserve. However, if the reserve is available for adding to the Tasmanian Wilderness World Heritage Area, consideration should be given to extending the protection northwards to the Lyell Highway and hence establishing full connectivity with the Mount Dundas Regional Reserve (see recommendations re Mount Dundas Regional Reserve elsewhere in the report).

## Recommendations

1. Consider FID 52 for permanent protection from mining and other development. Reserve as national park or similar.
2. Add the West Coast Range Regional Reserve, together with FID 52, to the Tasmanian Wilderness World Heritage Area.
3. Acknowledge that the West Coast Wilderness Railway is an historically significant piece of cultural heritage and a further opportunity to link quality tourism with the TWWHA and so incorporate it into the permanent reserve (see 1.) and TWWHA (see 2.).



Mapped King Billy Pine *Athrotaxis selaginoides*, a threatened plant community. (Source: LIST)



## Mount Jukes assessment area

FID 50

FID 50 is a small parcel of land on the north-eastern boundary of the West Coast Range Regional Reserve. It is a very steep and rocky area extending down the face of Mount Jukes, from the summit, almost down to Lake Burbury. FID 50 includes the whole of the glacial feature 'Main Jukes Cirque', together with the major lateral moraines.

### **Geoconservation**

FID 50 is part of a mountain massif (Mount Jukes) that is rich in geoconservation values including:

- Proprietary Peak Types Area, geographical significance, regional
- Transect through Mt Read Volcanic, Mt Jukes Road, geographical significance at regional level:
 

*Statement of Significance:* A representative transect through the hydrothermal alteration zone in the Central Volcanic Complex, including faulted boundary with the Eastern Sequence.
- West Coast Range, geographical significance, continental (national significance).

### **Biological**

Much of the lower slopes in FID 50 are wet woodlands of *Eucalyptus nitida* and moorland. The cirque contains a significant area of Huon pine *Lagarostrobos franklinii* rainforest and scrub. Further upslope the vegetation is mapped as 'Highland low rainforest and scrub' and 'western alpine sedgeland/herbland'.

FID 50 includes a significant area of Huon pine *Lagarostrobos franklinii* 'rainforest and scrub' high up in the Jukes Cirque.

### **Finding**

FID 50 is of definite high heritage conservation significance and is an integral part of a landform and landscape that can readily qualify as a potential addition to the TWWHA.

Further, FID 50 is an integral part of the West Coast Range massif and as such must be assessed accordingly.

Together with the West Coast Range Regional Reserve, FID 50 would make a very significant contribution to the integrity of the adjoining Tasmanian Wilderness World Heritage Area.

### **Recommendations**

1. Add FID 50 to the West Coast Range Regional Reserve.
2. Add the West Coast Range Regional Reserve to the immediately adjoining TWWHA.

## Other reserves in the West Coast province

A number of reserves of conservation significance have been referred to in the text above. Some other reserves in the West Coast are collectively or individually considered to be of heritage conservation importance. For completeness, a full list of names of the reserves with identified or anticipated conservation values, and therefore worthy of consideration as additions to the Tasmanian Wilderness World Heritage Area, is provided below.

**Regional reserves**

1. West Coast Range
1. Mount Dundas
2. Tyndall
3. Mount Murchison
4. Mount Heemskirk

**Conservation areas**

5. Lake Beatrice
6. Granite Tor
7. Princess River
8. Crotty
9. South West

**Nature reserve**

10. Lake Johnson

**Forest reserve**

11. Badger River
12. Teepookana
13. Henty

CHAPTER 5

Tarkine



## Chapter 5

### Tarkine

#### Introduction

The Tarkine assessment area comprises an aggregate of ENGO-proposed reserves that collectively are based upon a long-standing concept for a national park—a proposed Tarkine National Park. The area has also been the subject of listing by the Australian Heritage Commission and is presently the subject of an assessment for National Heritage value by the Australian Heritage Council.

The national park proposal by the ENGOs has been developed around the existence of mapped wilderness that represents the core of the concept.

Under the circumstances it was logical to conduct an assessment of the aggregate area rather than attempt to assess the significance of individual ENGO-proposed parcels.

#### Context for heritage assessment

The Tarkine has been the subject of considerable attention and previous studies, evaluations and assessments including:

- National Wilderness Inventory (NWI)
- National Estate evaluation by the former Australian Heritage Commission
- Proposal as a national park by ENGOs
- National Heritage evaluation by the Australian Heritage Council (current).



Tarkine National Park (shaded) and area (blue edge) being assessed for National Heritage by the Australian Heritage Council. The 'hole' in the middle is the existing Savage River mine.

A number of surveys, studies and researches relevant to the area are quoted in the literature. The Tarkine has also been the subject of a number of publications, books and websites and extensively promoted by ENGOs over several decades. As well as being promoted for national park status, the area has received regular promotion for its claimed World Heritage significance.

The conservation attributes of the Tarkine have been promoted and debated in the media for several decades and there is a significant amount of publicly available information on the natural and cultural attributes of the area.

The area currently being assessed by the Australian Heritage Council (AHC) substantially coincides with the boundaries of the proposed Tarkine National Park. However, there are some puzzling differences such as in the area west of the Donaldson River Nature Recreation Area that has been omitted from the AHC assessment.

The Tarkine national park proposal stops just short of a physical link to the existing TWWHA but the area currently under assessment by the National Heritage Council has a token physical link to the north-western section (Cradle Mountain) of the Tasmanian Wilderness World Heritage Area. Irrespective of this physical link, the area could be assessed for World Heritage either as a potential stand-alone prospective World Heritage nomination or as an elaboration of the TWWHA. Physical connectivity is not a prerequisite for considering such an area as an extension of the TWWHA.

The 'Tarkine' aggregate of ENGO-proposed reserve lands is clearly intimately related to the Tarkine protected area concept and has been assessed in that context. It was considered inappropriate to take a reductionist approach and separately assess individual parcels except in the context of the larger core, given that:

- the concept of a single Tarkine national park/World Heritage Area is well known and for some years has been dealt with by Government as a single entity (see National Estate, National Heritage process)
- the Tarkine National Park concept has developed around wilderness core areas
- a significant proportion of the Tarkine is already recognised for its heritage conservation significance by designation as formal protected areas.

This assessment focused on **the single aggregate area** rather than each individual parcel. The heritage significance of individual parcels can be interpreted according to the contribution that they make to the integrity of the larger Tarkine heritage assessment unit.

Where appropriate and necessary, some specific attention has been directed towards particular parcels of the ENGO-proposed reserves.

### ***World Heritage assessment***

**CAVEAT:** Given the strict time constraints imposed by the IGA process, research of background data on the Tarkine region was similarly constrained; accordingly, the assessment and verification process documented below must carry the caveat of being regarded only as an **indicative assessment**. However, any additional data on natural and cultural heritage attributes forthcoming in future is only likely to increase the assessed heritage significance rather than detract from the values on which preliminary assessment was based.

### **Context for cultural heritage assessment and verification**

Firstly, although the author has extensive experience in World Heritage matters, including in analysis of cultural heritage material, he is not formally qualified in matters archaeological and anthropological and so defers to relevant specialists for any more comprehensive analysis

and assessment. The author had access to maps showing the location of all official recordings of Aboriginal sites in the region.

Secondly, the assessment is a holistic assessment at the landscape level and does not depend on separate analysis of specifics of each and every land parcel or locality. The assessment area is therefore the whole of the Tarkine region, incorporating all known (and doubtlessly the many unknown) field evidence of Aboriginal interaction with the environment.

Thirdly, while individual known cultural sites may be protected from development, the cultural heritage values are considered to embrace the wider environment, the landscape, with which the people interacted, especially through fire and hunting activities.

### **World Heritage Criterion (iii)**

... to bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared;

The former Australian Heritage Commission assessed the Tarkine as ‘one of the world’s great archaeological regions’ (1990, cited in Richards and Sutherland-Richards 1992).

Given the obvious Aboriginal cultural links between the landscapes of the Tasmanian Wilderness World Heritage Area and the Tarkine, a good starting point for a preliminary assessment is to compare the two. For example, the following quote is intended to summarise the Aboriginal cultural significance of the TWWHA in respect of Criterion (iii).

#### **Criterion (iii) Unique cultural tradition**

The Tasmanian Wilderness bears a unique and exceptional testimony to an ancient, ice age society, represented by:

Pleistocene archaeological sites that are unique, of great antiquity and exceptional in nature, demonstrating the sequence of human occupation at high southern latitudes during the last ice age. (inscribed values statement for Tasmanian Wilderness World Heritage Area under Criterion [iii])

The Tarkine area undoubtedly contains archaeological sites that date back to the Pleistocene. However, compared with the TWWHA it appears to lack the series of cave sites, some with artistic decoration that clearly correlate with Aboriginal occupation during the Pleistocene, including sites that subsequently became uninhabitable due to encroachment of forest into grasslands post Pleistocene.

We can confidently assume that in the Tarkine during the Pleistocene there would have been a concentration of Aboriginal occupation on the coastline, just as was the case post-Pleistocene and right up to the time of European settlement. However, given that the Pleistocene coastline has been submerged, much of the shoreline surface evidence from the Pleistocene will have been lost to rising sea level. At least the majority of the abundant midden and occupation sites such as the ‘doughnut middens’/house circles are likely post Pleistocene (Holocene).

Preliminary comparison between the TWWHA and the Tarkine Aboriginal landscapes indicates that whereas the coastline of the World Heritage Area is predominantly a rocky coastline, that of the Tarkine is predominantly a sandy beach coast, offering rather different food resources and living conditions to further south in the TWWHA. At the landscape level, the environments of the two regions differ significantly and so would have had different but complementary living conditions.

Preliminary assessment suggests that the Tarkine has the potential to independently qualify against Criterion (iii) but I defer to specialist cultural analysis for final arbitration on that point. Notwithstanding, there is no doubt that the cultural heritage values as they relate to Criterion (iii) **would contribute greatly to the integrity of the Tasmanian Wilderness World Heritage Area.** That is, if the Tarkine were added to the TWWHA, it would

significantly contribute to the integrity of the TWWHA by further enhancing the qualification of that area against Criterion (iii).

### **Criterion (v)**

... to be an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change; World Heritage criterion (v)

As for criterion (iii), it is useful to compare the Tarkine with the existing Tasmanian Wilderness World Heritage Area namely:

#### **Criterion (v) Outstanding example of traditional settlement for TWWHA**

The Tasmanian Wilderness provides outstanding examples of a significant, traditional human settlement that has become vulnerable under the impact of irreversible socio-cultural or economic change. The World Heritage values include:

... archaeological sites which provide important examples of the hunting and gathering way of life, showing how people practised this way of life over long time periods, during often extreme climatic conditions and in contexts where it came under the impact of irreversible socio-cultural and economic change. (inscribed values for Tasmanian Wilderness World Heritage Area at 2011).

The archaeological and anthropological descriptions and analyses of the Tarkine Aboriginal cultural heritage surely represent an echo of that statement of values, albeit in somewhat different landscapes. The huge number of coastal middens alone is more than comparable to those documented in the TWWHA, albeit in significantly different environments, particularly the coastal environment.

### **Assessment findings**

Preliminary analysis and comparison with the TWWHA leads to the conclusion that the Tarkine is comparable and so would probably equally meet Criterion (v) of the World Heritage Operational Guidelines. That is, it is likely that subject to more comprehensive analysis, the Tarkine would qualify against World Heritage Criterion (v).

At the very least, if the Tarkine was nominated as an addition to the existing TWWHA, it could be readily demonstrated to greatly contribute to the integrity of the TWWHA, especially in respect to values relevant to Criterion (v). The integrity of the TWWHA would be enhanced by a substantial resource of archaeological sites associated with a sandy coast, thereby complementing the TWWHA where sandy beach environments are more the exception than the rule.

### **World Heritage Criterion (vi)**

... to be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance. (The Committee considers that this criterion should preferably be used in conjunction with other criteria); (World Heritage Criterion [vi] )

As for criteria (iii) and (v), a useful starting point in assessing the Tarkine against the World Heritage criteria is to directly compare it with the adjacent Tasmanian Wilderness World Heritage Area:

#### **Criterion (vi) Directly associated with events or living traditions for TWWHA**

The Tasmanian Wilderness is directly associated with events of outstanding universal significance linked to the adaptation and survival of human societies to glacial climatic cycles. The World Heritage values include:

... archaeological sites including Pleistocene sites, which demonstrate the adaptation and survival of human societies to glacial climatic cycles and periods of long isolation from other communities (e.g. the human societies in this region were the most southerly known peoples on earth during the last ice age) (inscribed values for Tasmanian Wilderness World Heritage Area at 2011).

### **Assessment findings**

Arguably the Tarkine region can readily meet the description of the inscribed values applied to the TWWHA in respect of Criterion (vi). It may lack some of the highly significant inland Pleistocene cave sites but whereas some of the inland cave sites were abandoned after the Pleistocene, the Tarkine can, through historical documentation, demonstrate continuous Aboriginal occupation post-Pleistocene right up to early European settlement.

Preliminary assessment indicates that based on documented attributes and values, the Tarkine region may meet World Heritage Criterion (vi).

At the very least, if the Tarkine were to be proposed as an addition to the Tasmanian Wilderness World Heritage Area, it could be readily demonstrated that it would make a substantial contribution to the integrity of the already cited World Heritage Criterion (vi).

### **Summary of cultural heritage assessment**

This assessment should be regarded as **preliminary only** as it was not practicable to access all documentation within the time constraints. Notwithstanding, any additional data is only likely to increase the certainty of the area qualifying against Criteria (iii), (v) and (vi).

Based on the documented attributes and values of the Aboriginal cultural heritage in the Tarkine it is apparent that the Tarkine can readily meet World Heritage Criterion (v) and very likely (iii) and (vii).

An important contributor to the value of the cultural heritage is the context of a largely undisturbed if not wilderness landscape, an Indigenous cultural landscape.

Furthermore, subject to appropriate strict protection at the landscape level, much of the Tarkine can comply with the Conditions of Integrity, both general and specific to Criteria (iii), (v) and (vi).

### **Natural Heritage Criteria**

#### **World Heritage Criterion (vii)**

... contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance;

#### **Heritage assessment**

Assessment of the natural heritage values of the Tarkine needs to be considered both as a stand-alone assessment area and in the context of the adjacent Tasmanian Wilderness World Heritage Area.

#### **Comparison with TWWHA**

A useful starting point is to directly compare with the documented inscribed values ascribed to Criterion (vii) for the TWWHA:



Criterion (VII) Contains superlative natural phenomena
<p>The landscape of the Tasmanian Wilderness has exceptional natural beauty and aesthetic importance and contains superlative natural phenomena including:</p> <ul style="list-style-type: none"> <li>• viewfields and sites of exceptional natural beauty associated with:</li> <li>• flowering heaths of the coastline;</li> <li>• the south and south-west coasts comprising steep headlands interspersed with sweeping beaches, rocky coves and secluded inlets;</li> <li>• eucalypt tall open forests including <i>Eucalyptus regnans</i>, the tallest flowering plant species in the world;</li> <li>• rainforests framing undisturbed rivers;</li> <li>• buttongrass, heath and moorland extending over vast plains;</li> <li>• wind-pruned alpine vegetation;</li> <li>• sheer quartzite or dolerite capped mountains (including Cradle Mountain, Frenchmans Cap, Federation Peak and Precipitous Bluff);</li> <li>• deep, glacial lakes, tarns, cirques and pools throughout the ranges;</li> <li>• the relatively undisturbed nature of the property;</li> <li>• the scale of the undisturbed landscapes;</li> <li>• the juxtaposition of different landscapes;</li> <li>• the presence of unusual natural formations (e.g. particular types of karst features) and superlative examples of glacial landforms and other types of geomorphic features;</li> <li>• rare or unusual flora and fauna.</li> </ul>

In approaching the assessment of World Heritage values of the Tarkine, it is instructive to firstly conduct a brief comparison with the recognised World Heritage values of the Tasmanian Wilderness World Heritage Area. An attribute, by attribute comparison is presented below.

- (flowering heaths of the coastline;) A prominent feature of the Tarkine is the much more extensive flowering coastal heaths; indeed the coastal heaths of the Tarkine may be almost as extensive as in the TWWHA. It is reasonable to argue that the expansive treeless coastal plains, largely devoid of evidence of industrial man, gently rising to distant rainforested hills represents an aesthetically appealing landscape and landscape of ‘exceptional natural beauty’.

### Assessment

The ‘flowering heaths of the coastline’ undoubtedly contribute an important dimension to the overall exceptional natural beauty of the Tarkine, contrasting with the adjacent very extensive deep shaded and mossy temperate rainforests. This feature contributes to the Tarkine, meeting Criterion (vii):

- (the south and south-west coasts comprising steep headlands interspersed with sweeping beaches, rocky coves and secluded inlets;) The Tarkine coastline is very different to the ‘rocky coves and secluded inlets’ of the TWWHA; by contrast it is dominated by ‘sweeping beaches’ far longer and more connected than any in the TWWHA. The impression is more of a wild deserted desert coast with few if any trees visible, often dominated by the wildness of massive oceanic swells that expend their energy as massive wave breaks on shallow gradient deserted sandy beaches.

### Assessment

Large open areas of natural beachfronts are now uncommon in temperate Australia although still relatively common in tropical Australia. The beaches on the Tarkine coastline contribute to the experience of encountering open expanses of wild beauty. The ‘sweeping beaches’ make an important contribution to the Tarkine meeting Criterion (vii):

- eucalypt tall open forests including *Eucalyptus regnans*, the tallest flowering plant species in the world;) compared with the TWWHA, tall eucalypts are less a feature but are never the less a significant part of the Tarkine vegetation and landscape. The tallest growing species, *E. regnans* is not a feature, the best-developed tall eucalypt stands being dominated by *E. obliqua*, the first eucalypt to be officially described. As with the TWWHA, the tall eucalypts in the Tarkine are often intimately mixed with the temperate rainforest, a constant reminder of the dynamic interplay between these two great ecosystems and the critical role that fire plays in those dynamics.

### Assessment

- Rainforests framing undisturbed rivers—compared with the TWWHA, the Tarkine can equally claim ‘rainforests framing undisturbed rivers’ although there is much less diversity of landscape through which the rivers flow. Tarkine does, however, include

some quite extensive rainforests, which contain undisturbed rivers—the most outstanding example being the headwaters of the Savage River, already partly protected in the Savage River National Park. There is a much greater concentration of rainforests in the Tarkine than in the TWWHA so the assumption is that rainforest framed undisturbed rivers will be commensurately more common and/or better developed. Of the Tarkine imagery presented on the Internet and in books and other publications, ‘rainforests framing undisturbed rivers’ is a common recurring feature, tending to confirm an objective assessment of the presence and distribution of this feature in the Tarkine landscape.

### Assessment

As with the TWWHA, the Tarkine features many ‘rainforest framed undisturbed rivers’ although the Tarkine may differ in having fewer undisturbed rivers. That is offset, however, by the more extensive rainforests associated with those ‘undisturbed rivers’. The many outstanding examples of ‘rainforests framing undisturbed rivers’ found in the Tarkine undoubtedly contributes significantly to the Tarkine meeting World Heritage Criterion (vii):

- ‘buttongrass, heath and moorland extending over vast plains;’ When compared with the TWWHA, the Tarkine can equally claim ‘buttongrass, heath and moorland extending over vast plains;’ although probably less buttongrass and more heath. This attribute tends to be associated with the mostly treeless coastal lowlands and could be said to take the form of ‘extending over vast plains’.

### Assessment

There is little doubt that the treeless coastal lowlands and adjacent low hills present vistas that for many could invoke the judgement of ‘exceptional natural beauty’, especially on cold misty days and low light conditions. The very extensive treeless heaths and moorlands extending over the expansive plains of the Tarkine lowlands would make a significant contribution to the Tarkine as a whole, meeting World Heritage Criterion (vii):

- ‘wind-pruned alpine vegetation;’ In distinct contrast to the TWWHA, the Tarkine does not significantly feature ‘wind-pruned alpine vegetation’. There are extensive wind pruned forest vegetation margins where the coastal treeless plains meet the eucalypt and rainforests but these could not be said to represent an outstanding feature. Much of the Tarkine, although exposed to driving westerly and south westerly winds, is a generally more subdued landscape than the very rugged mountainous TWWHA and so the vegetation is not exposed to extreme pruning impacts
- ‘sheer quartzite or dolerite capped mountains (including Cradle Mountain, Frenchmans Cap, Federation Peak and Precipitous Bluff)’
- ‘deep, glacial lakes, tarns, cirques and pools throughout the ranges;’ The Tarkine, in sharp contrast to the adjacent TWWHA does not present ‘sheer quartzite or dolerite capped mountains’ and the associated ‘deep, glacial lakes, tarns, cirques and pools throughout the ranges;’ Tarkine instead is a very different landscape, much more subdued than the TWWHA. Instead, the Tarkine is characterised by low, often rounded mountains with little or no evidence of glacial sculpting, thereby contrasting with the very different landscape of the TWWHA
- ‘the relatively undisturbed nature of the property’
- ‘the scale of the undisturbed landscapes’
- ‘the juxtaposition of different landscapes;’ The Tarkine shares with the TWWHA ‘relatively undisturbed nature’ on a large scale, wilderness, and exhibits remarkable juxtaposition of different landscapes, notably the contrast between the exposed, treeless coastal lowlands and adjacent or immediately adjoining sheltered shady rainforests

- ‘the presence of unusual natural formations (e.g. particular types of karst features) and superlative examples of glacial landforms and other types of geomorphic features’. The Tarkine lacks the superlative glacial landforms of the TWWHA but this is in part offset by a completely different geology and geomorphology. For example, the combination of a highly jointed and dissected granite landscape draped with a highly variable mosaic of moorland and low scrub in the Meredith Range is an extraordinary natural landscape and geomorphic feature
- ‘rare or unusual flora and fauna’. The Tarkine shares with the TWWHA ‘rare or unusual flora and fauna’ some of which are likely to contribute to the region qualifying to meet Criterion (vii) namely: ‘to contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance’.

### Other main attributes

Some of the natural heritage attributes of the Tarkine region relevant to Criterion (vii) and absent from or not specifically recognised in the TWWHA include:

- much more extensive well developed (tall) temperate rainforest
- greater extent of open coastal plain
- greater lengths of sandy ocean beaches.

### Overall assessment against criterion (vii)

... to contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance;

The Tarkine has the following natural attributes:

- vast expanse of largely treeless coastal plains
- long sandy ocean beaches backed by tracts of treeless heath
- very extensive tracts of well-developed temperate rainforest (the most extensive individual stand(s) in Australia) of exceptional natural beauty and aesthetic importance’
- visually outstanding stands of tall eucalypt forest, often intimately associated with rainforest
- major tracts of apparently pristine natural landscapes—recognised wilderness qualities
- the extraordinary visual impact of the complex granite landscape of the Meredith Range with its mosaic of moorland and scrub.

It is therefore reasonable to conclude that the Tarkine landscapes include major areas of superlative natural phenomena (major tracts of pristine natural temperate rainforest and treeless plains—the second largest tract in the world of cool temperate rainforest) and areas of exceptional natural beauty and aesthetic importance (temperate rainforests, tall eucalypt forest, wild coastline and vast treeless coastal plain).

It is reasonable to conclude as a preliminary finding that the lands known as the Tarkine National Park proposal and AHC assessment area, community understanding of ‘The Tarkine’ meets World Heritage Criterion (vii).

**NOTE:** If the Tarkine is considered as an addition to the Tasmanian Wilderness World Heritage Area, it is sufficiently distinctly different to that area that it would greatly complement that area and make a major contribution to the integrity of the existing TWWHA in respect of Criterion (vii).



by **Nic McCaffrey**

... the combination of a highly jointed and dissected granite landscape draped with a highly variable mosaic of moorland and low scrub in the Meredith Range is an extraordinary natural landscape and geomorphic feature.

### **World Heritage Criterion (viii)**

... be outstanding examples representing major stages of earth's history, including the record of life, significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features;

Assessing the natural heritage values of the Tarkine needs to be considered both as a stand-alone assessment area and in the context of the adjacent Tasmanian Wilderness World Heritage Area. A useful starting point is to directly compare with the documented 'inscribed values' ascribed to Criterion (viii):

**Criterion****(VIII) Outstanding examples of stages of earth's history**

- The Tasmanian Wilderness is an outstanding example representing major stages of the earth's evolutionary history. The World Heritage values include:
- geological, geomorphological and physiographic features, including:
    - rock formations including Precambrian rocks and Cambrian rocks;
    - Late Cambrian to Early Ordovician sequences of the Denison Range;
    - fossiliferous Ordovician limestone;
    - Permian-Triassic sediments and associated Jurassic dolerite intrusions;
    - Darwin Crater and Lake Edgar fault;
    - karst systems including glacio-karstic features;
    - karst geomorphology and karst hydrology;
    - glaciation, including glacial deposits of the Late Cainozoic, Permo-Carboniferous and Precambrian;
    - extraglacial areas (eg solifluction sheets, block streams, rock glaciers, landslip deposits);
    - periglaciation (e.g. Mt Rufus, Frenchman's Cap);
    - soils (e.g. peatlands); and
    - undisturbed river systems which show particular geomorphological processes;
  - relict biota which show links to ancient Gondwanan biota including:
    - endemic conifers (including the King Billy pine *Athrotaxis selaginoides*, the Huon pine *Lagarostrobos franklinii* and the genera *Diselmia*, *Microcachrys*, *Microstrobos*);
    - plant species in the families Cunoniaceae, Escalloniaceae and Winteraceae;
    - the plant genera *Bellendenia*, *Agastachys* and *Cenarrhnes* in the Proteaceae;
    - other plant genera with Gondwanan links (e.g. *Eucryphia*, *Orites*, *Lomatia* and *Nothofagus*);
    - monotremes (e.g. platypus *Ornithorhynchus anatinus*, short beaked echidna *Tachyglossus aculeatus*);
    - dasyurid species;
    - parrots (e.g. orange-bellied parrot and the ground parrot);
    - indigenous families of frogs with Gondwanan origins (e.g. Tasmanian froglet *Ranidella tasmaniensis*, brown froglet *Ranidella signifera*, Tasmanian tree frog *Litoria burrowsi*, brown tree frog *Litoria ewingi*);
    - invertebrate species in the genera *Euperipatoides* and *Ooperipatellus*;
    - the Tasmanian cave spider (*Hickmania troglodytes*);
    - aquatic insect groups with close affinities to groups found in South America, New Zealand and Southern Africa (e.g. dragonflies, chironomid midges, stoneflies, mayflies and caddisflies);
    - crustaceans (e.g. *Anaspidacea*, *Parastacidae*, *Phreatoicideae*);
    - primitive taxa showing links to fauna more ancient than Gondwana (e.g. *Anaspids*, *Trogloneta* (a mysmenid spider), species of alpine moths in the subfamily *Archiarinae*, species in the genus *Sabatina* of the primitive lepidopteran sub-order *Zeugloptera*).

The Tarkine undoubtedly shares many of the attributes of the Tasmanian Wilderness World Heritage Area although some special values are absent for example Darwin Crater, the extensive well-developed karst\* and all the intrusive dolerite and associated landforms and features. The Tarkine shares many of the biological features that are evidence 'representing major stages of earth's history, including the record of life ...'.

(\*While there are reasonably extensive mapped areas of karst in the Tarkine, these have been little explored so it is difficult to directly compare its potential for important karst and caves with the much better-known karst and caves of the TWWHA, especially of the Mole Creek karst.)

At the geological level, Tarkine shares with the TWWHA an extraordinary array of rocks of many ages, including from the oldest era, the Pre-Cambrian.

**Assessment**

**NOTE:** Much of the material in this section is directly quoted from the document *A proposal for a Tarkine National Park* (Pullinger 2004). This has proved a convenient and reasonably reliable source of information for a preliminary assessment of World and National Heritage significance. A sample of data on biodiversity contained in the report was subjected to verification and where necessary, the corrected result adopted.

The geology of the NW (north-west) is diverse and most rock types in Tasmania are represented in the region. The dominant feature of the region's geology is the north-east trending Arthur Lineament. This lineament is host to several currently-mined ore deposits and is considered by some to be a highly prospective region for economic mineralisation. Exploration interests in the region are in magnetite, magnesite, Cu-Au, silica flour and potential base metals.

In places, the ultramafic-magnetite bodies have been altered to magnesite and this has undergone significant dissolution to produce magnesite karst systems. The distribution and extent of the magnesite karst is poorly defined and in need of attention but initial evidence points to the presence of sinkholes deeper than 70 metres, and this suggests that the karst networks are extensive. Globally, magnesite karst is very rarely reported and

these North-West sites satisfy the National Estate criteria for significant geological, geomorphological and soil sites. (Pullinger 2004)

It is apparent that the geology of parts of the Tarkine is well studied, partly because of the commercial interest in mineralisation prospects. On the other hand it is also apparent that some geological formations have not attracted the same level of exploration and as a result are only poorly known.

The intensive geological investigation driven by commercial interest along the Arthur lineament in particular means that the Tarkine has yielded much more evidence of the geological dynamics of the Tasmanian corner of the Australian tectonic plate than has the TWWHA which has mostly not been the subject of such intense research. It may not be a case of one area is more important than the other but rather that the Tarkine region has yielded more direct evidence of ‘... representing major stages of earth's history, ... significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features’. The geological evidence in the Tarkine is not a substitute for that in the TWWHA but rather is complementary and contributes to the overall evidence of earth's history as revealed by the geology of the whole of western Tasmania.

### **Other features of geoconservation significance**

#### **Magnesite karst**

These are present as well-developed karst systems in an unusual magnesium carbonate substrate and are globally unusual (Sharples 1992b; Sharples 1997; Houshold et al. 1999). The magnesite karst systems of the Arthur Lineament exhibit well-developed relict karst landforms of Tertiary age, including caves and pinnacle karst at Lyons River and the Arthur River–Victory Springs area, and active hydrothermal karst hydrology including warm springs. (Pullinger 2004)

#### **Lyons River**

Magnesite karst features in this area include well-developed Tertiary-age relict karst landforms such as pinnacles and caves, and an extensive hydrothermal karst hydrological system including a major warm spring in pristine condition (Houshold et al. 1999). Part of the magnesite body is covered by a flow of basalt over 40 metres thick in some areas. Present day vegetation along Lyons River is predominantly callidendrous rainforest with a rainforest/eucalypt forest mosaic on the Northern side of the river Northwards along Prospect Ridge to the Keith River. This mostly undisturbed magnesite karst area is a high priority for protection of its karst values, since no magnesite karst is currently represented within any Tasmanian conservation reserve or the TWWHA. (Pullinger 2004)

#### **Keith/Arthur Rivers**

Karst landforms here include warm springs developed in magnesite carbonate rock, and include at least one deep in-filled sinkhole.’ (Lake Chisholm)

#### **Main Rivulet–Bowry Creek**

Karst landforms here include a number of small, undecorated caves and several castle-like outcrops with impressive undercut bases (swamp notches). The latter feature may also be representative at an international level, given that karstic landforms in magnesite are **globally rare and no other significant systems are known**. The magnesite itself is an unusual rock type, the occurrence here most commonly comprising a fine-grained equigranular marble, which probably formed by metasomatism of original dolomite (Sharples 1997). Cave sediments and pollen records provide palynological evidence of past climates and vegetation distribution. Karst landforms vary from pinnacles to overhangs, caves and underground cavities. (Pullinger 2004)

#### **Palaecological and quaternary values**

Dendrochronological sequences of importance in determining climate trends from living and buried conifers, *Lagarostrobos franklinii* (Huon pine) and *Phyllocladus asplenifolius* (celery-top pine) (Hill 1995).

The sub-fossil logs of coniferous trees, in particular the Huon pine, buried in the Stanley River have proven to be of global scientific interest for dendrochronology and therefore of interest in the study of climate change, particularly post Pleistocene. High-precision carbon 14 analysis, 'covering an age range from 10,350 to 10,760 14C years BP, has been linked to the European absolute tree-ring and floating Late Glacial Pine chronologies, bridging the current gap in the European tree-ring chronologies during the early YD (Young Dryas) period and making a continuous and reliable atmospheric 14C record for the past 14,000 cal BP.' (Hua, Barbetti, Fink et al. 2008).

The Stanley River sub-fossils are unlikely to be the only such material in the Tarkine, which because of its largely undisturbed condition, is conducive to survival of other such material with the potential of global significance.

The buried sub-fossil material in the Stanley River is demonstrably a scientific resource of global scientific importance.

**NOTE:** The precise location and the likely extent of remaining buried material needs to be verified.

The Little Rapid River (in Tarkine), Cethana, Lea River and Monpeelyata sites provide a record of most of Australia's late Eocene—early Miocene macrofossil evidence (Hill 1995). The quality of fossil preservation at these sites and their uniqueness in the Southern hemisphere represent a scientific resource of global significance (Hill 1995). (Pullinger 2004)

## Soils

The kraznozem soils on Tertiary basalt plateau in the Arthur Lineament region of the area are of particular interest, since they represent the largest area of basalt soils in Tasmania which support undisturbed natural vegetation communities (Sharples 1992b). (Pullinger 2004)

## Other geoconservation sites

- Internationally significant sites (Tasmanian Geoconservation Database—'TGD')
  - Little Rapid River early Oligocene plant fossil site
  - Hellyer River insect fossil locality
  - Balfour–String of Beads fossil locality
  - Western Tasmania blanket bogs (widespread in TWWHA and Tarkine)
- Nationally significant sites (TGD)
  - Trowutta–Sumac Karst Systems
  - Lyons River Magnesite Karst
  - Keith–Arthur Rivers Magnesite Karst
  - Arthur Lineament
  - Main Rivulet–Bowry Creek Magnesite Karst
 (all above date to 2009 State of Environment Report)

## Geomorphological processes

The Tarkine ‘... is a large, relatively undisturbed area with topographic and catchment integrity where natural processes continue largely unmodified by human intervention. Extensive areas in which undisturbed ongoing geomorphic and soil processes continue (e.g. blanket bog peat-lands, fluvial, karst and coastal processes), are a key geoconservation value’ (Sharples 2004).

## **Assessment finding**

Based on the more readily available information, it is apparent that the Tarkine as an assessment region, has a suite of geological and geomorphological features and processes of geoconservation significance, a selection of which are of national significance and some arguably of global significance.

Commercial interest has driven intense geological study in the region, select parts in particular, such as along the Arthur lineament, providing a large volume of knowledge and understanding of the geological evolution of the region since the Pre-Cambrian and, by extension, of the:

... outstanding examples representing major stages of earth's history, including the record of life, significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features;

Not separately assessed is the substantial representation of plant and animal species that are evidence of the link to Gondwana. Many of these are the same as found in TWWHA and which are cited against Criterion (viii) in the inscribed values for that TWWHA.

It is worth noting however, that recent molecular analysis strengthens the importance of Tasmania's freshwater crayfish as an outstanding example of evolution in a Gondwanan group (Richardson et al. 2006). And that, the Tarkine supports healthy populations of a suite of Gondwanan vertebrate and invertebrate fauna and an apparently healthy population of the now endangered Tasmanian Devil, the world's top order carnivorous marsupial.

Provisional assessment based on the data assessed, it is likely that the Tarkine contains values that can qualify against World Heritage Criterion (viii) namely:

... be outstanding examples representing major stages of earth's history, including the record of life, significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features;

Qualification against Criterion (viii) requires further analysis.

## **National Heritage**

Although not specifically assessed, based on the data used for assessing World Heritage significance, the Tarkine can be expected also readily meet relevant National Heritage criteria (a) and (c).

## **World Heritage Criterion (ix)**

... be outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals;



## Criterion (IX) Outstanding examples of ongoing evolution

- The Tasmanian Wilderness has outstanding examples representing significant ongoing geological processes and ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water and coastal ecosystems and communities, including:
- sites where processes of geomorphological and hydrological evolution are continuing in an uninterrupted natural condition (including karst formation, periglaciation which is continuing on some higher summits (e.g. on the Boomerang, Mount La Perouse, Mount Rufus, Frenchmans Cap), fluvial deposition, evolution of spectacular gorges, marine and aeolian deposition and erosion, and development of peat soils and blanket bogs);
  - ecosystems which are relatively free of introduced plant and animal species;
  - coastal plant communities free of exotic sand binding grasses which show natural processes of dune formation and erosion;
  - undisturbed catchments, lakes and streams;
  - alpine ecosystems with high levels of endemism;
  - the unusual 'cushion plants' (bolster heaths) of the alpine ecosystems;
  - ecological transitions from moorland to rainforest;
  - pristine tall eucalypt forests;
  - examples of active speciation in the genus *Eucalyptus*, including sites of:
    - hybridisation and introgression;
    - clinal variation (e.g. *E. subcrenulata*);
    - habitat selection (e.g. *E. gunnii*); and
    - transition zones which include genetic exchanges between *Eucalyptus* species;
  - plant groups in which speciation is active (e.g. *Gonocarpus*, *Ranunculus* and *Plantago*);
  - conifers of extreme longevity (including Huon pine, Pencil pine and King Billy pine);
  - endemic members of large Australian plant families (e.g. heaths such as *Richea pandanifolia*, *Richea scoparia*, *Dracophyllum minimum* and *pronotes cerinthoides*);
  - endemic members of invertebrate groups;
  - invertebrate species in isolated environments, especially mountain peaks, offshore islands and caves with high levels of genetic and phenotypic variation;
  - invertebrates of unusually large size (e.g. the giant pandini moth - *Proditrix* sp., several species of *Neauridae*, the brightly coloured stonefly - *Eustheria spectabilis*);
  - invertebrate groups which show extraordinary diversity (e.g. land flatworms, large amphipods, peripatus, stag beetles, stoneflies);
  - skinks in the genus *Liolopisma* which demonstrate adaptive radiation in alpine heaths and boulder fields on mountain ranges;
  - examples of evolution in mainland mammals (e.g. sub-species of Bennett's wallaby - *Macropus rufogriseus*, swamp antechinus - *Antechinus minimus*, southern brown bandicoot - *Isodon obesulus*, common wombat - *Vombatus ursinus*, common ringtail possum - *Trichosurus vulpecula*, eastern pygmy possum - *Cercartetus nanus*, the swamp rat - *Rattus lutreolus*) in many birds (e.g. the azure longfincher - *Alcedo azurea*) and in island faunas;
  - animal and bird species whose habitat elsewhere is under threat (e.g. the spotted-tail quoll - *Dasyurus maculatus*, swamp antechinus - *Antechinus minimus*, broad-toothed rat - *Mastacomys fuscus* and the ground parrot - *Pezoporus wallicus*); and
  - the diversity of plant and animal species.

The Tasmanian Wilderness World Heritage Area met World Heritage Criterion (ix) so it is useful to compare the 'inscribed values' of the TWWHA with the Tarkine.

### Comparison with TWWHA

The reality is that apart from some important differences in respect of the high mountain–alpine geomorphic and ecological processes of the TWWHA, the Tarkine shares many of the attributes of the area, including 'outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals'.

It is therefore reasonable to conclude that many, but not all, of the values claimed for the TWWHA in respect of Criterion (ix) (see 'inscribed values' above) apply equally to the Tarkine. The level of significance may differ in some cases such as for tall eucalypt forests and native conifers, which are significantly better represented in the TWWHA.

Unlike much of the TWWHA, the Tarkine landscape and biota has evolved largely free of the direct impacts of glaciation and lacks the major mountainous landscapes of the TWWHA.

Like the Tasmanian Wilderness World Heritage Area, the Tarkine retains areas of intact natural vegetation, illustrated by the qualification of at least parts of the area as high quality wilderness under the National Wilderness Inventory. Parts of the areas mapped as wilderness in the past have now had some of their wilderness values and extent eroded by a combination of new roads, logging and some mining. Logging and associated roading in particular has made in-roads into a previously intact natural landscape. Removing some of this disturbance could help to restore wilderness values.

Notwithstanding the incremental development that has been taking place, much of the Tarkine remains intact and reasonably well-buffered from mainstream development pressures. Some important areas of intact catchment remain. Overall, much of the Tarkine remains largely undisturbed by the activities of modern technological man. Consequently it is conducive to 'significant ongoing ecological and biological processes in the evolution and

development of terrestrial, fresh water, coastal ... ecosystems and communities of plants and animals’.

Although the overall habitat of the Tarkine is represented by a moderately complex mosaic of geological, topographic and vegetation classes, two habitat types in particular are very extensive, the largely treeless moorland and the rainforest. Both are of sufficient extent and diversity to be conducive to ‘significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal ... ecosystems and communities of plants and animals’.

The cool temperate rainforest is of such substantial extent (the second largest area in the world) that much of it represents what appears to be a very stable ecosystem where fire plays no part in the ongoing natural processes. This is in contrast to the TWWHA where much of the rainforest is much less continuous and more likely to be conducive to periodic incursion of fire, especially in the mostly steeper terrain of that region and via numerous moorland fire paths.

The rainforest occurs both as larger tracts of pure rainforest and in places as narrow galleries dictated by topographic and the dynamics of fire. Moorland, which is conducive to fire, tends to occur as larger more or less continuous tracts extending inland from the coast.

From maps and imagery it is apparent that the predominant fire pathways are from the coastal area, running inland along well-defined pathways revealed by the pattern of moorland. The extent to which this pattern was created or maintained by Aboriginal burning is unclear but that they played a role is certain.



The isolated stands of eucalypt forest have survived frequent burning of the surrounding moorland in ‘fire shadows’ afforded by deeply incised streams down the gently sloping coastal plain. Fires burning inland from the coast would tend to be deflected around the eucalypt forest as a result of protection provided by the deeply incised gullies on either side.

Similarly, further inland, rainforest pockets survive in topographically maintained 'fire shadows'. The extent to which this pattern was created or maintained by Aboriginal burning is unclear but note that the peninsula on left is Sandy Cape, site of a major concentration of Aboriginal sites. Note also the prevailing wind direction revealed in the mobile coastal sand dunes.

Sandy Cape, site of a major concentration of Aboriginal sites, suggests a continuous occupation of this section of the coast during the Holocene (see image above). In some places there is close juxtaposition of fire-maintained moorland and fire-sensitive rainforest. In others there may be a number of transitional plant communities which exist as a result of a lower frequency fire regime and may include eucalypt forests, such as, in better environmental conditions, tall eucalypt forests, albeit of limited extent. Some examples of tall eucalypt forest coexist with well-developed rainforest understorey, indicating a very infrequent incursion of fire. Although there are a few anomalous small stands of eucalypt forest on the coastal plain, most, especially tall eucalypt forest (>40 metres) occurs inland (higher rainfall/lower fire frequency). The latter occurs as narrow transition forests adjoining the rainforest.

### **Assessment**

The Tarkine, on preliminary assessment, is likely to readily qualify against Criterion (ix) so a comprehensive analysis has not been presented here. Key attributes include:

- Tarkine is a large tract of relatively undisturbed land where natural ecological and evolutionary processes are ongoing (indicators: wilderness mapping, wild river mapping)
- the products of those ongoing processes are evident in the maintenance of extensive temperate rainforest and associated Gondwanan flora and in the form of more recently evolved local endemic taxa, including species that are confined to the Tarkine
- ecosystems which are relatively free of introduced plant and animal species
- the most extensive and least disturbed tract of cool temperate rainforest ecosystem in Australia and second largest in the world
- coastal plant communities free of exotic sand binding grasses which show natural processes of dune formation and erosion
- undisturbed catchments and streams.

### **Findings**

The Tarkine as a whole is considered, on preliminary assessment, likely to meet Criterion (ix) in its own right.

However it needs to be recognised that the attributes and values of the Tarkine and the TWWHA overlap significantly, particularly in respect of Criterion (ix). Each has unique values but many other values are complementary.

At the very least, if the Tarkine area were added to the TWWHA, it would make a very significant contribution to the values and integrity of the TWWHA.

### **World Heritage Criterion (x)**

... contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.

The Tasmanian Wilderness World Heritage Area met World Heritage Criterion (x) so it is useful to compare the 'inscribed values' of the TWWHA with the Tarkine:

### Criterion (X) Important habitats for conservation of biological diversity

The ecosystems of the Tasmanian Wilderness contain important and significant natural habitats where threatened species of animals and plants of outstanding universal value from the point of view of science and conservation still survive, including:

- habitats important for endemic plant and animal taxa and taxa of conservation significance, including:
  - rainforest communities;
  - alpine communities;
  - moorlands (e.g. in the far south-west);
  - riparian and lacustrine communities (including meromictic lakes).
- habitats which are relatively undisturbed and of sufficient size to enable survival of taxa of conservation significance including endemic taxa;
- plant species of conservation significance
- animal species of conservation significance, such as:
  - spotted-tail quoll *Dasyurus maculatus*;
  - swamp antechinus *Antechinus minimus*
  - broad-toothed rat *Mastacomys fuscus*
  - ground parrot *Pezoporus wallicus*
  - orange-bellied parrot *Neophema chrysogaster*
  - Lake Pedder galaxias *Galaxias pedderensis*

### Comparison with TWWHA

At the habitat level, the most important differences are that the Tarkine, apart from a thin belt of sub-alpine rainforest along the eastern flank of the Norfolk range and in parts of the Meredith Range, does not include any significant alpine ecosystems and the riparian and lacustrine communities, although represented, lack the meromictic lakes and the numerous glacial lakes of the existing TWWHA. However, the rainforest and buttongrass moorland communities are particularly well represented in the Tarkine.

Of the species cited in the 'inscribed values' for the TWWHA, Lake Pedder galaxias *Galaxias pedderensis* Pedra Branka skink *Niveoscincus palfreymani* are absent from the Tarkine. These absences are more than offset by species found in the Tarkine and not found in the TWWHA e.g. The EPBC listed giant freshwater crayfish *Astacopsis gouldi* is one example, being confined to northern Tasmania. The minimally disturbed and less accessible rainforest streams of the Tarkine are critical habitat of the species that in many areas has traditionally been exploited.

In terms of potential to meet Criterion (x), on first blush, the Tarkine appears quite comparable to the TWWHA, particularly in terms of species diversity and habitat importance.

### Preliminary heritage assessment

By far the two most extensive habitats/communities in the Tarkine are the rainforest and moorland communities and so are of potential high conservation importance.

The Tarkine comprises ‘habitats which are relatively undisturbed and of sufficient size to enable survival of taxa of conservation significance including endemic taxa; plant species of conservation significance animal species of conservation significance ...’ (From ‘inscribed values’ of TWWHA)

### **Rainforest**

The highlight of the Tarkine is the extensive tracts of intact temperate rainforest including a single aggregate stand of temperate rainforest greater in extent than in the TWWHA. It is the largest single aggregate of temperate rainforest in Australia. This is the most important area in Australia for ensuring ongoing conservation of cool temperate rainforest and its associated ecological and evolutionary processes because of its:

- extent
- habitat diversity
- condition
- level of catchment protection
- buffering from fire.

More than one million hectares of buttongrass moorland are in western Tasmania, largely shared between the TWWHA and the Tarkine.

The taxon that most characterises buttongrass moorland is the tussock sedge *Gymnoschoenus sphaerocephalus* (buttongrass). The genus *Gymnoschoenus* is endemic to Australia and has only two species, *Gymnoschoenus sphaerocephalus* and *G. anceps*. The first species has its greatest abundance in Tasmania ... The extensive dominance by *Gymnoschoenus* of Tasmania’s sedge-lands and wet heaths has led to this ecosystem being dubbed ‘buttongrass moorlands’. —Balmer 2008

Notwithstanding that the ‘buttongrass moorlands’ are visually dominated by the one species of buttongrass, this ecosystem supports a diversity of smaller plant species and soil fauna. Although it is very extensive in Tasmania, including in the Tarkine, the community is very sensitive to fire regime so that extensive areas are essential for conservation of the biodiversity.

In the Tarkine, the buttongrass moorlands often immediately abut eucalypt vegetation and on occasions rainforests. As vegetation community capable of conducting wildfire, albeit low intensity, it can deliver fire to other more flammable or fire sensitive vegetation communities, hence the concern about how fire in the buttongrass in western Tasmania is managed.

The current pattern of buttongrass juxtaposed with rainforest and wet eucalypt in the Tarkine raises some concerns about the final disposition of any protected area boundaries. In particular there is a narrow corridor of wet eucalypt and rainforest separating two great tracts of moorland in the core of the Tarkine. Logging of this ‘fire barrier’ has already been occurring and may contribute to loss of this natural barrier and lead to the merging of the two moorland systems, at the same time severing the connectivity between the two major tracts of rainforest. Regrettably, the Australian Heritage Council has already removed this potentially vital barrier from the National Heritage assessment area, thereby appearing to foreclose on its protection.

The main threat to the buttongrass is considered to be the soil pathogen *Phytophthora cinnamomi*.

### **Basalt Plateau–Mt Bertha/Savage River**

This large Tertiary basalt plateau comprises dissected portions of the largest Tertiary lava plain in Tasmania.

Soils developed on the plateau remain the largest undisturbed area of such soils in Tasmania, and are currently almost entirely unrepresented in the TWWHA, or in other reserves. They support characteristic vegetation communities including large areas of rainforest, and are significant as an undisturbed soil/vegetation association related directly to basalt bedrock (rather than for strictly geological or geomorphic values of the basalt). Soil type sites (not yet identified) have potential scientific value as baseline sites (Sharples 1992b). (Pullinger 2004)

Basalt soils are relatively restricted in distribution in Australia and most have been extensively developed and modified by agriculture, especially in higher rainfall regions, such that opportunities to protect such soils and associated, often distinctive, vegetation are relatively rare. Almost as an historical accident, the basalt plateau in the Tarkine escaped agricultural development so is now an area of outstanding conservation value at least of national significance.

The Tarkine includes a number of other less extensive but nevertheless important communities of conservation importance including tall eucalypt forest and dry sclerophyll eucalypt communities.

### **Plants**

A number of individual plant species and communities deserve special mention in any assessment of heritage significance.

- 'Rare and vulnerable endemic heath, *Epacris curtisiae*, which is concentrated in the Nelson Bay River area and is not known within any secure reserves.' TNC National Park Proposal. A local endemic and listed in Tasmania as 'Rare'
- 'Representative sample of the '*Poa labillardieri* – *Trachymene humilis* tussock grassland' community, located within the Netherby plains region (Kirkpatrick et al. 1988a). This community is poorly reserved (Kirkpatrick et al. 1995).' (TNC National Park Proposal).
- Huon pine (*Lagarostrobos franklinii*) The Tarkine includes an outlier occurrence of this iconic long-lived coniferous tree species, here at its northern limit. See also sub-fossils of the species in the Stanley River.

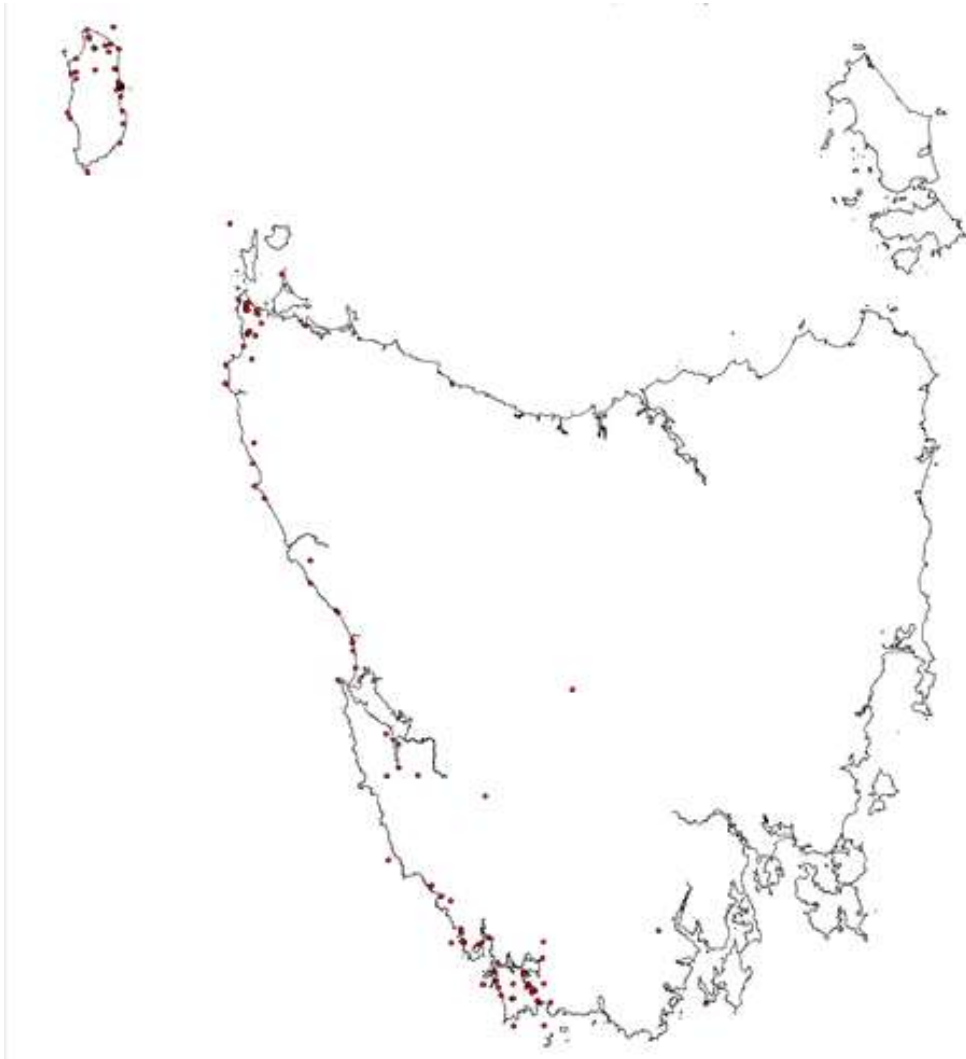
### **Animal species**

Important species of animals of conservation significance include:

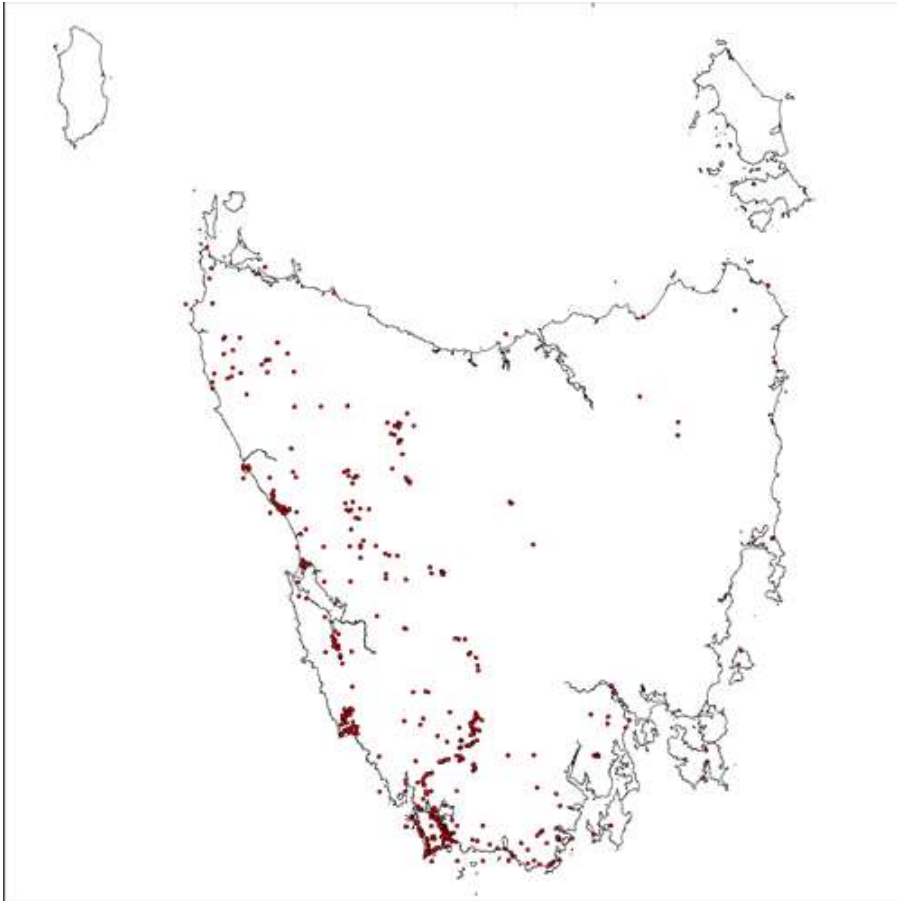
The Tasmanian whitebait and Tasmanian smelt (*Retropinna tasmanica*) are endemic. The Australian grayling is listed as threatened under state and Commonwealth threatened-species legislation. These uncommon species occur in significant numbers in the Pieman River (Slater 1992).' (Pullinger 2004).

- Two threatened frog species, the green and golden frog (*Litoria raniformis*) and striped marsh frog (*Limnodynastes peronei*), are rare and have restricted distributions in Tasmania. The green and golden frog has been listed as vulnerable and its populations are declining in Tasmania; its range in Northern Tasmania has contracted (Bryant & Jackson 1999). The striped marsh frog can be found in the coastal North East, the far North West and King Island. Both these species occur in coastal lagoons, marshes and swamps of the Arthur–Pieman plains. (Pullinger 2004).
- Eleven of Tasmania's twelve endemic birds live in the Tarkine (national park proposal).
- Two migratory bird species that breed only in Tasmania, the swift parrot (*Lathamus discolor*) and the orange-bellied parrot (*Neophema chrysogaster*), forage in the Tarkine. The latter, a critically endangered species, breeds in South West Tasmania but migrates along the West coast and forages on coastal plants, especially samphire. Consequently the Tarkine's coastal vegetation is extremely important habitat. The endangered swift parrot

breeds predominantly in South East Tasmania and feeds on the nectar from the Tasmanian blue gum (*Eucalyptus globulus-globulus*). In the Tarkine, the swift parrot forages on these trees during the post-breeding dispersal and migration season.



- Records of orange-bellied parrot (*Neophema chrysogaster*) in Tasmania. The critically endangered species breeds in the TWWHA in the far south west and seasonally migrates up the west coast, using coastal habitat including on the Tarkine coast.
- A third parrot, the nationally vulnerable ground parrot, represented as a Tasmanian endemic sub-species *Pezoporus wallicus leachi*, is concentrated in the buttongrass moorlands of western Tasmania, occupying moorland shared between the TWWHA and the Tarkine. The moorlands of western Tasmania represent some of the most important habitat of the species, being the most extensive relatively secure habitat of the species nationally.



- Eastern ground parrot, Tasmanian endemic sub-species *Pezoporus wallicus leachi* distribution in Tasmania is concentrated in the west, shared between the TWWHA and the Tarkine.
- Tasmania's largest diurnal raptors are the Tasmanian subspecies of the wedge-tailed eagle (*Aquila audax fleayi*) (listed as endangered under EPBC) and the white-bellied sea-eagle (*Heliaeetus leucogaster*) (listed as migratory under CAMBA). The largest nocturnal predator is the masked owl (*Tyto novaehollandiae castanops*). The Tasmania population is listed under the EPBC as 'vulnerable'. The Tarkine provides significant habitat for some fifteen to twenty pairs of the wedge-tailed eagle and six pairs of white-bellied sea-eagle and the grey goshawk as well as habitat for the masked owl (Slater 1992, Pullinger 2004 [errors removed and verified] and EPBC documents).
- Tasmania's three largest extant mammalian predators, in order of decreasing size, are the Tasmanian devil (*Sarcophilus harrisii*), the spotted-tailed quoll (*Dasyurus maculatus maculatus*), and the eastern quoll (*Dasyurus viverrinus*). The presence of these top predators in the Tarkine is a sign of a healthy ecosystem. Currently there is an epidemic of viral cancer in populations of Tasmanian devil particularly in eastern Tasmania. Populations of the Tasmanian devil in the North West appear to be healthy and the Tarkine may be a significant refuge. Listed nationally as vulnerable, the spotted-tailed quoll (*Dasyurus maculatus maculatus*) requires extensive areas of relatively undisturbed wet forest and suitable prey for its survival. Tasmania is the global stronghold of the spotted-tailed quoll and the wet forests of the Arthur River catchment are core habitat (Jones & Rose 1996). The smaller eastern quoll (*Dasyurus viverrinus*) preys on insects

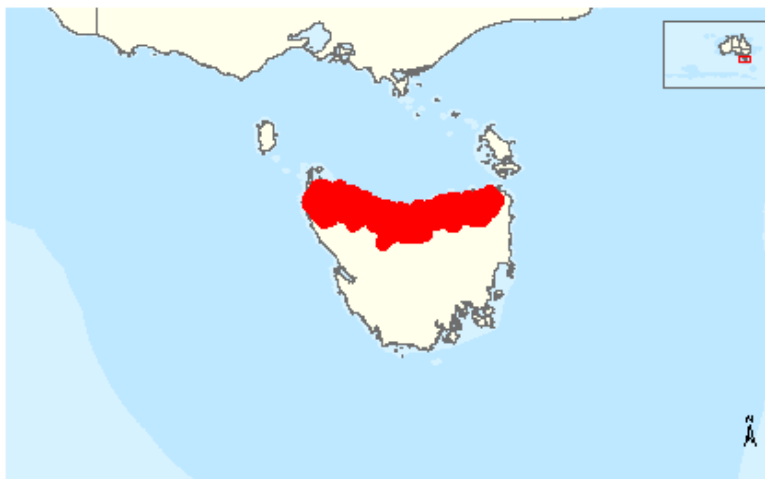


and is much scarcer in the Tarkine than in the woodlands and mountains of eastern and central Tasmania. (Pullinger 2004). [Not verified yet.]

- The Tarkine is one of the highest centres of invertebrate diversity out of the 11 sites sampled for the Tasmanian component of the National Rainforest Conservation Program (AHC, 1989). The Savage River rainforest in the Tarkine is also the only known location of 15 invertebrate species:
  - two species of Pauropoda (*Allopauropus convexus* mss name, *Stylopauropoides erectus* mss name)
  - three species of Symphyla (*Hanseniella pyrethrata*, *Hanseniella*, *Hanseniella pluvialis*)
  - two species of Diplopoda
  - three species of Opiliones (*Calliuncus vulsus*, *Mestonia* sp. N. and *Numioides* sp. N.)
  - two species of Collembola (*Phradmon tasmaniae*, *Paronellides* sp. Nov) (AHC, 1989).

Along with the Pedder River *Lissodesmus* millipede (Mesibov 1992) this brings the total number of invertebrate species known from nowhere else but the Tarkine to at least 16.

- The Tarkine is particularly important for freshwater crustaceans, which are of global significance (PWS, 2001).
- Among the crustaceans, there are at least 17 species of Amphipod (landhopper), making the Tarkine one of the richest centres of diversity for this invertebrate group in the world (PWS, 2001). National Park proposal
- One of the largest freshwater invertebrates in the world, *Astacopsis gouldi*, inhabits rivers in the north of Tasmania and the Arthur River catchment (PWS 2001, Lynch & Blühdorn 1997). (Pullinger 2004) Verified.



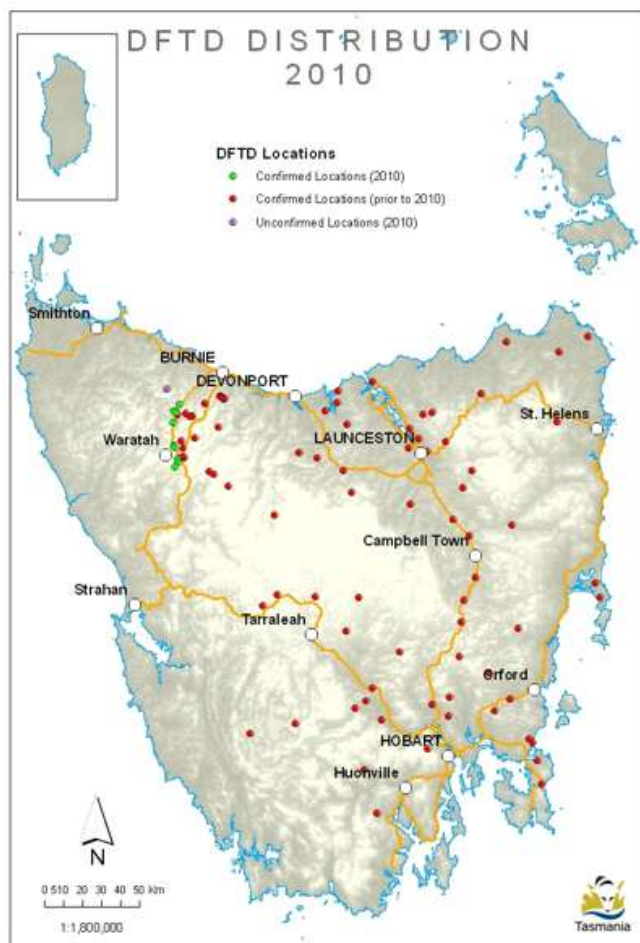
Indicative distribution of giant freshwater crayfish *Astacopsis gouldi*

Walsh (2003) recommends that important habitat include the Hebe River (Inglis catchment), Frankland, Rapid, Keith and Lyons Rivers (all Arthur River catchments), Duck River catchment above Trowutta Road, Black River catchment, and the Dip Range streams for higher protection due to good quality habitat with good lobster populations. (Recovery Plan).

## Tasmanian devil (*Sarcophilus harrisi*) IUCN Red list 'endangered'

This species is now classified as endangered due to the ravages of a fatal contagious cancer. Populations across central, northern and eastern Tasmania have dropped dramatically in the past few years. Some disease resistance has been found in a population at West Pencil Pine near the eastern extremity of the Tarkine National Park proposal.

As at August 2011, 'no confirmed cases of DFTD have been recorded west of the Murchison Hwy'; that is, there have been no reports of the disease in the main core area of the Tarkine. It appears to remain disease free. If the Tarkine population of devil remains disease free it may become a critically important habitat for this globally endangered species.



Records of DFTD disease in the Tasmanian Devil population in 2010. Note that no occurrences in the Tarkine west of the Murchison Highway

## Geoconservation

Sharples, C A Reconnaissance of Landforms and Geological Sites of Geoconservation Significance in the Circular Head Forest District, Forestry Tasmania (1996) [Contract Report]. Not accessed.

## Contributory World Heritage values

- Important habitat of rare local endemic crustacean *Astacopsis gouldi*, the world's largest freshwater crayfish.
- Largest example of Gondwanan cool temperate rainforest in outstanding natural condition.
- A significant habitat for in-situ conservation of *E.obliqua* tall eucalypt forest ecosystem.
- Outstanding example of interaction between cool temperate rainforest and moorland/heath—both well represented in complex mosaic.
- Extensive intact areas of native forest on Tertiary basalt is now rare and adds an important new dimension to the ecological diversity of the TWWHA. For example *Eucalyptus brookeriana* tall eucalypt forest.

## Summary of Tarkine assessed against all World Heritage criteria

### **Cultural**

#### Criterion (iii)

... to bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared;

Preliminary assessment indicates high probability of qualifying against Criterion (iii)

#### Criterion (v)

... to be an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change;

Preliminary assessment indicates high probability of qualifying against Criterion (v)

Rather than being seen simply as a collection of identified individual archaeological features, the Tarkine is a rare Aboriginal cultural landscape. It has undergone only limited post-contact disturbance and has a range of evidence of past Aboriginal use of the landscape, including but not limited to individual sites. Given the obvious role that fire has played in creating the vegetation mosaic across the region, there can be no doubt that Aboriginal use of fire played a major role in creating this mosaic, a 'cultural landscape'. Regrettably, the precise nature of that role can now only be speculated upon but given the minimal post-Aboriginal disturbance, opportunities may still exist for researching that aspect.

There is no doubt that the Tarkine is a regional landscape which has extensive evidence of past Aboriginal occupation and activity. It justifies the statement describing the region as follows.

### **Natural**

The Tarkine region of Tasmania contains some outstanding natural heritage attributes, some of which are clearly of World Heritage significance.

The most obvious natural heritage attributes include:

- largest tract of intact cool temperate rainforest in Australia (biodiversity, aesthetics)
- extensive high quality wilderness (aesthetics, ongoing evolution)
- expansive tracts of temperate moorland and heathland (outstanding natural beauty and important habitat for species conservation)

- habitat important for ‘... in-situ conservation of biological diversity
- geological and geomorphological evidence of earth’s history (fossils, geological formations, landscape evolutionary processes).

The indicative results provide sufficient evidence to indicate that the Tarkine in its present form could qualify as a stand-alone World Heritage Area. The dissimilarities of the Tarkine and the Tasmanian Wilderness World Heritage Area could be interpreted either as a case for the Tarkine being separately considered for World Heritage or as a case of complementarity which binds the two great natural areas into a single entity with a common future. Some of the key attributes of the Tarkine would, if added to the TWWHA, greatly enhance the natural integrity of the TWWHA.

The most important contribution that the Tarkine can make to the integrity of the TWWHA is a major enhancement of the integrity of rainforest resources, not just because of the larger tract of rainforest but also because of the additional ecological diversity of the cool temperate rainforest (e.g. rainforest on Tertiary basalt, pristine larger catchments of rainforest etc.).

### **Conclusion**

Preliminary assessment based on accessible data (and subject to appropriate delineation), The Tarkine is considered to qualify against Criteria (vii), (ix) and (x). It does have some valuable contributions to make against Criterion (viii) but these would need to be further evaluated.

### **Overall conclusions of World Heritage assessment**

Based on the documented attributes and values of the Aboriginal cultural heritage in the Tarkine it is apparent that the Tarkine can readily meet World Heritage Criterion (v) and very likely (iii) and (vii).

An important contributor to the value of the cultural heritage is the context of a largely undisturbed if not wilderness landscape, an Indigenous cultural landscape.

Preliminary assessment of accessible data leads to the conclusion that the Tarkine region as defined for this assessment can qualify against World Heritage Criteria for cultural heritage.

Preliminary assessment based on accessible data (and subject to appropriate delineation), The Tarkine is considered to qualify against Criteria (vii), (ix) and (x) for natural heritage. It does have some valuable contributions to make against Criterion (viii) but these would need to be further evaluated.

### **Caveats on assessment**

The following caveats apply to the above assessment:

1. The assessment as presented was for World Heritage criteria only; given the findings of this assessment, no assessment was conducted against National Heritage criteria.
2. The assessment is tenure blind.
3. The assessment was conducted with serious time constraints with the result that some data sourcing remains incomplete.
4. Based on the time limitations and constraints on accessing some data, the assessment must be regarded as being provisional only. Notwithstanding, additional data is more likely to reinforce the assessment rather than detract.
5. The assessment was conducted using the proposed Tarkine National Park as a basis but in several instances extended into immediately adjacent lands which might form a natural part of the Tarkine region. For example, Lake Chisholm which is of high heritage

conservation significance, is just outside both the national park proposal and the Australian Heritage Council(AHC) assessment area.

6. Comparative analysis was largely limited to direct comparison with the adjacent Tasmanian Wilderness World Heritage Area. This was considered legitimate given that the TWWHA has been subject to ongoing comparison at the national and global level and provides a useful benchmark for any related values.
7. Any deletion or excision of lands from the assessment area, for any future protected area has the potential to dilute, or even invalidate, the assessment. Potentially important areas of lands already excised from the AHC process could diminish the assessment findings. A map illustrating the boundaries nominated by the author following the assessment is presented below.

Heritage summary—Tarkine Region*		
*Approximating the ENGO-proposed Tarkine National Park.		
WORLD HERITAGE		
Attribute	Relevant criterion	Value
1.1.1. vast expanse of largely treeless coastal plains 1.1.2. long sandy ocean beaches backed by tracts of treeless heath 1.1.3. very extensive tracts of well developed temperate rainforest (the most extensive individual stand(s) in Australia) 'of exceptional natural beauty and aesthetic importance'. 1.1.4. visually outstanding stands of tall eucalypt forest, often intimately associated with rainforest 1.1.5. major tracts of apparently pristine natural landscapes—recognised wilderness qualities 1.1.6. the extraordinary visual impact of the complex granite landscape of the Meredith Range clothed in a mosaic of moorland and scrub.	(vii) 'to contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance;'	While some of these attributes overlap with the values of the Tasmanian Wilderness World Heritage Area, the great expanse of temperate rainforest stands out as being distinctive of the Tarkine and would be the core value for qualifying against Criterion (vii). Note that the context of these rainforests—in a largely wilderness setting surrounded by intact non-rainforest vegetation is important for 'framing' this 'exceptional natural beauty and aesthetic importance'  On preliminary assessment, 'The Tarkine'* , the centrepiece of which is the intact expansive temperate rainforest, could qualify against World Heritage Criterion (vii)  * Approximating the ENGO-proposed Tarkine National Park.  If added to the TWWHA, the various attributes and values presented here against Criterion (vii) would make a very important contribution to the values and hence the integrity of the Tasmanian Wilderness World Heritage Area.

Heritage summary—Tarkine Region*		
*Approximating the ENGO-proposed Tarkine National Park.		
WORLD HERITAGE		
Attribute	Relevant criterion	Value
<ul style="list-style-type: none"> <li>• Magnesite karst: 'globally unusual', rare in Australia (Lyons and Arthur Rivers)</li> <li>• Karst: well developed relict karst landforms of Tertiary age. One deep flooded sinkhole (Lake Chisholm)</li> <li>• Sub-fossil tree wood: of global palaeoecological importance. (Stanley River)</li> <li>• Fossils: Little Rapid River (et al) Oligocene plant fossil-earliest macrofossil records of the family—a scientific resource of global significance (Hill 1995). Hellyer Gondwanan insect fossil site (oldest in Australia) (Jell 2004)</li> <li>• Kraznozem soils: extensive intact vegetation on basalt lava flows.(rare)</li> <li>• Gondwanan biota, both living and in fossil form, demonstrate multiple links to Gondwana.</li> </ul>	<p><b>Criterion (viii)</b>'be outstanding examples representing major stages of earth's history, including the record of life, significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features;'</p>	<p>As with the Tasmanian Wilderness World Heritage Area, no one particular feature of the Tarkine represents the core or '...outstanding examples representing major stages of earth's history, including the record of life, significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features'. Instead, it is the many features combined which provide the evidence of the major stages of earth's history, from the most ancient of rocks, the Pre-Cambrian through to the modern day aeolian coastal sand dunes are all chapters in the story of earth's history.</p> <p>Fossil and sub-fossil material in the Tarkine, from the Carboniferous insect fossils of Hellyer gorge, through the Little Rapid River macro plant fossils, to the sub-fossil Huon pine logs in the Stanley River, the fossil resource of the Tarkine is already outstanding.</p> <p>Provisional assessment of the numerous outstanding geological, geomorphological and Gondwanan linked biological resources of the Tarkine suggests there is a case for qualifying against Criterion (viii) 'be outstanding examples representing major stages of earth's history, including the record of life, significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features;' Qualification against Criterion (viii) requires further analysis.</p> <p>If added to the TWWHA, the various attributes and values presented here against Criterion (viii) would make a very important contribution to the values and hence the integrity of the Tasmanian World Heritage Area.</p>

Heritage summary—Tarkine Region*		
*Approximating the ENGO-proposed Tarkine National Park.		
WORLD HERITAGE		
Attribute	Relevant criterion	Value
<ul style="list-style-type: none"> <li>• extensive landscapes—including ‘wilderness areas’—in which natural evolutionary processes continue, evidenced by undisturbed tracts of vegetation, pristine catchments, lakes and streams;</li> <li>• extensive landscapes free from introduced plants and animals.</li> <li>• extensive tracts of cool temperate rainforest and buttongrass moorland and blanket bogs conducive to ongoing evolutionary processes.</li> <li>• extensive landscapes, which demonstrate the ongoing interaction of vegetation with natural ongoing processes, in particular fire, creating a vegetation mosaic of communities promoted by frequent fire through the transitional communities of eucalypt forest to highly fire sensitive temperate rainforest.</li> <li>• species with Gondwanan affinities that are of outstanding significance in terms of the evolution of plant life, including Huon pine <i>Lagarostrobos franklinii</i>, Beech <i>Nothofagus cunninghamii</i>.</li> </ul>	<p>Criterion (ix) ‘...be outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals</p>	<p>The Tarkine has outstanding examples representing significant ongoing geological, ecological and biological processes in the evolution and development of terrestrial, fresh water and coastal ecosystems and communities, including:</p> <ul style="list-style-type: none"> <li>• sites where processes of geomorphological and hydrological evolution are continuing in an uninterrupted natural condition (including karst formation, fluvial deposition, marine and aeolian deposition and erosion, and development of peat soils and blanket bogs); such landscapes are now rare in Australia, indeed through much of the temperate zones of the world</li> <li>• ecosystems that are relatively free of introduced plant and animal species; this compares favourably with the TWWHA but unlike many landscapes in mainland Australia.</li> <li>• ecosystems which (with the notable exception of the recently extinct Tasmanian tiger) retains all of the complement of biodiversity existing at the time of European settlement—a rarity in Australia, indeed many parts of the world.</li> <li>• coastal plant communities largely free of exotic sand binding grasses and shrubs that show natural processes of dune formation and erosion; unlike the sandy coasts of north and east coasts of Tasmania and much of mainland Australia. (Control strategy in place)</li> </ul>

Heritage summary—Tarkine Region*		
*Approximating the ENGO-proposed Tarkine National Park.		
WORLD HERITAGE		
Attribute	Relevant criterion	Value
<ul style="list-style-type: none"> <li>• sites where processes of geomorphological and hydrological evolution are continuing in an uninterrupted natural condition (including karst formation, fluvial deposition, coastal aeolian deposition and erosion, and development of peat soils and blanket bogs)</li> <li>• coastal sand environments, including active sand dunes and which are free of introduced sand binding grasses</li> <li>• coastal environments utilised by migratory species of conservation importance including the endangered orange bellied parrot <i>Neophema chrysogaster</i></li> </ul>		<ul style="list-style-type: none"> <li>• undisturbed catchments and streams; ecological transitions from moorland to rainforest and tall eucalypt forests; apart from TWWHA, rare in Tasmania and mainland Australia.</li> <li>• conifers of extreme longevity (Huon pine) including sub-fossil logs dating 10,000+ yrs -already proven of global significance.</li> <li>• endemic members of invertebrate groups; invertebrates of unusually large size (e.g. the giant freshwater crayfish <i>Astacopsis gouldi</i> animal and bird species whose habitat elsewhere is under threat (e.g. the spotted-tail quoll—<i>Dasyurus maculatus</i>, Tasmanian Devil <i>Sarcophilus harrisi</i>, <i>Mastacomys fuscus</i> and the ground parrot, <i>Pezoporus wallicus</i>);</li> </ul>



Heritage summary—Tarkine Region*		
*Approximating the ENGO-proposed Tarkine National Park.		
WORLD HERITAGE		
Attribute	Relevant criterion	Value
<ul style="list-style-type: none"> <li>• giant freshwater crayfish <i>Astacopsis gouldi</i> northern Tasmanian endemic, world's largest freshwater crayfish</li> <li>• many local endemic invertebrate species (e.g. two species of Pauropoda (<i>Allopauropus convexus</i> mss name, <i>Stylopauropoides erectus</i> mss name))</li> <li>• important bird habitat (e.g. eastern ground parrot Tasmanian endemic subspecies <i>Pezoporus wallicus leachi</i>)</li> <li>• orange-bellied parrot (<i>Neophema chrysogaster</i>), critically endangered species forage in the Tarkine. Critically important habitat</li> <li>• eleven of the 12 Tasmanian endemic birds are resident.</li> <li>• important fish habitat Tasmanian whitebait and Tasmanian smelt (<i>Retropinna tasmanica</i>) are endemic. The Australian grayling is threatened species (all three inhabit in Pieman River)</li> <li>• major representation of cool temperate rainforest (largest in Australia)</li> <li>• rare and outstanding example of rainforest on basalt kraznozem soils (Mt. Bertha/Savage River)</li> <li>• Major representation of <i>Gymnoschoenus sphaerocephalus</i> (buttongrass) moorland (important habitat)</li> </ul>	<p>Criterion (x) 'contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.'</p>	<p>Although the Tarkine and the TWWHA share much of their biota there are some significant differences at the both the community and species level. Indeed they even complement each other with several migratory species utilising both regions e.g. orange bellied parrot <i>Neophema chrysogaster</i> (breeds in TWWHA and feeds in Tarkine on annual migration)</p> <p>The Tarkine contains habitats important for endemic plant and animal taxa and taxa of conservation significance, including:</p> <ul style="list-style-type: none"> <li>• extensive rainforest communities;</li> <li>• moreland</li> <li>• riparian and lacustrine communities (including Tasmania's only non-meromictic polyhumic forest lake)</li> </ul> <p>Habitats which are relatively undisturbed and of sufficient size to enable survival of taxa of conservation significance including endemic taxa:</p> <ul style="list-style-type: none"> <li>• Plant species of conservation significance</li> <li>• Animal species of conservation significance, such as: <ul style="list-style-type: none"> <li>○ giant freshwater crayfish <i>Astacopsis gouldi</i></li> <li>○ spotted-tail quoll <i>Dasyurus maculatus</i></li> <li>○ swamp antechinus <i>Antechinus minimus</i></li> <li>○ broad-toothed rat <i>Mastacomys fuscus</i></li> <li>○ ground parrot <i>Pezoporus wallicus</i></li> <li>○ orange-bellied parrot <i>Neophema chrysogaster</i></li> <li>○ Tasmanian subspecies of the Wedge-tailed Eagle (<i>Aquila audax fleayi</i>) (listed as 'Endangered' under EPBC)</li> <li>○ Tasmanian devil (<i>Sarcophilus harrisii</i>) (endangered species).</li> </ul> </li> </ul>

### **Threatening processes**

A range of threatening processes can be identified in the Tarkine, all of which must be addressed in heritage conservation planning. The most significant threats include:

- roads
- logging and associated roads
- mining and associated roads and effluent discharge into streams
- vehicular access, especially in coastal areas
- *Phytophthora cinnamomi* pathogen (in buttongrass moorland)
- inappropriate fire regimes, especially in buttongrass moorland.



Mining represents a significant threat to the environment in the Tarkine, including its outstanding heritage values and could complicate or threaten protection of those values. Existing Savage River mine, straddling the Savage River. Environmental impacts may extend well beyond the immediate footprint of a mine site with roads, pipelines, powerlines and effluent potentially impacting a much wider area.

Mining in particular has the potential to seriously detract from the full potential of this outstanding natural tract of land. The undeniable high conservation value (HCV) of the Tarkine, including high probability of World Heritage significance, needs to be factored into all development decisions in the region.

### **Boundary considerations**

Comparing the boundaries of the ENGO-proposed national park and the current assessment area adopted by the Australian Heritage Council (AHC) reveals some very important differences, which need to be explained. The more significant differences are identified below:

### **Mawson Bay area**

This appears to be part Arthur Pieman Conservation Area and West Point Aboriginal Site: Included in the AHC assessment area but not included in the Proposed National Park.

**Comment:** Based on at least the Aboriginal cultural heritage values in the area, the AHC is justified in including this outlier area in the Tarkine National Heritage Assessment. There are some unusual geomorphic/vegetation features behind Bluff Hill Point, which deserve investigation (see below).

### **Excluded enclaves**

A number of areas internal to the national park proposal have been excluded from the AHC assessment process, some for obvious reasons, some not so obvious. See example below.

**Comment:** Some such exclusions are already heavily impacted and have probably lost any heritage values. Others are intact natural vegetation and have identified important heritage values. For example, an area of state forest excluded in Rebecca Creek (adjoining Arthur–Pieman Conservation Area) is part of a landscape unit which has one of the greatest concentration of Aboriginal cultural sites, including stone quarries, in the Tarkine area (circa 50+ sites in the catchment of Rebecca and Little Eel Creeks). This appears to be an example of where potentially important heritage values may not be captured by the National Heritage assessment process.



Excluded enclave: An area within the national park proposal but excluded by AHC assessment: the reason is obvious with a complex of mining disturbances. Blue is AHC exclusion, yellow tint is ENGO HCV [FID 252]

### **Arthur River–Frankland River**

A large tract of mostly naturally vegetated land between the Arthur and Frankland Rivers in the north of the Tarkine within the proposed Tarkine National Park was originally included in the emergency National Heritage gazettal but has now been excised from the National Heritage assessment area:

**Comment:** It is most regrettable that any proposal for a major protected area, indeed World Heritage nomination, incorporating all or part of this potentially important tract of forest and moorland has been pre-empted by the National Heritage assessment process. This excision also excludes the very extensive and little known ‘Welcome Swamp/Salmon/Blackwater Karst Systems’ (Tasmanian Geoconservation Database) together with a long section of the Arthur River gorge.

### **Sumac Road**

A large area of forested land on the Sumac Road—ENGO HCV [FID 252]—is within the national park proposal but has been excluded from the AHC assessment process.

**Comment:** Notwithstanding that there has been some limited coupe logging in this section, the overall natural condition and extent of rainforest would be a good reason to at least assess the natural heritage values of the area. This exclusion is critical to planning and designing a major protected area in the Tarkine. The area excised from the assessment area, as well as excluding significant areas of temperate rainforest, including a link between two major rainforest tracts, also excludes the Sumac karst system.

### **Trowutta–Sumac Karst**

The high conservation value Lake Chisholm and associated extensive areas of the Trowutta-Sumac Karst have been omitted from both the national park proposal and the AHC assessment process. Lake Chisholm is at least of national significance and possibly of world significance. (Lake Chisholm is the only non-meromictic polyhumic forest lake in Tasmania and is also of particular geoconservation importance as a water-filled sinkhole)

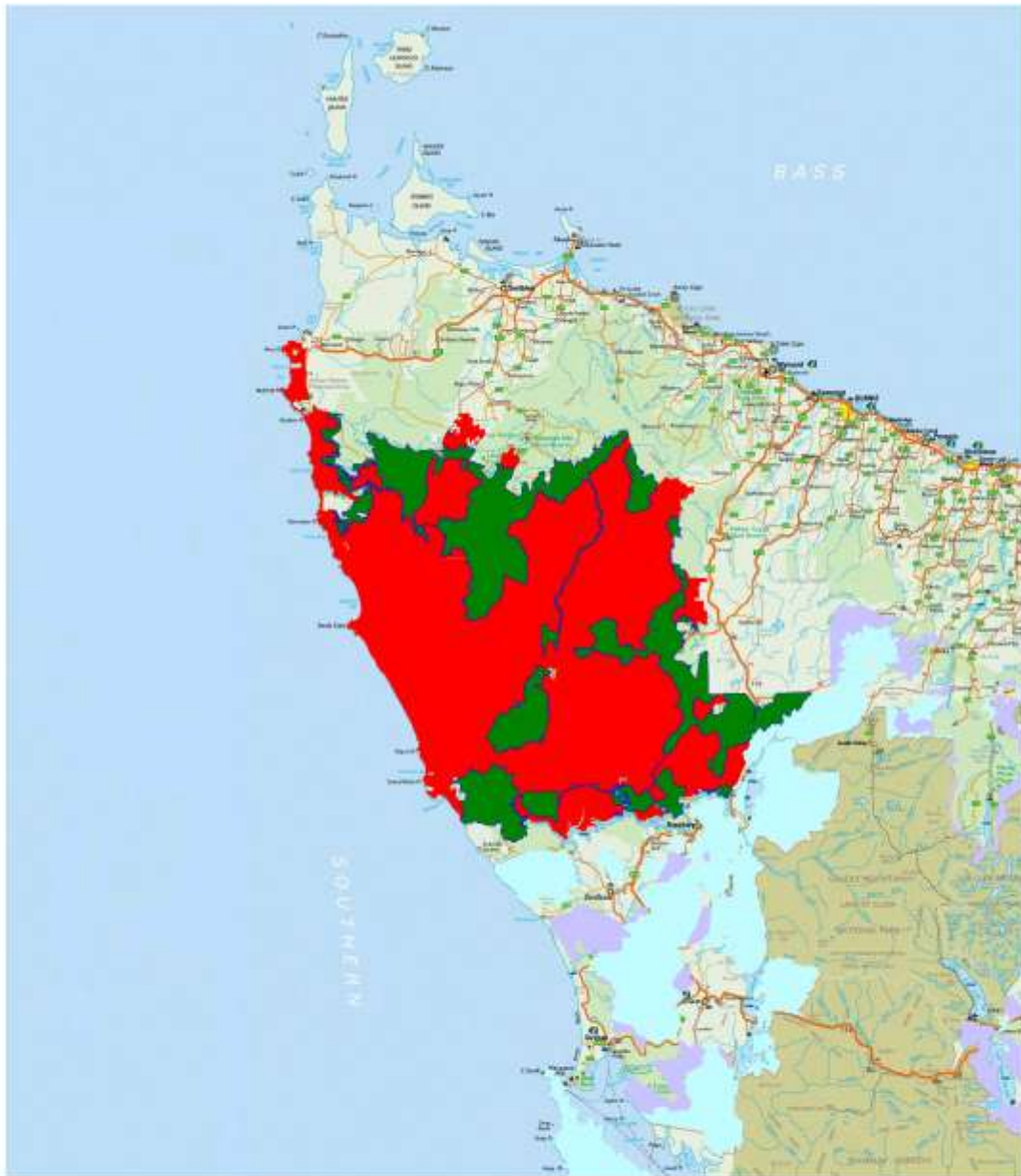
### **Link to TWWHA**

Although not part of the ENGO HCV, it is recommended that logically those public reserves east of Lake McIntosh (Granite Tor CA and that part of Reynolds Falls NRA east of McIntosh Creek) be added to the Tasmanian Wilderness World Heritage Area. As well as adding protection to these important heritage assets significantly improves the existing boundary of the TWWHA in this locality. This has been previously recommended\* on a number of occasions. This tract of existing reserves is a vital link between the TWWHA and any major protected area in the Tarkine and should be recognised for its habitat connectivity value irrespective of any World Heritage nomination of the Tarkine.

\*[Department of Parks, Wildlife and Heritage (1990): *The Appropriate Boundaries of a World Heritage Area in Western Tasmania—report to the Minister of Parks, Wildlife and Heritage.*]

Notwithstanding that important heritage values may have been excluded from the National Heritage assessment process, any known attributes of these areas were taken into account when assessing the overall heritage significance of the Tarkine region.

### Proposed Tarkine World heritage Area



Proposed WHA boundaries proposed for consideration for WHA  
designated in this proposal. Prepared by IVG 21/11/2014  
All reserves managed by TASS 21/11/2014  
Reserves and the wilderness - the world heritage program for Australia

CHAPTER 6

North Central



## Chapter 6

### North Central

Lands associated with northern boundary of TWWHA (Central Plateau, Western Tiers, Mole Creek, Mersey, Cradle Mountain)

### Central Plateau—Great Western Tiers

#### Introduction

A series of ENGO-proposed reserves adjoin or are adjacent to the Tasmanian Wilderness World Heritage Area. Some parcels extend well east of the TWWHA. It is apparent that the rationale for the ENGO proposals is to achieve a more general north-easterly extension along the Great Western Tiers and Central Plateau.

As there are so many separate parcels of the ENGO-proposed reserves and there is no immediate evidence to hand that suggests that any one parcel of land would qualify as of stand-alone World or National Heritage significance, it was considered appropriate to conduct at least an initial assessment on the aggregate of parcels. Any attributes or values specific to individual parcels have been documented where necessary.

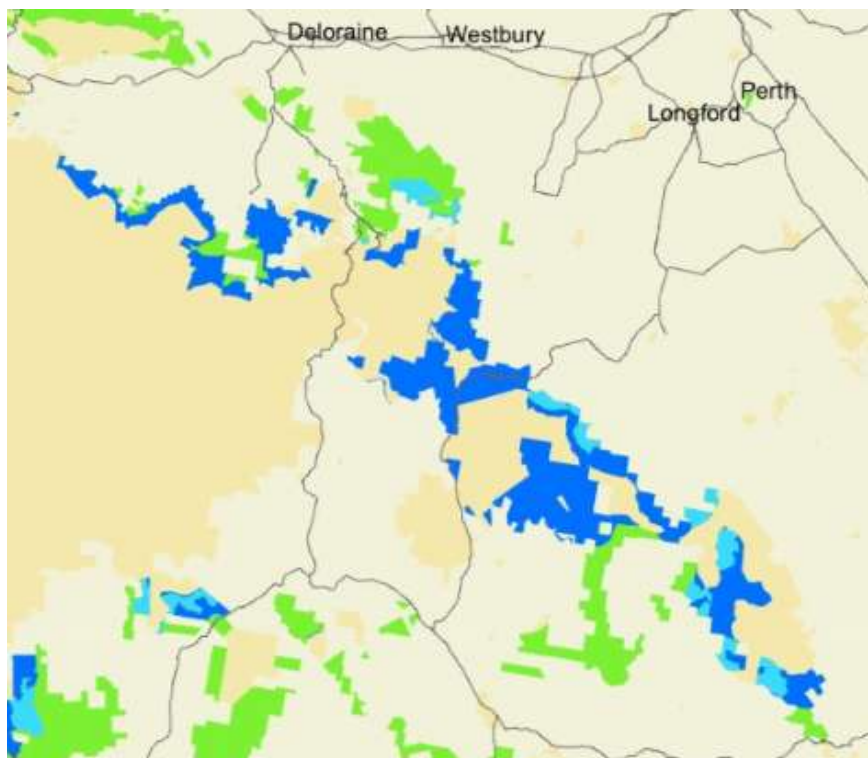


Diagram illustrating a string of ENGO proposed reserves (dark blue and light blue) along the Great Western Tiers and the Central Plateau. The assumption is made that the vision behind inclusion of some of the more easterly parcels is that together with closely associated Conservation Areas these might be proposed for addition to the Tasmanian Wilderness World Heritage Area.

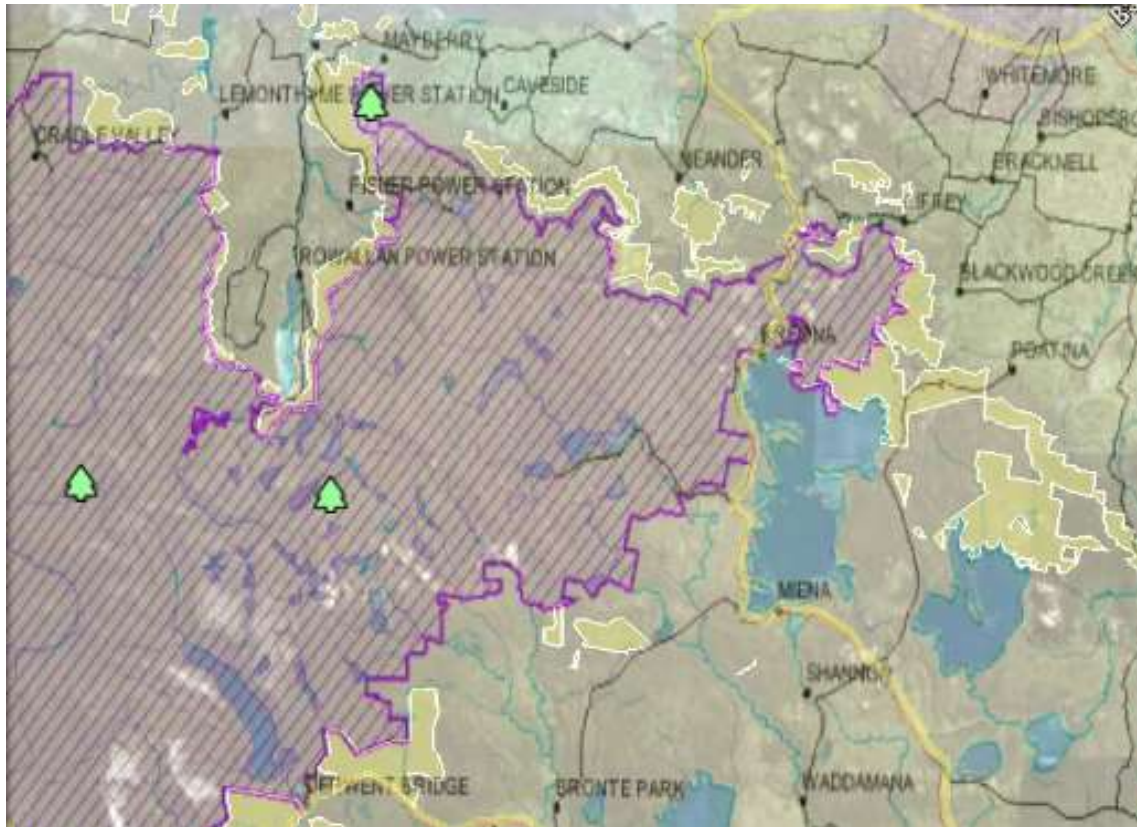


Diagram illustrating a string of ENGO nominated reserves (yellow) along the Great Western Tiers (left) and the Central Plateau (right).

## Context for assessment

The ‘Great Western Tiers’ aggregate of ENGO-proposed reserves has been selected for assessment as a generic group but where necessary, the attributes and values of particular individual parcels have been identified.

### *Characterising the Great Western Tiers*

The verification process involved a series of relatively small parcels of ENGO-proposed land along the Great Western Tiers, most of which occupy a very similar topo-geographic position in the landscape. Rather than analysing each and every parcel of land separately it was decided, at least initially, to address the generic issue. This led to them being listed as ENGO-proposed reserves with likely generic values.

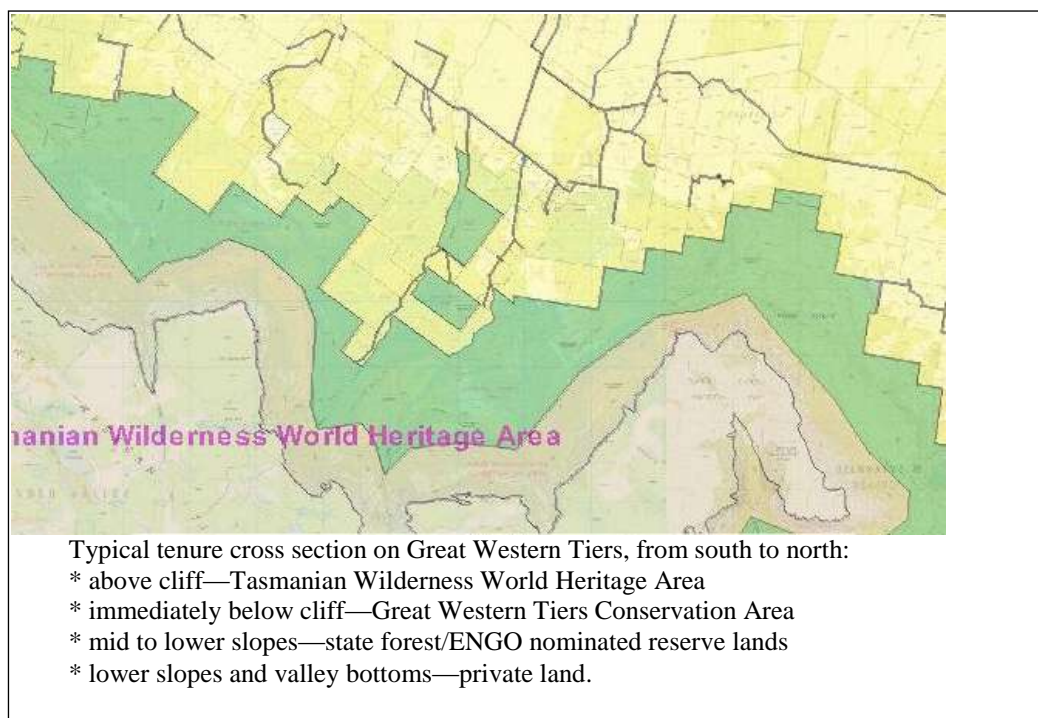
For the sake of this verification exercise, the geographic feature largely identified as the ‘Great Western Tiers’ might be characterised as follows:

- Land marked by a near continuous cliff lined escarpment extending from Devils Gullet in the west to Millers Bluff in the east. This is the northern escarpment of the Central Plateau.
- Geographically, the ‘Great Western Tiers’ landscape unit comprises:
  - flat to undulating, often rocky plateau surface
  - well-defined cliff line in dolerite geology
  - immediate under cliff environment comprising mostly rocky scree slopes and in places minor sandstone cliffs in underlying sedimentary strata



- a gradation of mostly drier eucalypt woodland and forest on the mid to lower slopes
- a significant number of small streams, including some that drain over the escarpment, often as small waterfalls creating environments conducive to development of gallery rainforests in incised valley heads below the escarpment.
- Historically:
  - agricultural development extended from the lowlands up to the foot slopes under the escarpment
  - timber harvesting focussed on accessible forest areas on the mostly steeper footslopes not suitable for agriculture
  - the plateau surface of the Central Plateau, being mostly unsuitable for agriculture or timber harvesting, was protected for conservation, initially using the convenience of the cliff line to define the protected area.
- Changing knowledge and community interest:
  - increasingly valued scenic backdrop
  - increasing interest in public recreational access to under cliff area
  - increased awareness of environmental values
  - increased knowledge and understanding of Aboriginal sites in under cliff area
  - increased perception of link with Tasmanian Wilderness World Heritage Area on plateau area
  - initial government response with some protection of under cliff areas of lesser interest for timber production.

From a World Heritage/Protected Area perspective, the cliffed escarpment was originally seen as a very convenient land use and protected area boundary. Revising the purpose and values of the TWWHA lead to thinking that adopting the cliffline as the boundary fails to recognise important heritage values integrally associated with the cliffed escarpment of the Central Plateau and under cliff environments. If the sole objective of the TWWHA was to protect alpine plateau environments, then the original cliffed boundary might still be appropriate.



Taking a more holistic view of the landscape, the significant heritage values, including World Heritage values, do not end at the cliff edge. Rather the cliffs and under cliff areas form an integral part of the same wilderness or largely intact landscape additional to the alpine plateau environment:

- wilderness values in some cases extend below the cliffs
- a regional scale concentration of Aboriginal sites is closely associated with caves below the cliffs (as well as the lakes above the escarpment)
- plant communities not otherwise represented in the TWWHA
- regional connectivity of forest habitat along under cliff and lower slopes.

There is a reasonable expectation that there are heritage values and attributes extending below the cliffline, and indeed may be nationally and internationally significant. Given the juxtaposition, and in some cases ecological relationship, of much of the escarpment and under cliff environment to the existing Tasmanian Wilderness World Heritage Area, it is appropriate for some of those natural and cultural attributes to be assessed for heritage value and significance in the context of the TWWHA. Natural or cultural attributes or features which are 'partly in and partly out', of the TWWHA are given special attention on the basis of the contribution that they could make to the integrity of the existing TWWHA.

Adding the largely intact forested lands below the cliffed escarpment would undoubtedly add a new dimension to the natural and cultural heritage values of the Tasmanian Wilderness World Heritage Area and so better contribute to the integrity of the TWWHA.

It was noted that most of the ENGO-proposed reserves below the cliffed escarpment are separated from the boundary of the Tasmanian Wilderness World Heritage Area by a corridor already within the Western Tiers Conservation Area. Accordingly, the assessment takes that into account and considers the combination of both the ENGO-proposed reserves and the conservation area(s).

In assessing the series of ENGO-proposed parcels below the escarpment, attributes of particular interest included:

- presence of or probability of Aboriginal cultural sites
- presence of threatened plant communities
- attributes or features that may be already partly within the TWWHA
- connectivity of forest habitat at regional scale
- outstanding scenic beauty
- manageability and boundary considerations.

## Heritage assessment

The fundamental generic question that arises is whether the lands below the cliffline of the Great Western Tiers can contribute to the value and integrity of the Tasmanian Wilderness World Heritage Area. Answering this question would lay the groundwork for assessing the ENGO-proposed reserves below the escarpment, both individually and collectively.

The well-defined regional scale cliff line known as the Great Western Tiers forms, in many places the northern boundary of the World Heritage Area and is from a protected area boundary perspective, a highly appropriate boundary. However, the primary focus must be on the issue of the heritage values. Significance of the lands below the cliffs and the appropriateness of the boundary are of secondary concern.

Several precedents have already been set for extending the TWWHA to below the cliffs including:

- Mole Creek Karst National Park
- Liffey Falls
- Dry's Bluff.

The primary focus should therefore be on the heritage values.

At the generic level, there is a sound case for considering lands below the cliff line for including in the TWWHA.

### Criterion (vii)

The inscribed values recorded against Criterion (vii) include:

... dolerite capped mountains (including Cradle Mountain, Frenchmans Cap, Federation Peak and Precipitous Bluff);

Whereas individual mountains are cited, by far the largest scale (more than 100 km long), and arguably a superlative natural phenomenon in its own right, is the huge exposure of the dolerite cap forming the Central Plateau, forming the Great Western Tiers. The spectacular escarpment created by the very extensive dolerite capping of the Great Western Tiers represents a third dimension of the Central Plateau section of the TWWHA, exposing both the dolerite capping in cross section and also in places the underlying sediments.

The Great Western Tiers is of such dimension and acclaimed natural beauty and aesthetic importance that it meets Criterion (vii) '... superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance;'. As such, if added to the TWWHA, the Great Western Tiers would add both a largely new value as well as contribute to the integrity of the existing TWWHA.

### Criterion (viii)

Outstanding examples of stages of earth's history.

... to be outstanding examples representing major stages of earth's history, including the record of life, significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features;

The Great Western Tiers is a 'significant geomorphic or physiographic feature'.

The inscribed values statement for the TWWHA lists against Criterion (viii)

'Permian–Triassic sediments and associated Jurassic dolerite intrusions;' although Sharples (2003) suggests that this value requires further investigation and comparison with related features in Antarctica and South Africa.

Notwithstanding Sharples's reservations, adding the Great Western Tiers to the TWWHA would substantially contribute to the geoconservation values of the adjoining TWWHA and hence to the integrity of the TWWHA boundaries.

### **Criterion (ix)**

Outstanding examples of ongoing evolution.

... sites where processes of geomorphological and hydrological evolution are continuing in an uninterrupted natural condition (including karst formation, ... fluvial deposition, evolution of spectacular gorges, marine and aeolian deposition and erosion, and development of peat soils and blanket bogs);'

To this could equally be applied to the Great Western Tiers where ongoing '*geomorphological and hydrological evolution are continuing in an uninterrupted natural condition*', is ongoing and continues to drive the retreat and renewal of this great escarpment.

As a geological/geographic feature, the Great Western Tiers has the potential to qualify as a value against at least one World Heritage Criterion, particularly, Criterion (vii) '... superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance;'. Natural vegetation, animals and Aboriginal sites associated with the feature also have the potential to contribute value and integrity to the World Heritage Area.

**In conclusion**, there are a number of valid grounds for considering the Great Western Tiers—a complex of geological, geomorphological, biological, scenic, cultural heritage values—to be potentially a very important addition to the existing Tasmanian Wilderness World Heritage Area, and could contribute to both the values and integrity of the World Heritage Area. Subject to closer scrutiny for condition and integrity, those ENGO-proposed reserves associated with the escarpment have heritage values, which are of both national and global significance, and are prospective additions to the TWWHA.

**NOTE:** Those parts of the Great Western Tiers Conservation Area that are not yet part of the TWWHA, have been taken into account as an integral part of the landscape unit in which the ENGO-proposed reserves are located and assessed accordingly. The whole of the Great Western Tiers Conservation Area should be added to the TWWHA together with the specified ENGO-proposed reserves.

### **Notes on individual parcels**

#### **FID 125**

Mostly dry forest but with some extensive recent clearing. Needs subdivision to remove main older clearing.

**NOTE:** Several Aboriginal sites are recorded near the clearing so care should be taken to include them in area to be protected.

Most eastern section (Bessell's Road)—concentration of Aboriginal cultural sites. Adopting the ENGO-proposed boundary is appropriate.

Meander River section—it is recommended to delete the most heavily logged and cleared section and devise a better boundary in the remainder.

### Long section (western)

Boundary is mostly appropriate. Significant areas of plantation are below Mother Cummings Peak so an exclusion and a shorter boundary needs to be considered.



FID 125: Recent clearing

### FID 115

Escarpment Section (southern)—together with the Great Western Tiers Conservation Area, contributes to integrity of TWWHA (ecological diversity, regional connectivity, boundary benefits).

Warners Road satellite forest (northern)—at least five Aboriginal cultural sites. Small areas of *E. ovata* threatened vegetation community—part in, part out. No immediately obvious contribution to the natural heritage of TWWHA but if considered together with Quamby Bluff, of possible national significance.

### FID 114, 121

These two parcels of forest directly relate to the Quamby Bluff Forest Reserve, not directly to the Tasmanian Wilderness World Heritage Area. FID 114 directly adjoins the Western Tiers Conservation Area. As such, at least in terms of habitat connectivity there is a habitat corridor link back to the Western Tiers proper. Quamby Bluff might be regarded as a ‘satellite’ facsimile of the Great Western Tiers, complete with remnant capping of dolerite (dolerite cap listed on Tasmanian Geoconservation Database). Quamby Bluff represents a more advanced stage in the erosion of the dolerite cap and may offer further insight into the evolution of the Great Western Tiers escarpment. If considered in conjunction with Quamby Bluff and FID 115, would be of at least state significance and may also qualify for National Heritage if the dual connectivity back to the Western Tiers and TWWHA are taken in to account.

### FID 108, 109, 110

This is in the Liffey Falls Area. FID 109 is of local significance only and 108 is forested and drains directly into the TWWHA and would contribute to the integrity of the TWWHA (catchment protection). FID 110 is of at least national significance and, if considered in

conjunction with the adjoining Great Western Tiers Conservation Area, would contribute to the integrity of the TWWHA.

### FID 106

Mostly directly adjoins the TWWHA and is a tract of eucalypt forest below the escarpment. One Aboriginal site recorded. Almost all is intact natural forest. One small section cleared (illegal logging?) If added to the TWWHA, resultant boundary would be acceptable and appropriate (accessible surveyed straight line adjoining private lands). If added to the Tasmanian Wilderness World Heritage Area, FID106 would contribute significantly to the integrity of the TWWHA. In summary, this would make a good addition to the TWWHA.

### FID 97

Plateau Section—Great Lake—contains areas of highland grassy sedgeland (MGH)

Plateau Section—Arthurs Lake—contains areas of subalpine *Diplarrena latifolia* rushland (MDS). Contains areas of MGH.

### Below escarpment section

The eucalypt forest contributes to regional-scale forest connectivity right along the Great Western Tiers escarpment.

### FID 120 Not on Tiers

Tasveg.2.0 Code NLM *Leptospermum lanigerum*–*Melaleuca squarrosa* swamp forest threatened vegetation community (LIST)

Summary attributes of parcels closely associated with Great Western Tiers						
FID	Locality name	Cultural site(s)	Threatened community/species	Contributes to forest connectivity	Boundary improvement	Comment
78	Millers Bluff	3 sites	Minor occurrences	No	No	No particular heritage values identified. Need for further investigation.
97 + 84	Poatina Rd. to Maclanachan S'loaf	5+	Yes <i>Eucalyptus amygdalina</i> on Cainozoic Karst under Thresherman's Hill	Yes	Improvement as addition to Conservation Area .	Adjoins Conservation Area but does not adjoin TWWHA directly.
97	Arthur Lake section	30+		Extension of plateau habitat	No	Plateau environment.

Summary attributes of parcels closely associated with Great Western Tiers						
FID	Locality name	Cultural site(s)	Threatened community/species	Contributes to forest connectivity	Boundary improvement	Comment
97	Above cliffs (Gt. Lake)	15+		No	Yes (consolidation of TWWHA)	Logical addition to TWWHA.
106	Westons Rivulet	1	No	Yes	Yes	Good enhancement to TWWHA.
108	Liffey Falls		Unknown	Unknown	Yes	Small parcel draining directly into TWWHA. Possible benefit to integrity of TWWHA.
109	Liffey Falls	Unknown	Unknown	Unknown	Unknown	Very small parcel. Possible benefit to integrity of WHA boundary.
110	Liffey Falls	No	No	Yes	Yes Good consolidation of TWWHA.	Important addition to TWWHA + GWT CA addition.
114	Quamby Bluff	No	No	Yes, improves connectivity of Quamby Bluff Res to GWT CA and hence WHA	Yes for Quamby Bluff  No for TWWHA	Useful Addition to Quamby Bluff FR/Great Western Tiers CA.

Summary attributes of parcels closely associated with Great Western Tiers						
FID	Locality name	Cultural site(s)	Threatened community/species	Contributes to forest connectivity	Boundary improvement	Comment
121	Quamby Bluff	-	-	-	-	Adds intact forest to QBFR and improves boundary.
125 Sth	Warners Falls– Quamby	5+	-	Yes	Yes	Important component of GWT for addition to TWWHA.
125 Nth	Quamby	5+	-	Part (satellite)	No	Link to satellite forest area (Quamby Bluff).
136	Meander	10+	-	Yes	Yes	

### Data sources

Included:

- Tasmanian Government official Aboriginal site records
- LIST Database (particularly for threatened plant communities)
- published papers (e.g. Sharples 2003)
- Google Earth imagery
- Internet sourced pictorial imagery (for natural beauty, aesthetic assessment).



Summary—Great Western Tiers		
World Heritage		
Attribute	Relevant criterion	Value
Major (100 km+) dolerite cliffed escarpment, which is visually outstanding and includes areas of exceptional natural beauty.	Criterion (vii) ‘... superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance;’	The Great Western Tiers would add a new ‘third’ dimension to the TWWHA in terms of both ‘natural beauty and aesthetic importance’. The Great Western Tiers is ‘... of exceptional natural beauty and aesthetic importance;’
Permian–Triassic sediments and associated Jurassic dolerite intrusions	Criterion (viii) ‘outstanding examples representing major stages of earth’s history,’	An area where ongoing ‘ <i>geomorphological and hydrological evolution are continuing in an uninterrupted natural condition</i> ’, and which drives the retreat and renewal of this great escarpment. The Great Western Tiers would substantially contribute to the <i>geoconservation value</i> of the TWWHA and hence to the integrity of the TWWHA.
e.g. threatened plant communities.	Criterion (x) ‘... most important and significant natural habitats for in-situ conservation of biological diversity ...’	Would add a whole new dimension to the ecological diversity of the TWWHA, incorporating new drier, lower elevation forest communities on different substrates. Makes significant contributions to the ecological diversity and hence integrity of the TWWHA.
Numerous Aboriginal cultural sites including cave occupation sites & open sites.	Criterion (v) Outstanding example of traditional settlement	‘archaeological sites which provide important examples of the hunting and gathering way of life, showing how people practised this way of life over long time periods, during often extreme climatic conditions and in contexts where it came under the impact of irreversible socio-cultural and economic change.’

National Heritage		
Attribute	Relevant criterion	Value
		Not assessed as area qualifies as an area which would make an important contribution to the integrity of the Tasmanian Wilderness World Heritage Area and which is also National Heritage listed.

## Heritage summary

The Great Western Tiers landscape, assessed at the generic level, has attributes which if added to the Tasmanian Wilderness World Heritage Area represent new World Heritage values and which would also contribute to the integrity of the TWWHA.

In particular, the Great Western Tiers represents an area ‘... of exceptional natural beauty and aesthetic importance;’ thereby significantly contributing to the integrity of the TWWHA.

The major exposure of ‘Permian–Triassic sediments and associated Jurassic dolerite intrusions’ presented by the Great Western Tiers would substantially contribute to the geoconservation values of the TWWHA and hence to the integrity of the TWWHA. It presents the ‘third dimension’ of the extensively glaciated dolerite capped Central Plateau already within the TWWHA.

Included in the Great Western Tiers landscape are a series of threatened communities, especially on higher elevation and plateau edge areas, which would contribute to the integrity of the TWWHA.

There are several very significant clusters of Aboriginal archaeological sites, both above the cliffs and below and which would contribute significantly to the already cited cultural heritage values of the Tasmanian Wilderness World Heritage Area, thereby contributing to the integrity of the TWWHA.

Given the substantive evidence of the heritage significance of the Great Western Tiers in the context of being an addition to the TWWHA and time constraints applying to the assessment, National Heritage was not assessed. However, the Great Western Tiers aggregate of ENGO-proposed reserves and existing Conservation Area(s) would certainly enhance the National Heritage value of the already National Heritage listed TWWHA.

The precedent had already been set for extending the TWWHA below the cliffed escarpment (Mole Creek, Liffey Falls and Drys Bluff) so the Great Western Tiers is already partly within the TWWHA. Adding the balance would therefore contribute to the integrity of the site.

The assessment therefore verifies that the collection of ENGO-proposed reserve lands, considered in conjunction with the adjoining Great Western Tiers Conservation Area, if added to the Tasmanian Wilderness World Heritage Area, would contribute to the integrity of the TWWHA and therefore have World Heritage significance and, hence, National Heritage significance.

## Conclusion

A selection of the ENGO-proposed reserves along the northern part of the Central Plateau and the Great Western Tiers was verified as being of conservation importance, much being of National Heritage and World Heritage significance, especially because of the important value-adding and contribution to integrity that these areas could make as additions to the TWWHA.

## Recommendations

1. Recognise that decision-making on the ENGO-proposed reserve lands of heritage significance along the Great Western Tiers must be integrally linked with the Great Western Tiers Conservation Area, the critical link to the Tasmanian Wilderness World Heritage Area.
2. Add the ENGO-proposed reserve lands identified in this report, together with the closely associated Great Western Tiers Conservation Area to the Tasmanian Wilderness World Heritage Area.

Extensive high rainfall, glaciated, upland karst system developed in Ordovician Gordon Group limestone. More than 200 caves known, some of which are spectacularly decorated. Very large variety of surface and subsurface karstic landforms and features, many of which are individually significant at a national level or higher. This system is one of the three or four most extensively developed karst systems in Tasmania. It corresponds to Kiernan's (1995) NW48 area. Significant surface and underground karst features include the following:

... the Mole/Lobster system includes Westmorland Cave, Herbet Pot, Wet Cave, Honeycomb Cave and Pyramid Cave, taking the headwaters of Mole Creek from where they first sink underground below Westmoreland Falls to their final emergence at Scott's Rising; the Kubla Khan system is internationally renowned for its underground scenery, geomorphological and biological values; Croesus, Lynds and Tailender Cave systems, all magnificently decorated and significant at a national scale for aesthetic, geomorphological and biological values; The Devils Pot–Marakooopa and King Solomons–Kohinoor–Soda Creek systems are significant for tourism at a state and national level; The Mersey Hill–Den Cave system is an extensive series of near horizontal passages, potentially useful in determining long-term erosion rates in the Mersey catchment; The My–Cyclops–Baldocks–Sassafras Cave system is important for preserving relicts of early cave tourism and for its biological values—the glow-worm displays in Sassafras Cave are at times spectacular; Many other caves are also significant. Significant and visually spectacular surface karst features include: Sassafras Rising, Scotts Rising, Croesus Cave outflow, Tailender Cave, Little Trimmer Cave, Lynds Cave, Kubla Khan Exit Cave, and Soda Creek Cave Springs are significant karst springs; Westmorland Cave, Kelly Pot, Devils Pot, Execution Pot, Circular Ponds and Howes Cave are representative of many important and spectacular streamside sinks, many with underground waterfalls; Dogs Head Hill and Cheops Pyramid are significant karst residual hills.

—Tasmanian Geoconservation Database

## Mole Creek Karst cluster

FID 121, 124, 142, 129,136, 131, 133, 134, 135, 141, 148, 151, 155, 158

### Introduction

This collection of ENGO-proposed reserves is centered on the Mole Creek Karst although not all areas are necessarily karst.

A brief outline of the heritage assessment is provided in the table below.

Summary—Mole Creek Karst		
ENGO reserve parcel no.	Heritage significance	Remarks
FID 142	<p>Located in a karst landscape with many sinkholes. Part of the Dogs Head Hill/Union Cave system of the Mole Creek Karst.</p> <p>Dry open eucalypt forest—mapped as threatened plant community <i>Eucalyptus amygdalina</i> forest and woodland on sandstone.</p> <p>Important as buffer to the Dogs Head Hill/Union Cave system, including the Moss Palace and its phytospeleothems.</p> <p>High Conservation Value.</p>	<p>'Dogs Head/Union Cave system. This system drains the Dogs Head Hill hum, a conical shaped karst residual hill containing many vertical percolation water caves. These drain to Union Cave, a large stream cave with a sump located 150 m into the cave.' Management Plan for Mole Creek Karst National Park.</p> <p><b>Recommendations:</b></p> <p>Add FID 142 to the adjoining Dogs Head Hill Forest Reserve.</p> <p>Consider adding the Dogs Head Hill Forest Reserve to the adjoining Mole Creek Karst National Park. See Lichon (1992).</p>
FID 136	<p>Critically important surface catchment of Croesus and Lynds Cave systems. Much of the famed Croesus Cave is not within the Croesus block of the national park but under FID 136 section of state forest. Also important contribution to integrity (karst, scenery, geoconservation) of TWWHA. (See report for details of significance).</p> <p>High heritage conservation value.</p>	<p>A critically important parcel of land above several caves systems of outstanding heritage conservation value.</p> <p>Protection would link up the Croesus and Marakoopa blocks of Mole Creek Karst National Park.</p> <p><b>Recommendation:</b></p> <p>Add the whole of this parcel to Mole Creek Karst National Park and to then add this and the Croesus block to the Tasmanian Wilderness World Heritage Area.</p> <p><b>NOTE:</b> The boundary for World Heritage nomination purposes should extend to include that part of the Mersey River Forest Reserve and an informal reserve east of the Mersey River, that is the river becomes the boundary. Southern boundary would be the powerline spur off the Lake Mackenzie Road.</p>
FID 131	<p>Very small parcel adjoining Croesus Cave section of Mole Creek Karst National Park.</p>	<p>Probable logical addition to national park but needs local decision-making.</p>
FID 133	<p>Very small parcel adjoining Croesus Cave section of Mole Creek Karst National Park.</p>	<p>Probable logical addition to national park but needs local decision-making.</p>

Summary—Mole Creek Karst		
ENGO reserve parcel no.	Heritage significance	Remarks
FID 134	Very small parcel adjoining Croesus Cave section of Mole Creek Karst National Park.	Probable logical addition to national park but needs local decision-making.
FID 135	Very small parcel adjoining Croesus Cave section of Mole Creek Karst National Park.	Probable logical addition to national park but needs local decision-making.
FID 141	<p>Threatened plant community <i>Eucalyptus amygdalina</i> forest and woodland on sandstone.</p> <p>The south-western part (slopes of Solomons Dome) includes part of the catchment of the King Solomons Cave karst area (but not KS Cave itself). More importantly, the eastern half of the area includes the bulk of the catchment of the very significant Kubla Khan cave system and is hence critical for the long-term protection of this icon cave. All of FID 141 is very important. High heritage conservation value of national to global significance.</p>	<p>Major link between King Solomon and Kubla Khan blocks of the Mole Creek Karst National Park.</p> <p><b>Recommendation:</b></p> <p>Add FID 141 and FID 136 to Mole Creek Karst National Park.</p> <p>Add FID 141 together with FID 136 and the Solomons and Kublai Khan blocks of Mole Creek Karst National Park to the Tasmanian Wilderness World Heritage Area.</p>
FID 148	Inadequate data. <b>Not assessed.</b> May be important for karst conservation.	Very steep land falling to Mersey River. Requires further investigation.
FID 151	Several dolines apparent. Inadequate data. <b>Not assessed.</b> May be important for karst conservation.	Narrow sliver of land adjoining Mount Rowland Regional Reserve.

Summary—Mole Creek Karst		
ENGO reserve parcel no.	Heritage significance	Remarks
FID 158	<p>Tall eucalypt forest of <i>E. regnans</i> and <i>E. obliqua</i>.</p> <p>About 15% recently clear felled logged. Intact stands of <i>E. regnans</i> are increasingly rare.</p> <p>(Mount Roland RR+CA is potentially national significance)</p> <p>(State significance)</p>	<p>Elongate stand of mainly tall eucalypt forest adjoining Mount Roland Regional Reserve and abutting Mount Roland Conservation Area.</p> <p>Intact stands of <i>Eucalyptus regnans</i> are increasingly rare. Adding this block to the adjoining Mount Roland Conservation Area would significantly enhance the heritage conservation values of the combined Mount Roland Regional Reserve and Conservation Area.</p>

## Croesus and Lynds Caves (Kansas and Mill Creek Area)

FID 136

This parcel is clearly of high heritage conservation value, the evidence for such being presented below. Most are quotes from recent, relevant documents.

**Marakoopa Cave block** is part of the Tasmanian Wilderness World Heritage Area (TWWHA). Other parts of the park are potentially of World Heritage value, but remain outside the TWWHA. In particular, karst in the Mole–Lobster catchment, Kubla Khan Cave and **Croesus Cave** areas ‘would, collectively and individually, contribute significant further values’ to the TWWHA —Department of Parks, Wildlife & Heritage 1990). (Mole Creek Karst National Park Management Plan 2004)

### **Croesus Cave block**

This block protects the entrances to two outstanding caves: Croesus Cave and Lynds Cave. Most of these caves and their catchments are located in adjacent state forest. —Mole Creek Karst National Park Management Plan 2004)

The Croesus Cave system (Hidden Cave/Tatana Magra/Croesus Cave/Rubbish Heap/Lynds Cave/Rathole/Tailender Cave/Shooting Star Cave.) This system is highly complex hydrologically, involving radical changes in subsurface streamflow directions under different streamflow conditions. All the above caves and/or catchments are likely to be hydrologically connected to some extent during very high flows, however at base flow, streams revert to discrete systems. At base flow, Croesus Cave is probably fed mainly by percolation water, and has hence developed a magnificent set of rimstone gours, covering the floor of the cave for almost 1 km. At high flows it receives large amounts of streamflow, either from surface streams overtopping blind valleys, or from high stage branches of underground streams. It contains significant glacially related sediment deposits, being the type section for the Croesus Cave Member. It is a significant platypus habitat. It is a highly significant recreational cave. Lynds Cave is also a spectacular, highly decorated cave of high scientific and recreational value. Tailender Cave, Rathole and Shooting Star Cave are also highly decorated caves and require climbing skills to negotiate. The latter cave is 247 m deep (eighth deepest in Australia) and was only explored in 2002. Tailender and Shooting Star are particularly delicate

caves, where each visit is likely to cause significant further impacts to speleothems. This system is only partially reserved by the Croesus Cave block. The park boundary is located approximately one-third the distance along Croesus Cave, the upper two thirds and all of its catchment being located under state forest. Only a small proportion of the downstream end of Lynds Cave is located within the park. The remaining caves are within state forest. —Mole Creek Karst National Park Management Plan 2004)

### **Croesus–Lynds–Tailender Caves**

Croesus Cave, Lynds Cave and Tailender Cave are springs that feed the Mersey River from catchments on the slopes of Western Bluff.

Because of likely genetic relationships between the caves and the implications of this in terms of the hydrology, it is particularly important that the caves and their catchments are managed as a single integrated system.

The source of the cave stream in Croesus Cave is enigmatic and no streamsink sources have yet been confirmed. It has a modest discharge compared with the two other caves. Water chemistry and other evidence suggest that a significant proportion of the discharge is derived from diffuse percolation and slow moving groundwater sources. However, at times in the past, the cave has evidently carried more vigorous flows capable of mobilising coarse gravels, which can only have been washed in from the surface.

The two upstream entrances to Croesus Cave, known as Top Hole and April Fools, may represent former inflows. Their location at the downstream end of a drainage line which extends below Rubbish Heap Cave raises the possibility that Kansas Creek formerly contributed water to Croesus Cave prior to its capture by Lynds Cave. If Kansas Creek overtopped Rubbish Heap Cave during a flood event, it could be expected to flow to the same enclosed depression as Top Hole and April Fools. Vanishing Creek may also drain to the same depression if it exceeded the capacity of its normal sinks. The potential for subterranean pathways capable of delivering flood flows to Croesus Cave also needs to be considered.

Tailender Cave is fed by at least five principal sinks including Aqueduct Swallet, Blue Lake, Vanishing Creek and Nettle Sink. Tracers introduced at some of these streamsinks have been detected at Shooting Star Cave and Rat Hole, indicating that these caves are part of the same karst drainage system as Tailender Cave.

The Croesus Cave block encompasses a small proportion of the hydrological system described above. —Mole Creek Karst National Park Management Plan 2004

## **Assessment**

The following lengthy extract is helpful background to assessing the value and significance of FID 136:

The Mersey District Forest Management Plan classifies state forest in the Mill Creek–Kansas Creek catchment as conditional forest under Forestry Tasmania's Management Decision Classification System. Conditional forests have special circumstances, in this case karst values.

Forestry Tasmania considers that management options for these forests require further investigation before a decision can be made as to whether the area, in part or whole, should be managed in the longer term as part of either the production or protection zones. Wood production is excluded from the conditional zone.

The joint protocol is primarily concerned with day-to-day management issues, and does not address zoning or tenure. Given the significance and sensitivity of Croesus Cave and Lynds Cave, the PWS considers the Mill Creek–Kansas Creek catchment warrants a more secure context for management than conditional forest status. This is because:

- This catchment contains some of Australia's most outstanding caves. Their significance for conservation is well established and is deserving of the highest level of protective management.
- The caves are partly protected within the park, but the current reserved area does not protect the whole of the caves or their catchment. The caves extend across the tenure boundary, which does not provide a rational basis for managing the caves and karst system of which they form part.
- As state forest, the catchment is potentially subject to activities such as timber harvesting, mineral exploration and quarrying. Notwithstanding constraints under relevant codes of practice (e.g. Forest Practices Code, Mineral Exploration Code of Practice, Quarry Code of Practice), these activities are incompatible with protection requirements for the karst at this site.

Avoiding disturbance to soil–vegetation systems and natural runoff characteristics is critical to the integrity of features and processes in caves, particularly at Croesus Cave where baseflow is derived primarily from diffuse percolation sources. The complex hydrology and the potential for fossil conduits to be reactivated during floods (see Section 3.4) compounds the difficulty of protecting the caves from disturbance within the catchment. While wood production is excluded from Conditional forests, the zoning could be changed under a future forest management plan or an amendment to the current plan.

- The caves contain features that make this karst system unusually vulnerable to impacts from catchment-based activities, notably the magnificent rimstone speleothems in Croesus Cave. Evidence that some of the rimstones are subject to erosion linked to changes in water chemistry highlights the delicately poised thresholds, which govern natural processes within the karst system (Eberhard 1993). Whether the changes in water chemistry result from past catchment management practices is difficult to establish with scientific certainty, but this possibility must be considered in planning for future management.

—Mole Creek Karst National Park Management Plan 2004

The review of geoconservation values of the Tasmanian Wilderness World Heritage by Sharples in 2003 provides a solid recommendation about the value of the Mole Creek Karst, the Croesus cave system in particular:

**Integrity criterion 44(b) (i) (Inclusion of key interrelated elements):**

The majority of extensive karst areas within the TWWHA (see Figure 15) are entirely contained within the TWWHA together with their entire catchment areas (compare Figures 15 & 5). Particularly important and extensive undisturbed karst systems for which this is true include the Weld River valley and New / Salisbury River karsts, which are discussed further below.

However, this integrity condition is not met for several important karsts, which straddle the TWWHA boundary, particularly:

- Mole Creek karst
- Hastings karst
- Mt Picton–Riveaux karst.

Recommendations for incorporating parts of these karsts into the TWWHA and/or managing their karst values in sympathy with the TWWHA karsts are made in Sections (3.3), (3.4) and (4.2) of this report. With these exceptions noted, the overall high degree of inclusion of entire karsts with their catchments gives the TWWHA adequate integrity under this criterion to comprehensively represent an interrelated assemblage of karst



landforms, and to allow maintenance of ongoing natural karst geomorphic processes. (Sharples 2003).

#### **Mole Creek Karst** (in Sharples 2003 p.167)

Parts of this area have previously been recommended for inclusion in the TWWHA (DPWH 1990).

The Mole Creek karst geomorphic system is one of the most extensive and well-developed karsts in Tasmania (Kiernan 1984, 1989a; Eberhard 2003), and is a highly significant exemplar of the karst World Heritage geoconservation values of the TWWHA (see Section 3.2.2). However, only a portion of the karst system is located within conservation reserves and (the existing and recommended extensions of) the TWWHA (see Section 3.3 & Figure 15). Large contiguous, hydrologically connected and equally significant portions of the karst are situated on adjoining freehold and state forest land tenures outside the TWWHA boundary (Eberhard 2003). For example, the large and deep, recently-discovered pristine ‘Shooting Star’ cave, with its outstanding speleothem displays, lies partly in state forest, however its catchment is partly in the adjoining TWWHA (Eberhard 2003, Gray 2003).

The integrated nature of the entire karst means that effective management and protection of the World Heritage values of the Mole Creek karst cannot be successful unless the freehold and state forest portions of the karst are managed in sympathy with the TWWHA portions. A major process has been under development over the last three years to create a framework for cross tenure management of the Mole Creek Karst (*The Natural Heritage Trust Mole Creek Karst Integrated Catchment Management Strategy*, Eberhard 2003, Gray 2003, p. 359–360), and will be pursued further under a Meander Valley Partnership Agreement between the Meander Valley Council and the state government (R. Eberhard pers. comm.). **The draft Mole Creek National Park Management Plan also recommended extending reserve status to an important part of the state forest section of the karst, in the Croesus and Lynds Cave area.** —Sharples 2003

## **Conclusion**

A major part of FID 136 is the Kansas and Mill Creek catchments, which are so vitally important to protecting the Croesus and Lynds caves system, the caves themselves and their catchments. The cave catchments extend right up to the ‘tiers’ or cliffs (Kiernan, pers.comm.) that form the current boundary of the TWWHA in this locality.

Adding the TWWHA (Part of Mole Creek Karst National Park is already World Heritage listed) would contribute significantly to the value and integrity of the TWWHA.

FID 136 is of very high conservation value and of at least National Heritage significance. It would contribute to the integrity of the Tasmanian Wilderness World Heritage Area.

## **Recommendations**

1. Add FID 136 to adjoining Mole Creek Karst National Park.
2. Add the Croesus Cave block plus FID 136 to the Tasmanian Wilderness National Park.

## **Overall heritage summary—Mole Creek Karst**

It should be noted that the Marakoopa Block of the Mole Creek Karst National Park is already part of the Tasmanian Wilderness World Heritage Area. For whatever reason, the non-contiguous blocks were not added to the TWWHA but there is ample documentation, comment and recommendations about the very high heritage significance of the Croesus Cave, King Solomons Cave and Kublai Khan Cave Blocks.

This assessment of FID 136 and FID 141 finds them to be of very high natural heritage value, especially because they are integrally related to the King Solomon and Kublai Khan Cave blocks, either because the caves extend under these parcels or because they include the critically important catchments of the caves.

Protecting FID 136 and FID 141 and their addition to Mole Creek Karst National Park would consolidate these park blocks and contiguity with the Marakoopa Block. Protecting the catchments of the King Solomons Cave and Kublai Khan Cave Blocks would qualify them for adding to the TWWHA. The consolidated package of land (FID 136 and FID 141 + King Solomon and Kublai Khan Cave blocks) would make a very significant contribution to the value and integrity of the TWWHA.

Ample documentation supports the very high conservation significance of the Croesus Cave, King Solomons Cave and Kublai Khan Cave Blocks. The ENGO-proposed reserve blocks FIDs 136, 141, 131, 133, 134, 135 would greatly enhance the protection and integrity of these three important cave systems.

## Recommendations

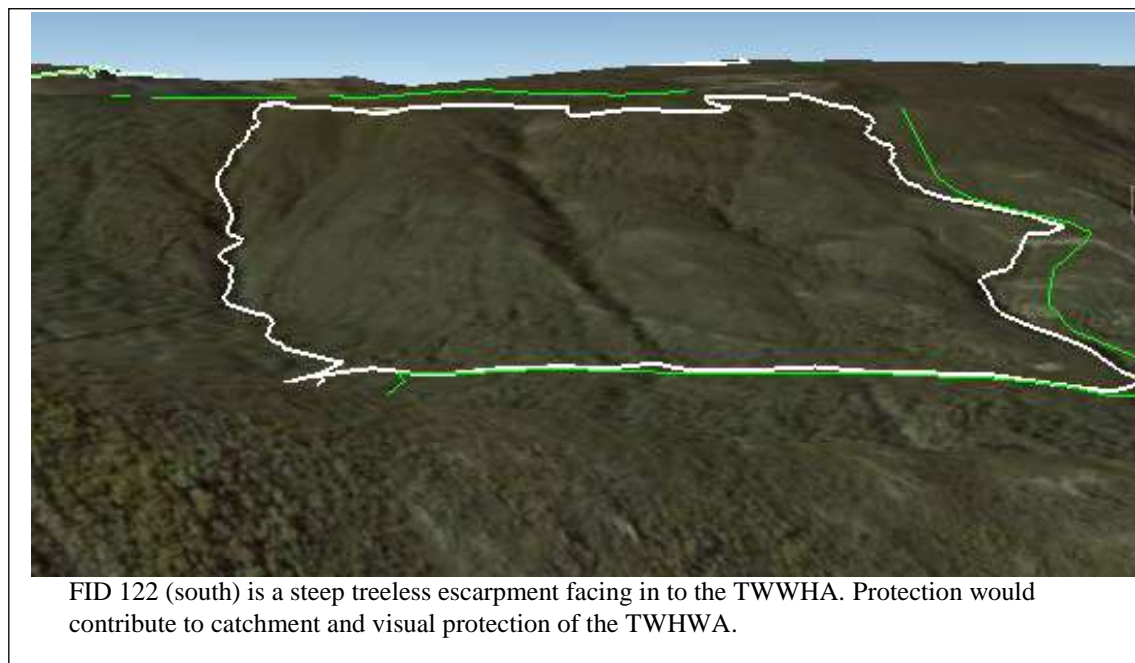
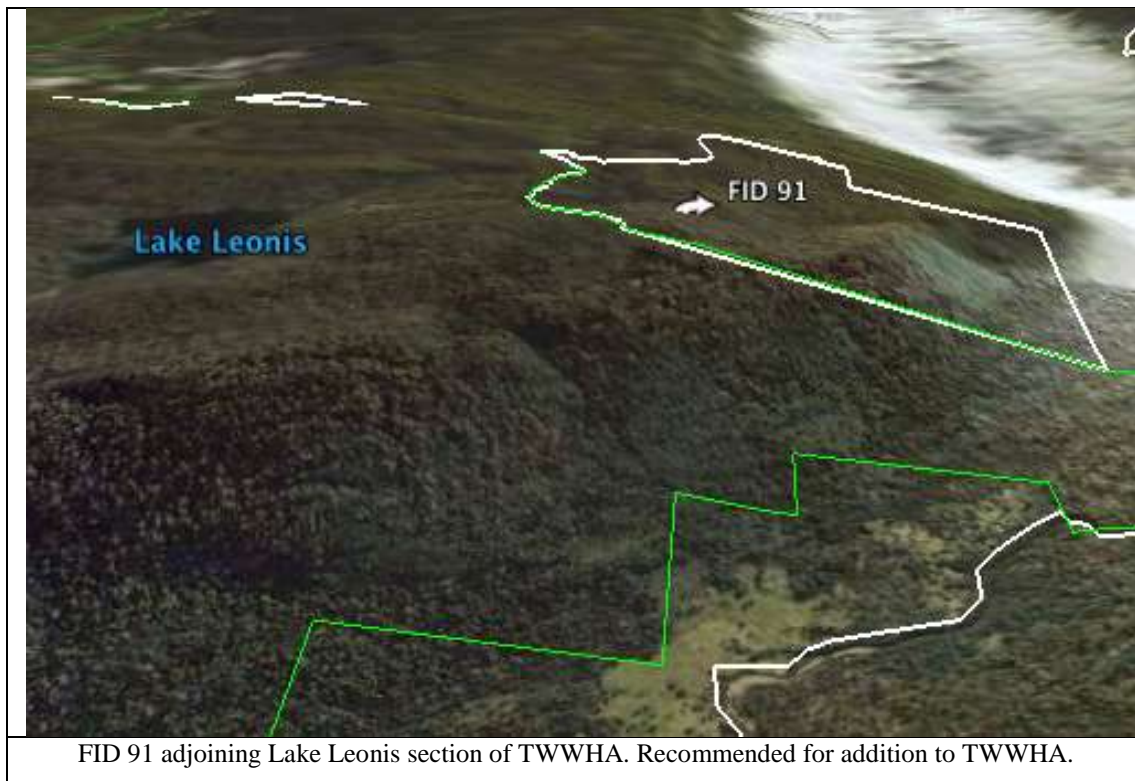
1. Add FIDs 136, 141, 131, 133, 134, 135, 139 to Mole Creek Karst National Park.
2. Add FIDs 136, 141, 131, 133, 134, 135, 139 together with the Croesus Cave, King Solomons Cave and Kublai Khan Cave Blocks of Mole Creek Karst National Park to the Tasmanian Wilderness World Heritage Area.
3. Include in the TWWHA for World Heritage nomination purposes, part of the Mersey River Forest Reserve and adjoining informal reserve east of the Mersey River (the river becomes the World Heritage boundary). See report on FID 136.
4. Add FID 142 to the adjoining Dogs Head Hill Forest Reserve.
5. Consider adding the Dogs Head Hill Forest Reserve to the adjoining Mole Creek Karst National Park.

## Mersey Valley escarpment cluster

FID 112, 91, 94, 107, 122

Heritage summary—Mersey Valley Escarpment cluster		
ENGO reserve parcel No.	Heritage significance	Remarks
FID 112	<p>FID 112 is an integral part of the glacial landscape otherwise already included in the adjoining Walls of Jerusalem section of the Tasmanian Wilderness World Heritage Area.</p> <p>Adding this glacial step would contribute to the integrity (glacial, landscape) of the TWWHA.</p> <p>High heritage conservation value.</p>	<p>By adding FID 112 to the TWWHA, the boundary would be much more appropriate. (Accessible in lowland position rather than a combination of cliff lines and straight line across gorges etc.)</p> <p><b>Recommendation:</b></p> <p>Add FID 112 to the adjoining TWWHA.</p>
FID 91	<p>Intact forest on glacial exit valley. Possibly includes large moraine on a terrace.</p> <p>Beneficial addition to TWWHA (boundary improvement)</p>	<p>Important as a buffer to limit vehicular access to the Lake Leonis glacial tarn in the immediately adjoining section of TWWHA.</p>
FID 94	<p>Narrow sliver. Not assessed. Consider at local level.</p>	

<b>Heritage summary—Mersey Valley Escarpment cluster</b>		
<b>ENGO reserve parcel No.</b>	<b>Heritage significance</b>	<b>Remarks</b>
FID 107	<p>Appears to be incorrectly mapped vegetation. Mostly mapped as eucalypt but most is rainforest with the occasional remnant tall eucalypt trees.</p> <p>Demonstrates a compressed sequence from rainforest on lower terrace, relic eucalypt on mid slope, then rainforest transition to moorland.</p> <p>Demonstrates the role of downslope change to fire movement from the west, reduced intensity and frequency allows survival of rainforest.</p> <p>Would contribute to the integrity (ecological diversity) of TWWHA.</p> <p>High heritage conservation value.</p>	<p>A long narrow strip of land adjoining TWWHA. Mostly a stepped escarpment slope.</p> <p>Definite value for addition to TWWHA.</p> <p>Benefits include improved accessible boundary in place of contour boundary and protection of rainforest fire barrier.</p>
FID 122 (north)	<p>A mostly treeless rocky knob above a stream that presently forms the boundary of the TWWHA.</p> <p>High heritage conservation value.</p>	<p>A narrow sliver of land between the TWWHA and logged private land.</p> <p>A very logical addition to the TWWHA to create a much more appropriate boundary than the existing.</p>
FID 122 (south)	<p>A steep treeless escarpment facing into the TWWHA.</p>	<p>Recommended for addition to TWWHA—improve visual protection and improve boundary.</p>



## Dove River cluster

FID 130, 132, 140 and Dove River Forest Reserve, Dove River Conservation Area, Swift Creek Conservation Area]

## Context for assessment

The three ENGO-proposed reserve lands parcels (FID 130, 132 and 140) need to be assessed collectively, together with the closely associated:

- Dove River Forest Reserve
- Dove River Conservation Area
- Swift Creek Conservation Area.

These six parcels of land form a consolidated block of highland landscape to the east of Cradle Mountain Lodge and Visitor Centre. It is assumed that it is this consolidated block that is being considered for adding to the adjoining Tasmanian Wilderness World Heritage Area. FID 130 and Dove River Forest Reserve form the core of this cluster.

The greater part of the three ENGO-proposed reserves is already the subject of informal protection within state forest.

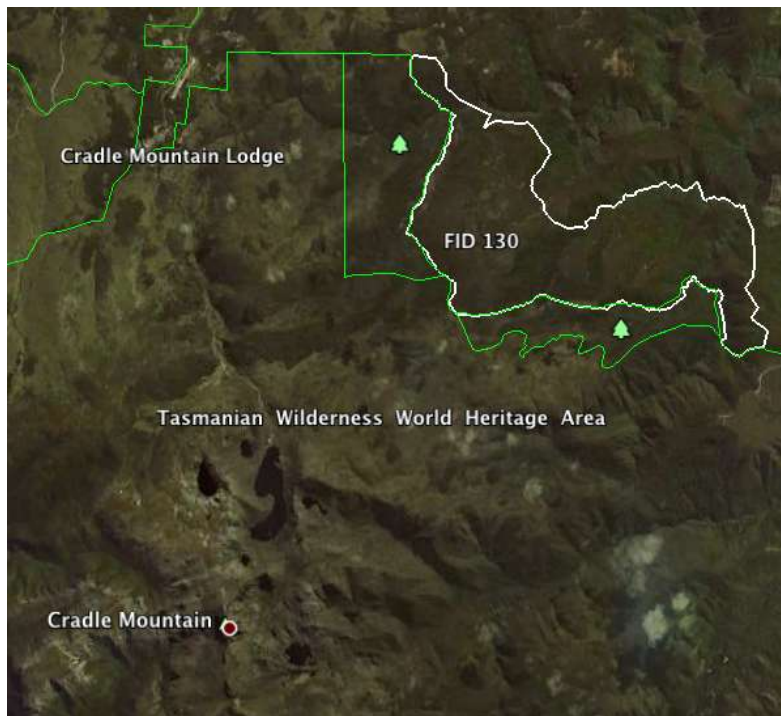
## Assessment

The western part of FID 130 comprises a patch of eucalypt forest on an exposed ridge, mainly *E. delegatensis* with some smaller patches of *E. subcrenulata* and has not been informally reserved. In the deep valley tributary to the Dove River, there is extensive *Nothofagus* rainforest connecting to the more extensive rainforest in the Dove River Forest Reserve. A vegetation pattern of alternating bands of rainforest with ridge communities of *Acacia melanoxylon* and/or *E. delegatensis* extends into the adjoining World Heritage Area. Some old, selective logging disturbance exist on FID 130.

The composite block of ENGO-proposed reserve lands and various formal reserves has a diverse mosaic of highland vegetation ranging from moorland in the west, through *Acacia* scrub and forest, eucalypt forest to well developed *Nothofagus* rainforest. Essentially all is in a natural condition.

Some rehabilitation required for old logging on FID 130.

ENGO reserve parcel No.	Heritage significance	Remarks
FID 130 FID 132 FID 140	<p>A diverse mosaic of vegetation ranging from moorland through eucalypt forest to rainforest. FID 130 shares with the adjoining Forest Reserve a superb series of spur-gully sequences of tall eucalypt-rainforest on low fire frequency steep slopes.</p> <p>Adding the package of ENGO-proposed reserve parcels and the three formal reserves to the TWWHA would:</p> <ul style="list-style-type: none"> <li>• contribute to the value and integrity of the TWWHA</li> <li>• further protect the scenic landscape associated with Cradle Mountain (logging in FID130 would be visible from Cradle Mountain, distant 8 km on facing slope)</li> <li>• significantly improve the boundary of the TWWHA, dispensing with a length of contour boundary</li> </ul> <p>High conservation value. Contribute to global significance.</p>	<p>The combination of the three ENGO-proposed reserve parcels and the three immediately adjoining formal reserves represent an integrated consolidated package, which would make a valuable contribution to the value and integrity of the TWWHA.</p>
FID 146	<p>Disjunct area. Already informally protected.</p> <p>No specific conservation attribute identified.</p> <p>May require local assessment. Not of heritage significance at national or global level.</p>	
FID 144	Tiny parcel. Not assessed.	
FID 155	Small parcel, partly cleared on road frontage. Not assessed.	



FID 130 includes elevated land visible from many parts of the treeless landscape in the adjoining TWWHA. Logging of FID 130 would likely be visible from the TWWHA, including from Cradle Mountain.

## Summary

The cluster comprising FID 130, 132, 140 and Dove River Forest Reserve, Dove River Conservation Area, Swift Creek Conservation Area represent a consolidated package of very diverse vegetation adjoining the otherwise largely treeless moorlands of the Cradle Mountain section of the Tasmanian Wilderness World Heritage Area.

The vegetation patterns of alternating tall eucalypt and rainforest are particularly noteworthy in terms of localised ecological diversity.

It is concluded that the consolidated package, including FID 130, 132 and 140 as an integral part of the package, is of very high conservation value and with it, FID 130, 132 and 140 are of high heritage conservation value.

The combination of these parcels of land would effectively protect the catchment of the Dove River and represent a very valuable addition to the adjoining Tasmanian Wilderness World Heritage Area.

## Recommendation

1. Add FID 130, 132 and 140 plus Dove River Forest Reserve, Dove River Conservation Area, Swift Creek Conservation Area as a consolidated block to the adjoining TWWHA.



## Vale of Belvoir cluster

FID 176 (plus nearby FID 160)

### Introduction

FID 176 is a large parcel of land that is part of a very large tract of natural landscape, which includes a number of large protected areas including:

- Black Bluff Nature Recreation Area
- Reynolds Falls Nature Recreation Area
- Vale of Belvoir Conservation Area
- Winterbrook Falls Forest Reserve.

### Assessment

The assessment is preliminary only.

The area is part of a large tract of mostly intact lands, some with wilderness qualities. There A number of enclaves of private lands are within the protected areas and one small one is east of FID 176.

FID 176 needed to be assessed as an integral part of the larger package of lands outlined in the Introduction. The combination of FID 176 with those existing protected lands, the package of lands represents an outstanding intact landscape with a great diversity of landscape, landforms, geology and natural vegetation. Doubtless there are species records, which add to the conservation potential of the area.

### Boundary considerations

The northern (external) boundary of FID 176 presents a surprisingly appropriate and mostly well-defined boundary for any protected area, in many places following a river. Much of the west and north boundary would be appropriate for a World Heritage Area.

### Recommendations

1. Consider FID 176 to be of high heritage conservation value of at least state and likely national significance and that, if added to the TWWHA, it would contribute significantly to the integrity of the World Heritage Area.
2. Provide separate conservation planning for FID 176, together with the adjoining major protected areas:
  - Black Bluff Nature Recreation Area
  - Reynolds Falls Nature Recreation Area
  - Vale of Belvoir Conservation Area.
  - Winterbrook Falls Forest Reserve
 to develop a consolidated package of lands to add to the Tasmanian Wilderness World Heritage Area.

**NOTE:** The Reynolds Falls Nature Recreation Area provides a direct physical link between the TWWHA and the Tarkine assessment area and the Granite Tor Conservation Area which is within the area currently being assessed by the National Heritage Council as part of the Tarkine National Heritage assessment area.



CHAPTER 7

North Coastal

## Chapter 7

### North Coastal

(Mostly ENGO-proposed reserve lands along north coast)

#### Introduction

The North Coastal section of this report is mostly a collection of ENGO-proposed reserves in the north of the state, which have no direct affinity with the World Heritage Area or with the North East cluster. Most of the ENGO-proposed reserve lands are associated with existing smaller protected areas on the coastal lowlands. None were assessed as being of global significance, one was assessed as having National Heritage significance and the balance were considered to be mainly of state significance.

The contents of this section of the report are set out below.

#### Dismal Swamp

[FID 261, 263, 265]

#### Introduction

Dismal Swamp has been recognised both as being of geoconservation and biodiversity significance. It is described in detail by Sharples as a karst ‘polje’ or flat-floored depression in a karst landscape. Dismal Swamp is located south-west of Smithton in the far north-west of Tasmania in a landscape largely cleared and developed for agriculture. The closed basin is forested with a blackwood (*Acacia melanoxylon*) forest. Three ENGO-proposed parcels of land are in the swamp.



South-west part of Dismal Swamp. The section in foreground is an ENGO Interim Protection Site (see adjacent image). Photo by Tourism Tasmania and Richard Bennett on <http://www.pleasetakemeto.com/australia/dismal-swamp/photos/dismal-swamp-42683> — not for publication.



Three ENGO parcels in Dismal Swamp Polje. Only the two parcels on the left are on the floor of the polje. Image Google Earth with IGA overlay.

## Geoheritage

Dismal Swamp is listed on the Tasmanian Geoconservation Database (TGD) as being of national significance.

## Biodiversity

Dismal Swamp has been listed on the Register of the National Estate.

<b>Dismal Swamp Area</b>	
<b>Source:</b>	Go to the <a href="#">Register of the National Estate</a> for more information.
<b>Identifier:</b>	12059
<b>Location:</b>	Togari
<b>Local Government:</b>	Circular Head Municipality
<b>State:</b>	TAS
<b>Country:</b>	Australia
<b>Statement of Significance:</b>	<p>Criterion C.1 the Dismal Swamp Nature Reserve located within this place provides an important scientific reference area for understanding the ecology of Blackwood communities.</p> <p>Criterion D.1 Dismal Swamp area is a very good representative example of the formerly extensive north-west Tasmanian wetlands vegetation types, including in particular the Blackwood swamp forests and associated EUCALYPTUS brookerana and LEPTOSPERMUM communities.</p>
<b>Description:</b>	Forested swamp land. Very old valley backwater. Even aged stands of Blackwood occur in the area as a result of regeneration following commercial logging operations.

Dismal Swamp is one of the few blackwood swamps in north-west Tasmania that has not been artificially drained. For that reason it was declared a CAR reserve. The swamp is of particular nature conservation significance as one of the few remaining in the region. Its natural (karstic) hydrological processes continue to operate at natural rates and magnitudes of change, allowing the continued existence of a natural swamp forest community.

Dismal Swamp also has considerable geoconservation value as one of the best-expressed examples of a polje in Australia. It has significance as an exemplar of an element of geodiversity that is uncommon in Australia. The swamp, with its very flat floor and almost complete surround of steep marginal slopes, conforms closely to the ideal form of a polje.

Dismal Swamp conforms very well to Sweeting's (1972) description of the typical Dinaric poljes:

Spate (1990) considered that compared to other known or suspected Australian poljes (in Western Australia, in the Mt Gambier and Portland regions of South Australia and Victoria, and in the Mole Creek area of Tasmania), Dismal Swamp is closest to the 'classical' polje type specimens of eastern Europe, and as such could be considered an Australian 'type'. In conventional geoconservation parlance, this means the significance of Dismal Swamp can be said to be Representative or Outstanding at a National level.'

—Sharples 1999

It is noted that two of the three ENGO-proposed parcels (two westernmost [FID 261, 265]) are located in the bed of the polje whereas the third [263] is mostly on a hill above the polje but incorporating a section of the eastern escarpment. Forestry Tasmania has developed the elevated parcel with a visitor centre and an adventure facility. These are not directly related to

the heritage conservation significance of the polje and blackwood swamp forest and presumably are not threatened by logging.

## Heritage assessment

It is likely that Dismal Swamp has heritage values of national significance, given that it is:

- listed on the Tasmanian Geoconservation Database (TGD) as being of national significance
- a geoconservation site that has been subject to expert comparison at the national and international level
- recognised as being of national heritage significance based on representative and remnant plant community value (Register of the National Estate)
- already reserved (in part) as a state nature reserve.

Blackwood swamp forest is largely confined to Tasmania and has been subject to extensive drainage and clearing. Dismal Swamp is regarded as an excellent example of its type and on that basis has been recognised as a CAR reserve (Sharples 1999).

NATIONAL HERITAGE		
Attribute	Relevant criterion	Value
Karst polje	<i>(b) the place has outstanding heritage value to the nation because of the place's possession of uncommon, rare or endangered aspects of Australia's natural ...history;</i>	'... one of the best expressed examples of a polje in Australia, which is to say that it has significance as an exemplar of an element of geodiversity which is uncommon in Australia.' —Sharples 1999
<i>Acacia melanoxyton</i> swamp community	<i>(b) 'the place has outstanding heritage value to the nation because of the place's possession of uncommon, rare or endangered aspects of Australia's natural or ... history;'</i>	<i>Acacia melanoxyton</i> swamp community is a nationally uncommon plant community—essentially confined to Tasmania—and now a rare aspect of Australian vegetation.
	<i>(d) the place has outstanding heritage value to the nation because of the place's importance in demonstrating the principal characteristics of: ... (ii) a class of Australia's natural ... environments;</i>	The place represents an excellent example with intact natural hydrological processes and minimal disturbance and which demonstrates the principal characteristics of <i>Acacia</i> dominated swamp forest in Australia.

## Heritage assessment conclusion

Based on both geoconservation and biodiversity values, Dismal Swamp in the north-west of Tasmania is of definite natural heritage value and of national significance.

## Condition and integrity

Although subject to some early timber exploitation, Sharples considers that the hydrological processes responsible for maintaining the swamp forest community still operate. The vegetation is essentially intact and there are no significant invasive species apparent.

## Recommendations

1. Recognise as being of national heritage significance the two parcels [FID 261, 265] of ENGO-proposed reserve lands within Dismal Swamp based on geoconservation and biodiversity values.
2. Protect the two parcels [FID 261, 265] of ENGO-proposed reserve lands within the Dismal Swamp and add to the Dismal Swamp Nature Reserve.

## Bibliography

Sharples C 1999, 'The Dismal Swamp Polje of northwest Tasmania: a case study in geo-conservation' in *Cave Management in Australasia* 13, proceedings of the Thirteenth Australasian Conference on Cave And Karst Management, Mt Gambier, South Australia.

The Australasian Cave and Karst Management Association Inc., p. 52–74.

<http://www.pleasetakemeto.com/australia/dismal-swamp/photos/dismal-swamp-42683>

## Leven Canyon cluster

[FID178, 183, 196]

## Introduction

This small cluster of ENGO-proposed reserve parcels is made up of three parcels of land immediately adjoining the Leven Canyon Regional Reserve.

## Context for assessment

The Leven Canyon Regional Reserve comprises a very rugged landscape bisected by a deep gorge carved by the Leven River.

Almost the whole of the reserve and the three ENGO-proposed reserve parcels are largely intact natural vegetation, mostly dry eucalypt forest but with some rainforest. FID 178 may have been subject to past logging or some other disturbance.

## Assessment

Not assessed in detail.

A significant area of threatened plant community *Eucalyptus amygdalina* forest and woodland on sandstone occurs on FID 196.

The Leven Canyon cluster is listed against three geoconservation values in the Tasmanian Geoconservation Database, one of which is specific to the Leven Canyon.

## Recommendations

1. Add the three ENGO-proposed reserve land parcels adjoining the Leven Canyon Regional Reserve.
2. Review the case for more formal protection of Leven Canyon Regional Reserve as a nature reserve or conservation area.

## Narawntapu cluster

[FID 188, 190, 194, 201, 203, 206, 232, 234, 239]

### Context for assessment

The ENGO-proposed reserve land parcels listed above are all forested hinterland parcels inland of Narawntapu National Park on the north coast of Tasmania. As such, the existence of the national park and the adjoining Briggs Regional Reserve provide an important context for assessing the heritage values and significance of the ENGO-proposed reserve lands.

Preliminary assessment indicated that the Briggs Regional Reserve was an integral part of the conservation core to this tract of land, providing the critical link between the national park and the forested inland. Accordingly, the assessed values of some of the ENGO-proposed reserve parcels is based on the presumption that the Briggs Regional Reserve will eventually be given a higher level of protection than its present tenure provides.

### Assessment

An indicative assessment of the heritage value and significance—a steep forested catchment flowing into wetlands in the park which logically deserves to be protected.

Summary—Narawntapu cluster		
ENGO-proposed reserve	Heritage significance	Remarks
FID 234	<p>Contribute to the integrity of Narawntapu National Park (adding wet eucalypt forest, catchment protection).</p> <p>High heritage conservation value.</p> <p>State significance.</p>	<p>A steep forested catchment flowing into wetlands in the park so logically deserves to be protected.</p> <p>Only minor informal reserves at present.</p> <p><b>Recommendations:</b></p> <p>Protect the whole of FID 234 and add to Narawntapu National Park.</p> <p>Investigate in more detail the Sheepwash Creek catchment given the diversity of intact forest vegetation.</p>

Summary—Narawntapu cluster		
ENGO-proposed reserve	Heritage significance	Remarks
FID239	<p>Large tract of mostly dry eucalypt with mosaic of smaller patches of wet forest.</p> <p>Substantial core area of informal protection in south-western part, albeit non-commercial woodland/dry forest. Deserves, consolidation formalisation and expansion to full catchment boundaries.</p> <p>Significant heritage conservation value.</p> <p>State significance, prospect of national heritage significance if part of a larger consolidated protected area linked to Narawntapu National Park.</p>	<p>Provides connectivity between the Narawntapu/Gibbs protected areas in the north and Holwell Gorge State Reserve and Coppermine Creek Forest Reserve in the south. Mostly intact forest but some recent logging coupes. Existing informal reserves provide only token connectivity.</p> <p><b>Recommendation:</b></p> <p>Explore options for establishing a substantial protected area combining formalising informal reserves and protecting at least all intact forests within FID 239.</p>
FID 206	<p>About 50% recently clear fall logging.</p> <p>Not high heritage conservation value.</p>	<p>Small sliver of land adjoining recent logging coupe and Coppermine Creek Forest Reserve—may be a misidentification or mapping error.</p> <p><b>Recommendation:</b></p> <p>No action.</p>
FID 201 FID 203	<p>Both parcels adjoin the Mount Careless Forest Reserve.</p> <p>FID 203: Most is intact forest but northern panhandle extensively disturbed. Notwithstanding the disturbance from logging and roads, this panhandle, with rehabilitation, represents an important last opportunity to re-establish connectivity with the northern Narawntapu forest block.</p> <p>Significant heritage conservation value.</p> <p>State significance</p>	<p>FID 201: Part area previously disturbed by mining or similar.</p> <p>FID 203: If added to adjoining Mount Careless Forest Reserve would significantly add to the value and catchment protection of the reserve.</p> <p><b>Recommendation:</b></p> <p>Add both FID 201 and FID 203 to adjoining Mount Careless Forest Reserve and consider option of upgrade to nature reserve status.</p>
FID 190	<p>Small parcel of forested land adjoining Mount Careless Forest Reserve.</p> <p>Not assessed.</p>	<p><b>Recommendation:</b></p> <p>Consider locally.</p>



Summary—Narawntapu cluster		
ENGO-proposed reserve	Heritage significance	Remarks
FID 188	<p>Threatened plant communities:</p> <ul style="list-style-type: none"> <li>• <i>Eucalyptus amygdalina</i> forest and woodland on sandstone</li> <li>• <i>Eucalyptus ovata</i> forest and woodland</li> </ul> <p>Significant amount of disturbance by both logging and sand mining.</p> <p>Significant heritage conservation value.</p> <p>State significance, possible national significance for threatened plant communities.</p>	<p>Parts informally protected—but not the threatened plant communities!</p> <p><b>Recommendation:</b></p> <p>Consider at least the eastern two thirds of FID 188 for formal protection. Protect the threatened plant communities from sand mining, quarrying.</p>
FID 194	<p>Mostly intact wet forest but with significant selective logging on ridge tops.</p> <p>Catchment flowing into main stream in Mount Careless Forest Reserve.</p> <p>Important value (locally uncommon/rare rainforest and <i>E. regnans</i> forest)</p> <p>State heritage significance.</p>	<p>Addition would greatly enhance the conservation value and effective protection, especially stream catchments.</p> <p><b>Recommendations:</b></p> <p>Add to Mount Careless Forest Reserve (highly recommended)</p> <p>Consider upgrading Mount Careless Forest Reserve and recommended additions to nature reserve status.</p>
FID 232	<p>Most is low forest or woodland with some swampy areas. Flora of heritage conservation significance has been recorded near the quarry. Species not searched.</p> <p>Insufficient data to complete assessment. Probably not high heritage conservation value.</p> <p>May have local conservation significance.</p>	<p>A major quarry, quarry processing plant and haul road are located within this area.</p> <p>The area still has options for connectivity to Narawntapu National Park but likely involves private land.</p> <p><b>Recommendation:</b></p> <p>Refer for local analysis of conservation values and significance.</p>

## Conclusions for Narawntapu cluster

A group of ENGO-proposed reserves form a cluster south of the existing Narawntapu National Park. The cluster was assessed for conservation values and found to contain a significant concentration of values. Some ENGO-proposed parcels were found to be directly relevant to the existing park and have the potential to greatly enhance the values and integrity of the Narawntapu National Park.

Further away from the park the lands became a little less directly relevant to the park. They were found, however, to have significant conservation values and deserve closer attention to maximise the opportunities for more effective and integrated protection of this largely intact landscape.

Notwithstanding that data supported only state significance, it is possible that additional data may raise the possibility of the cluster being of national significance.

Recommendations for protection action are made in the above summary tables.

## Long Hill–Frankford Road cluster

### Context for assessment

Several small forest reserves are in the area including:

- Franklin Rivulet Forest Reserve (north of FID 218)
- Virginstow Forest Reserve (South of FID 218).

It also contains significant areas of informal reserves on state forest including parts of the ENGO-proposed reserve lands.

Summary—Long Hill–Frankford Road cluster		
ENGO-proposed reserve	Heritage significance	Remarks
FID 195	<p>Adjoins Virginstow Forest Reserve</p> <p>Threatened plant communities ‘<i>Eucalyptus amygdalina</i> inland forest and woodland on Cainozoic deposits’ and ‘<i>Eucalyptus ovata</i> forest and woodland’ extensive within parcel.</p> <p>The whole of FID 195 is already the subject of an informal reserve on state forest. A major power transmission line crosses the northern end.</p> <p>High heritage conservation value.</p> <p>State significance.</p>	<p>FID 195 is adjoined on the west and east side by eucalypt plantation but connects to intact native vegetation to both the north and south.</p> <p><b>Recommendation:</b></p> <p>Formally protect FID 195 and add to Virginstow Forest Reserve (intact threatened plant communities).</p>

Summary—Long Hill—Frankford Road cluster		
ENGO-proposed reserve	Heritage significance	Remarks
FID 218	<p>Large parcel of intact forest—mostly <i>Eucalyptus amygdalina</i>—<i>Eucalyptus obliqua</i> damp sclerophyll forest.</p> <p>Significant parts are already informal reserves.</p> <p>As well as representing lowland forest of conservation value FID 218 plays a critical role in providing connectivity to the wider landscape creating a much more effective potential protected area.</p> <p>High heritage conservation value of state significance.</p>	<p>Adjoins Franklin Rivulet Forest Reserve in the north and Virginstow Forest Reserve in the south, connecting south-westward to FID 195 (see above).</p> <p><b>Recommendations:</b></p> <p>Protect the whole of FID 218 and consolidate formal protection of the aggregate comprising:</p> <ul style="list-style-type: none"> <li>• Franklin Rivulet Forest Reserve</li> <li>• FID 218 (ENGO-proposed reserve parcel)</li> <li>• Virginstow Forest Reserve</li> <li>• FID 195 (ENGO-proposed reserve).</li> </ul> <p>Investigate feasibility of achieving connectivity with:</p> <ul style="list-style-type: none"> <li>• the Narawntapu cluster of protected areas and proposed additions to north east</li> <li>• Long Hill—Brush Lagoon cluster to the south.</li> </ul>

### Reedy Marsh cluster

[FID 161, 165, 169, 170, 172, 177, 180, 186]

### Context for assessment

The most important contextual element that will influence the assessment of the various ENGO-proposed reserve lands in this cluster is undoubtedly the large Reedy Marsh Forest Reserve and, only slightly separated to the south of that, the Brushy Rivulet Forest Reserve.

Summary—Reedy Marsh cluster		
ENGO-proposed reserve	Heritage significance	Remarks
[FID 161, 165, 169, 170, 172, 177, 180, 186]	See individual parcels below	All FID in cluster were assessed as a single cluster because all share the common feature of adjoining Reedy Marsh Forest Reserve.

Summary—Reedy Marsh cluster		
ENGO-proposed reserve	Heritage significance	Remarks
FID 177	<p>Completely selectively logged. Adjoined on two sides by plantation. Would appear to contribute nothing of significance to the Reedy Marsh Forest Reserve.</p> <p>No significant heritage conservation value.</p>	<p>Small block on western boundary of Reedy Marsh Forest Reserve.</p> <p><b>Recommendation:</b> No action on heritage grounds.</p>
FID 180	<p>A significant part has been logged—part selectively, part by clear felling.</p> <p>Not high heritage conservation value but potentially important addition to Reedy Marsh Forest Reserve, which adjoins on three sides. Would make a valuable contribution to the reserve and consolidate it, significantly reducing the boundary length.</p>	<p><b>Recommendation:</b> Add FID 180 to the Reedy Marsh Forest Reserve even though a significant part has been logged.</p>
FID 186	<p>A large parcel of forest on the northeastern boundary of Reedy Marsh Forest Reserve. Includes artificial storage Brushy Lagoon.</p> <p>Given the extent of logging, assessment was preliminary only.</p> <p>Probably not important heritage conservation value.</p>	<p><b>Recommendation:</b> Do not add FID 186 to the Reedy Marsh Forest Reserve given the very extensive logging and the limited contribution to Reedy Marsh Forest Reserve.</p> <p><b>NOTE:</b> The unlogged western panhandle of FID 186 might be usefully added to the forest reserve.</p> <p>Conduct a local review of values especially with respect to plant and animal records.</p>
FID 169	<p>Forested block, in block with group of small hills. Most has been selectively logged.</p>	<p><b>Recommendation:</b> Add to the Reedy Marsh Forest Reserve. Notwithstanding that a significant part of FID 169 has been selectively logged.</p>
[FID 165, 170, 172]	<p>Small blocks on boundary of Reedy Marsh Forest Reserve.</p> <p>Not assessed other than for boundary improvement purposes.</p>	<p><b>Recommendation:</b> Add to adjoining Reedy Marsh Forest Reserve.</p>

Summary—Reedy Marsh cluster		
ENGO-proposed reserve	Heritage significance	Remarks
FID 229 (Emu River area)	Adjoins Emu River Forest Reserve About 30–40% logged. Mostly <i>Eucalyptus obliqua</i> wet forest (undifferentiated) High heritage conservation value of state significance.	Notwithstanding partial logging, FID 229 would contribute significantly to the value and integrity of Emu River Forest Reserve.

## Conclusions on Reedy Marsh cluster

The Reedy Marsh Cluster made up of eight ENGO-proposed reserves, together with the existing formal reserves, in particular Reedy Marsh Forest Reserve were considered to have considerable natural heritage potential. They form part of a substantial and largely intact landscape that is very vulnerable to degradation by roads, logging and other activities. Together these lands represent a potentially important state protected area.

While recommendations have been made relating to individual parcels, it is recommended that an integrated conservation planning exercise be conducted to obtain the best results from the significant existing conservation opportunities.

## Old Park cluster

FID [191, 192, 199]

## Context for assessment

The three parcels of ENGO-proposed reserve lands in this cluster all immediately adjoin the Old Park Forest Reserve.

Further, Old Park Forest Reserve is connected via informal reserves to a large tract of rainforest over which there is a conservation covenant. The combined aggregate of the forest reserve, ENGO-proposed reserve land parcels, the private land conservation covenant and the connecting informal reserves, add up to a significant parcel of native vegetation, much of it rainforest.

Assessing the ENGO-proposed reserve lands therefore needs to be seen in the context of the larger aggregate of native habitat.

Summary—Old Park cluster		
ENGO-proposed Reserve No.	Heritage significance	Remarks
[FID 191, 192, 199]	<p>Most of each block is naturally treeless—grassland and moorland.</p> <p>Most of Forest Park Forest Reserve and much of the forested sections of the ENGO-proposed reserves is well-developed <i>Nothofagus</i> rainforest and so is of conservation significance.</p> <p>High heritage conservation values of state significance.</p>	<p>Most of Old Park Forest Reserve and forested parts of the ENGO-proposed reserve lands are <i>Nothofagus</i> rainforest.</p> <p>Several minor roads traverse FID 199.</p> <p><b>Recommendation:</b></p> <p>Add all three ENGO-proposed reserve parcels [190,192 and 199] to the Old Park Forest Reserve.</p> <p>Further investigate, particularly with regard to fauna records.</p>



Three ENGO-proposed reserve parcels (white edge) adjoin Old Park Forest Reserve (light green shade—centre). One parcel (left) provides connectivity to a large private land conservation covenant further west.

## Duck River

[FID 257]

### Context for assessment

Adjoins Duck River Forest Reserve.

## Assessment

Summary—Duck River cluster		
ENGO-proposed reserve	Heritage significance	Remarks
[FID 257]	<p>No threatened vegetation communities.</p> <p>FID 257 includes part of the Trowutta–Sumac Karst Systems listed on the TGD as having ‘continental’ (national) significance:</p> <p style="padding-left: 20px;">Area comprises extensive karst development with diverse karst landforms that have been largely unexplored. Significant features include an outstanding sinkhole lake (Lake Chisholm) that is possibly the best example of its type in Australia (Timms 1992) — TGD</p> <p>High heritage conservation value (part only).</p> <p>Likely only state significance, possibly national if considered in conjunction with karst values in nearby Tarkine.</p>	<p>Unidentified large building in western end (a mine?).</p> <p>Numerous agricultural encroachments, mostly small, some larger (pasture land).</p> <p>Extensive recent clear fell logging across central northern section. Some older logging.</p> <p>Most of FID 257 is seriously disturbed and unlikely to be of heritage conservation value. Western and southern section, particularly karst area likely of high heritage conservation significance.</p> <p><b>Recommendation:</b></p> <p>Conduct detailed review of ENGO-proposed reserve FID 257 to delineate any areas of conservation importance in south and west, taking any karst data into account.</p>

## Trowutta cluster

### Context for assessment

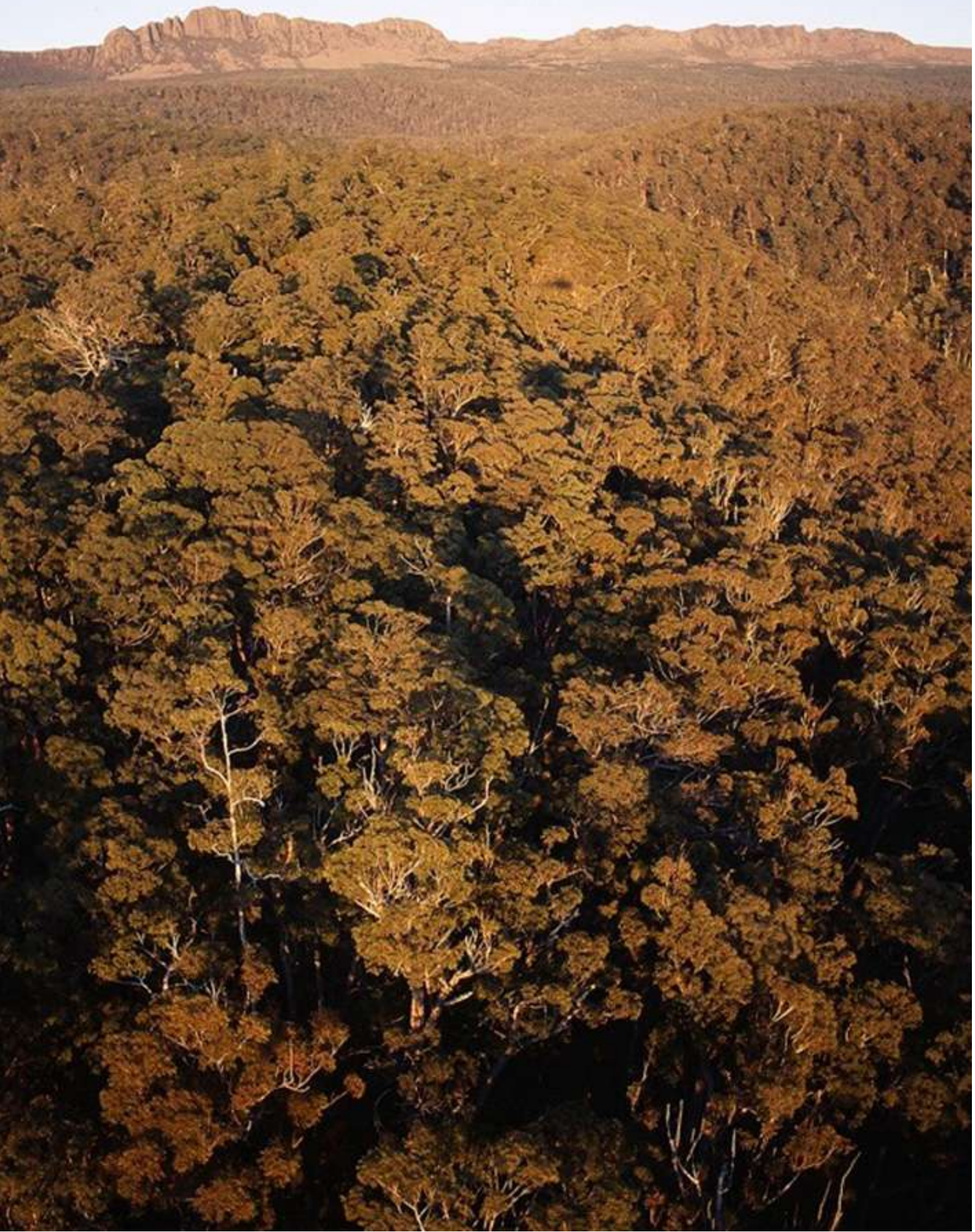
FID 241 is a relatively small parcel of ENGO-proposed reserve land

Summary—Trowutta Cluster		
ENGO-proposed reserve	Heritage significance	Remarks
FID 225	Not assessed. Assumed to be part of existing formal reserve.	On ListMap, shows as already part of Roger River State Reserve.
FID 241	Intact tall (wet) eucalypt forest ( <i>E. obliqua</i> ) and rainforest. Adding to forest reserve would significantly improve boundary. High heritage conservation value. At least state significance but contributing to integrity of Trowutta Forest Reserve which is assessed as having national and possibly global significance (see Tarkine). FID 241 may contribute to national significance via Trowutta Forest Reserve.	Small parcel of forest that appears to be identical to that in the immediately adjoining part of Trowutta Forest Reserve (mostly <i>Nothofagus</i> rainforest) <b>Recommendation:</b> Add FID 241 to Trowutta Forest Reserve, THEN Include Trowutta Forest Reserve (together with FID 241) in the Tarkine protected area (national park) proposal.



CHAPTER 8

North East



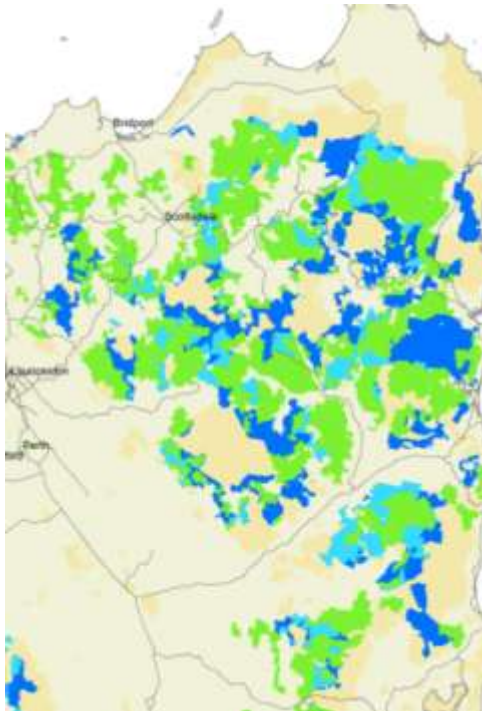
## Chapter 8

### North East

#### North Eastern cluster

#### Introduction

The ENGO-proposed reserves to be verified by the Independent Verification Group are made up of numerous parcels of land throughout the north-east and east of Tasmania. While some have been assessed as individual parcels of land, some are so located and linked as to form natural groupings that might logically be assessed together. One such grouping is described in this assessment as the North East cluster.



Assessment of the numerous ENGO-proposed reserve lands (dark blue and light blue) must address the context, especially the juxtaposition with existing protected areas (cream) together with adjoining and adjacent state forests (green).



The collection of ENGO-nominated reserve lands in the north-east of Tasmania. For the purpose of assessment for heritage significance all those areas east of the Midland Highway and north of the Esk Highway have been processed as a single group. What is absent from this diagram is the many existing reserves with which the ENGO-proposed reserves are linked.

## Defining the North East cluster

The North East cluster is defined as all ENGO-proposed reserves north of the Esk Highway and east of the Midlands Highway, including north of the Tasman Highway but not including the several isolated parcels on the north coast near Weymouth and Noland Bay. This assessment area approximates the Ben Lomond Bioregion, one of nine such bioregions recognised in Tasmania. It also includes some parts in the coastal Flinders Bioregion.

The reality is that there is a physical habitat link between the North East cluster and the East Coast Corridor cluster, which continues south from the Esk Highway. One critical habitat links the two defined clusters, occurring just east of St Marys where the Saint Patricks Head State Reserve extends across the highway.

For ecological and conservation purposes it is therefore important to recognise the physical habitat links and hence see many of the relict native habitats in the north-east and east as still retaining a significant degree of regional connectivity.

## Key documents

Two key documents provided valuable guidance for this section of the verification process:

- North East Bioregional Network and Wilderness Society 2007. *Linking landscapes: A wild country vision for North East Tasmania*. This document provides an important conceptual background on the rationale for selection of the land parcels presented as ENGO-proposed reserves in the North East cluster.
- McQuillan\* PB 2011. Report (9A) to the Independent Verification Group, December. (Draft).

## Context for assessment

A glance at a map of the ENGO-proposed reserve lands in the North East of Tasmania (see below) will reveal numerous parcels of land, often quite elongate, some relatively small but with a number of larger areas. Viewed in isolation, this collection of land parcels looks more like a ‘can of worms’ than a vision for heritage conservation. However, of great importance is the context of these many areas—the ENGO-proposed reserves are mostly intimately associated with the existing network of protected areas which includes a significant number of ‘formal reserves’ on state forest. Viewed in this context, the reserves are an integral part of a larger aggregate of existing and prospective protected areas.

## Connectivity

During the assessment considerable emphasis was placed on the value of habitat connectivity in assessing the overall conservation value of the ENGO-proposed reserve lands. Connectivity conservation is a relatively new science and is still evolving but there is a strong consensus on the imperative of connectivity for success of conservation over time. The definition of ‘connectivity conservation’ adopted in Worboys, Francis & Lockwood (2010) has been used as a guide.

### **Connectivity conservation**

Connectivity conservation is defined using biodiversity conservation criteria, but also includes social and institutional dimensions. Connectivity conservation describes actions taken to conserve landscape connectivity, habitat connectivity, ecological connectivity or evolutionary process connectivity for natural and semi-natural lands that interconnect and embed established protected areas. It may be represented by direct interconnections or by the ecological interconnectedness of disjunct conservation areas. The strong connectedness of people to natural and semi-natural lands is also recognized. This connection of people (and their groups and institutions) to land, combined with a shared conservation vision and actions such as communication, cooperation, collaboration and partnerships offer significant means for facilitating connectivity conservation outcomes.

—Worboys, Francis & Lockwood (2010)

It is important to be clear that ecological connectivity at the regional scale should be much more than simple or even token linear corridor connections of vegetation between protected areas. For connectivity to be effective the connecting corridors must, as far as practicable, be capable of allowing movement of all relevant species, not just a particular species. Each species will have different requirements for movement and this should be taken into account when designing corridors. There is no point in designing a ridge top corridor if there are species that never use or venture into such habitat.

While this heritage assessment process is not a conservation planning and protected area design mission, attention was paid to the relative value of the recognisable corridors for achieving long-term biological conservation. While there are no definitive ‘rules’ about designing corridors, the wider and more diverse corridors were rated higher in terms of conservation value than narrow, single-habitat type corridors.

Recommendations were made where opportunities to improve connectivity were recognised.

The document *Linking landscapes* (North East Bioregional Network & Wilderness Society 2007), recognises that connectivity should not be limited to a single strand approach and where opportunities remain for multi-stranding or regional networks of corridors then these would be far preferable to relying on single-strand corridors.

There are many informally recognised linear corridors within state forests in the North East and East Coast Corridor but these are mostly very narrow stream-side or roadside corridors. While these serve a local role in conservation they are not adequate nor can be relied upon for long-term species movement across the landscape at a regional scale.

The simple criteria used to assess the relative contribution of connectivity to conservation value of lands assessed were:

- the wider the better
- multiple habitat corridors better than single habitat
- multiple connectivity corridors better than single connectivity
- likely robustness over time, including risks from ‘edge effect’.

While some ENGO-proposed reserves were recognised for their contribution to connectivity, some were more than mere connecting corridors and might be regarded as potential protected areas in their own right, making multiple contributions to conservation value and heritage significance.



ENGO-proposed reserves (green) lands and existing reserves (blue) in North East Tasmania. Note that many of the proposed reserve lands adjoin existing reserves, and so were assessed in that context.

Some individual ENGO-proposed reserve areas were clearly conceived as prospective additions to existing larger protected areas such as Ben Lomond National Park while others

are intended to connect between existing reserves, so called 'linking landscapes'. The purpose or objective of a few parcels was not so apparent.

A significant number of protected areas already exist in various forms, ranging from national parks and reserves through the numerous forest reserves to regional reserves. Additionally, there are numerous areas of informally reserved land within state forests. Considered in isolation, many individual protected areas are comparatively small and undoubtedly are sub-optimal for the landscape in terms of ecological sustainability. The literature makes it apparent that many of the protected areas in the North East (including the Douglas Apsley landscape) are the product of initiatives driven by a range of processes and activities directed at either particular parcels of land or seeking representation of particular plant or animal communities without the benefit of a regionally integrated conservation master plan.

The ENGO-proposed reserves now presented for verification of their heritage values are based on a regional-scale process undertaken by ENGOs, the concept called 'linking landscapes'. This exercise appears to have addressed at least key elements of the type of conservation planning strategy advocated in technical bulletins by the Secretariat of the Convention on Biological Diversity. See extract below.

Strategy Advocated by the CBD Secretariat for  
MAKING PROTECTED AREAS RELEVANT

- ✓ **Improved linkages between protected areas:** by creating biological corridors that allow species to move, and genes to flow, from one protected or conserved area to another;
- ✓ **Improved protected area management:** by better managing existing protected areas to ensuring species survival within these areas and other intact habitats and species persistence within intact habitats;
- ✓ **Improved protected area design:** by ensuring that the design, layout and configuration enhances species survival and enhances connectivity with the surrounding landscape;
- ✓ **Improved management of the surrounding matrix:** by encouraging natural resource sectors to adopt practices that either positively impact (or at least do not negatively impact) biodiversity conservation and connectivity; and
- ✓ **Improved connectivity to allow species to migrate in the face of climate change:** by ensuring species have a wider range of options for movement and adaptation in the face of climate change

Clearly a primary focus of the 'linking landscapes' work that generated the ENGO-proposed reserves in the North East is 'connectivity'. The global literature (e.g. Bennett 2003, Anderson & Jenkins 2006, Mackey, Watson & Worboys 2008) strongly endorses the concept of connectivity between protected areas.

The 'five star' of terrestrial connectivity is seamless uninterrupted habitat providing a substantial width corridor between protected areas. In reality, this is not always achievable and indeed, for some species such as birds, may not even be essential. The precautionary approach to conservation planning should be, wherever the opportunity still exists, to retain and protect the widest and most continuous habitat link practicable. In some situations where connectivity has been severed, a case may exist for rehabilitation and restoration of pre-existing connectivity.

Connectivity is much more than just a narrow 'pathway for animals to walk along' rather, as far as practicable, connecting corridors must be well-designed and as wide as practicable to ensure that the corridors themselves are capable of supporting prevailing natural ecological

processes ('functionally linked') and to be sufficiently robust to avoid being degraded through 'edge effect' by adjacent land use activities—so they need to be buffered from such activities.

#### **'Connectivity'—definition IUCN**

The maintenance and restoration of ecosystem integrity requires landscape-scale conservation. This can be achieved through systems of core protected areas that are functionally **linked and buffered** in ways that maintain ecosystem processes and allow species to survive and move, thus ensuring that populations are viable and that ecosystems and people are able to adapt to land transformation and change.

Given the importance of connectivity of habitat for conservation, connectivity has been accorded due weighting in assessing the conservation value of the ENGO-proposed reserve lands, both individually and collectively.

Some individual parcels are unlikely to have independent or 'stand-alone' high conservation value only revealing their real conservation significance when their context is established and taken in to account. For example, some of the 'linking' corridors appear to have very limited independent conservation significance until their contribution to regional connectivity between other important habitat areas is recognised.

The provisional heritage assessment undertaken for the verification process therefore was largely directed at the aggregate of ENGO-proposed reserves in the context of existing protected areas.

Given the disposition of the ENGO-proposed reserves, their relationship to existing protected areas and the underpinning vision of *Linking landscapes*, it was decided that heritage assessment might be best conducted at three different levels:

- regional cluster
- local clusters
- individual ENGO-proposed reserve parcels.

For convenience and because of some identified issues, some clusters of land parcels have also been assessed separately e.g. areas proposed as additions to Ben Lomond National Park.

The third level of assessment was only conducted in those cases where a parcel appeared to have either independent or 'stand-alone' values or appeared to have little connectivity or relationship to the overall aggregate North East cluster.

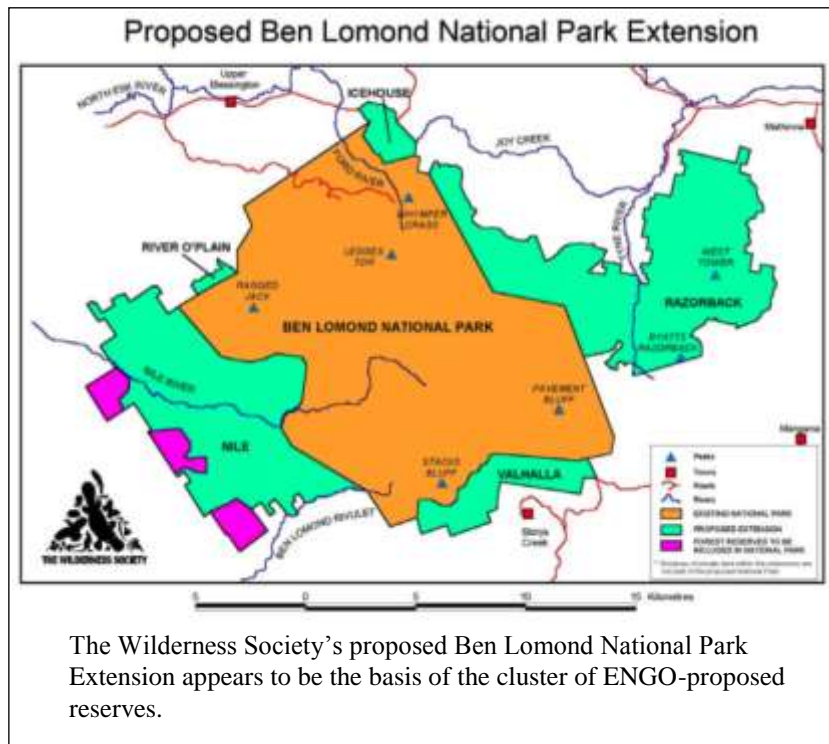
A number of categories of natural attributes warrant mention as making important contributions to the overall conservation values of the region and are briefly addressed below.

### ***Geological***

During the Jurassic geological era, around 183 million years ago, a massive dolerite intrusion occurred in Gondwana, forming what is today known as the 'Karoo-Ferrar large igneous province' extending across what is now five continents. The massive dolerite sill in Tasmania, together with counterpart formations in Antarctica, Argentina, South Africa and India, are like giant bookmarks indicating the incremental breakup of Gondwana. The Tasmanian dolerite is the largest dolerite formation in the world and despite its antiquity is still evident in much of the Tasmanian landscape, the remnant occurrences in the North East being the most north easterly relics of this once enormously extensive eruption.

The dolerite of the Central Plateau is an extensive glaciated plateau surface, demarcated in the north by the Great Western Tiers. Complementing this, in the north-east of Tasmania, the

dolerite is still evident in a whole range of landforms from the extensive dolerite capping of the residual Ben Lomond plateau and Mount Barrow, through all stages of eroded mountain with residual castle-like dolerite cappings through to the final erosional stage where the only



evidence of there having been a dolerite sill cap is in remnant talus and dolerite boulders on mountain tops.

The residual dolerite cappings are of geoconservation heritage significance and contribute significantly to the aesthetics of the landscape in the North East.

### **Rainforests in the North East**

Most rainforest in Tasmania is in the high rainfall and geographically diverse western half of the island. A significant outlier cluster of rainforest patches is found in the North East of the state, almost all of those patches are in the North East cluster assessment area.

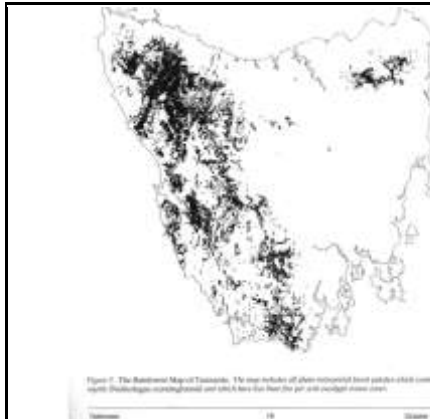
The main rainforest community found in the North East is the undifferentiated *Nothofagus* rainforest—*Nothofagus cunninghamii* often being found in association with sassafras *Atherospermum moschatum*.

Recent genetic studies have indicated a genetic difference between the *Nothofagus* of the North East and the more extensive *Nothofagus* forests of western Tasmania (Worth 2009). This suggests that the *Nothofagus* population in the North East has long been separated from those of western Tasmania, resulting in genetic divergence. Genetic differences in the north-eastern populations of Sassafras *Atherospermum moschatum* are also apparent for this ancient species, which appears to have evolved in Tasmania (Worth, Marthick et al. 2011).

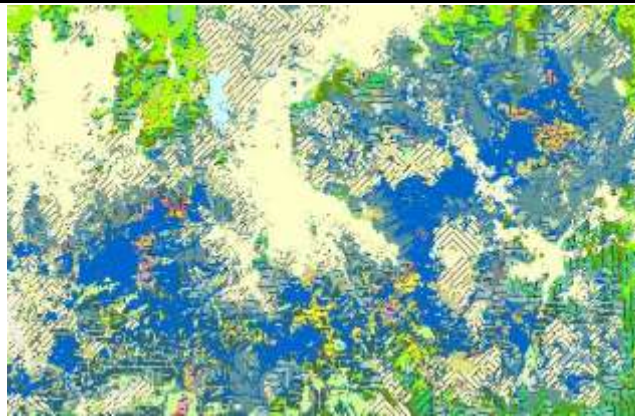
From a range of considerations, it is reasonable to conclude that the geographic outlier occurrence of rainforests (collectively) in the north-east of Tasmania is of high heritage conservation value, of state significance and likely to be of national significance.

A significant number of the ENGO-proposed reserves contain rainforest, which contribute to the overall high conservation value of the proposed reserves collectively. Again, it should not be assumed that rainforest of conservation value occurs throughout each and every parcel of land; rather it is an indicator of the overall high heritage conservation value of the collection of ENGO-proposed reserves. The *Linking landscapes* document provides details of the occurrence of rainforest in some specific localities. The extracted vegetation map below outlines the distribution pattern of the main rainforest occurrence in the North East.

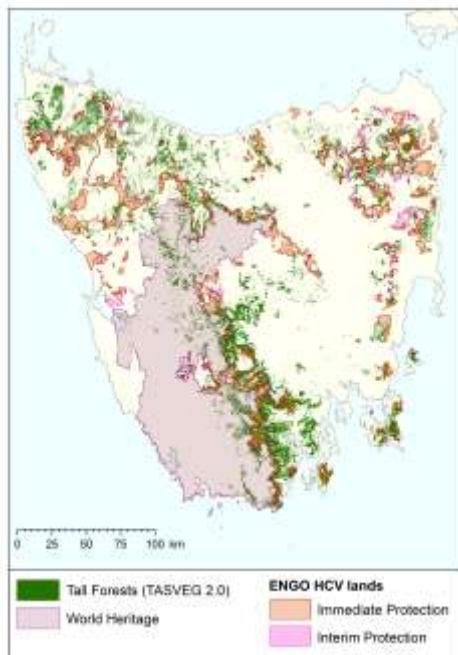




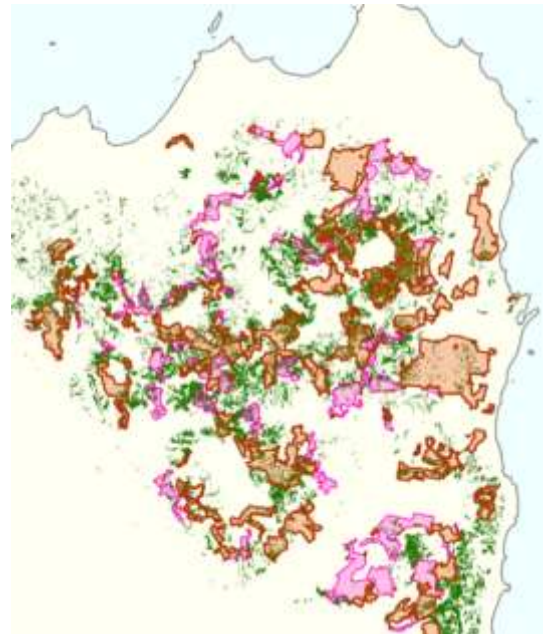
Rainforest distribution in Tasmania.



The distribution of the main occurrence of *Nothofagus* rainforest in the North East cluster assessment area. Tall eucalypt forests (*E. regnans* and *E. delegatensis* wet sclerophyll often overlap or are intimately associated with the areas mapped as rainforest (blue).



The main tract of tall eucalypt forest ecosystem in Tasmania extends in a corridor from central Tasmania down to the south coast. Another well-defined cluster of tall eucalypt forests is in the North East. Many of the ENGO-nominated reserve lands in the north include tall eucalypt forest.



Detail showing the distribution of tall eucalypt forests relative to the ENGO-proposed reserves (brown and purple). This diagram also illustrates the difference in distribution pattern of the tall eucalypt forests in the North East—mostly small and fragmented—compared with the more extensive stands in the Southern Forests.

### **Tall eucalypt forests in the North East**

The tall (wet) eucalypt forests in the North East, while geographically limited are nevertheless a significant component of the natural vegetation in the North East cluster (see map above). The tall eucalypt distribution is patchy, probably in response to soil and local rainfall patterns. Much of the tall eucalypt forest that originally occurred in the region has been cleared for farming or logged, and in many cases converted to eucalypt plantations. Coupe clear fall logging is conducted in tall eucalypt forest whereas selective logging appears to be the logging method adopted in adjacent dry sclerophyll forests.

Given the commercial value of the tall eucalypt forests of Tasmania, they have been in constant demand for timber production, competing with conservation. Many old growth areas have been harvested and some converted to plantation. **The result is that old growth tall eucalypt forests in the North East have been so extensively eliminated that they are now a premium conservation resource.**

Many of the ENGO-proposed reserves have occurrences of tall eucalypt forest, which contribute to the overall, collective high conservation value of the proposed reserves. Again, it should not be assumed that tall eucalypt forest of conservation value occur throughout each and every parcel of land—rather it indicates the overall high heritage conservation value of the collection of ENGO-proposed reserves. The *Linking landscapes* document provides details of the occurrence of tall eucalypt forest in some specific localities.

### **High conservation value, threatened species, threatened plant communities**

The document *Linking landscapes* (2009) was considered to be a reliable source of information on the occurrence of threatened species of plants and animals and threatened vegetation communities. Many threatened species and communities have been identified in the North East, in particular in the North East cluster assessment area. Given that the ENGO-proposed reserve parcels directly reflect *Linking landscapes*, its database is directly relevant to the verification process. No-one should assume that these threatened attributes are evenly distributed or occur in each and every ENGO-proposed reserve parcel but rather they are just one of the indicators of the conservation value of the identified prospective protected areas.

Mitochondrial DNA reveals a lineage of giant freshwater crayfish (*Astacopsis gouldi*), which is genetically divergent from the remaining populations in north-western Tasmania (Sinclair 2011). This cryptic lineage from the North East may therefore be of extremely high conservation value.

Conservation efforts for *A. gouldi*, combining habitat restoration with in situ management of wild populations and some population augmentation into once wild rivers, would have a positive impact for conservation of freshwater ecosystems in northern Tasmania  
—Sinclair 2011, McQuillan 2012.

### **Wilderness**

Wilderness is not considered a significant conservation attribute in the North East cluster and was not factored into the assessment of heritage value. There are, however, very significant areas of high integrity intact forests, which represent a premium heritage conservation resource where natural processes have some prospect of persisting.

### **Conclusion**

The combined attributes below, which were documented as occurring within the ENGO-proposed reserves in the North East cluster assessment area, contribute to the aggregate assessed heritage significance:

- rainforest

- tall eucalypt forest
- threatened species and threatened vegetation communities
- geoconservation
- genetic diversity and local endemism.

The combination of the significant conservation values in existing reserves in the region and the ENGO-proposed reserves within the North East cluster represents a highly significant set of conservation values—a regional scale tract of natural landscape of high heritage conservation value.

The existing reserves and the ENGO-proposed reserves are effectively linked and complementary—bringing existing and potential protected areas into a ‘linked landscape’ despite the:

- often convoluted boundaries of individual ENGO-proposed reserves
- numerous areas of cleared land or highly modified native vegetation adjoining the existing reserves and ENGO-proposed reserves.

It is this connectivity of habitat across the wider regional landscape, the combination of the ENGO-proposed reserve lands with existing protected areas that greatly enhances the conservation significance of the North East cluster and with it the heritage value of the ENGO-proposed reserves.

It is therefore concluded that the ENGO-proposed reserves, considered in the context of the existing reserve system, would make a major contribution to an interconnected system of protected lands that collectively would represent an area of high heritage conservation value of state and national significance.

## Boundary considerations

Although the ENGO-proposed reserves were holistically assessed in the context of existing reserves, some boundary issues have been identified should the ENGO proposals be adopted without change as additions to the existing reserve system. A number of these issues have been documented for example, as in the Ben Lomond (sub) cluster. There are a series of minor prolongations and peninsulas in the ENGO-proposed areas that deserve critical review in the interests of adopting more appropriate boundaries for the protected area system.

### Note on integrity

Deleting some strategically located areas of ENGO-proposed reserves from protection could impact significantly on, and reduce the conservation value of, adjoining lands by severing existing habitat connectivity. **It is therefore important to see the aggregate of ENGO-proposed reserves as an integrated package of lands, which relate to each other and to existing protected areas.**

## Assessment at local cluster level

Having verified that the aggregate of ENGO-proposed reserves is of conservation value, and of heritage conservation significance at both the state and national levels, it was apparent that some parts of the North East cluster deserved to be more closely assessed and commented on. Several localities appear to be particularly important as ‘core areas’ in the larger regional context. Two of the more obvious are centred on Ben Lomond National Park, Mount Maurice Forest Reserve and Mount Victoria Forest Reserve, both of very high heritage conservation value in their own right.

## Ben Lomond sub-cluster

FID 118, 119, 124, 126, 127, 137, 145, 156, 166, 208

### Context for assessment

There appears to be a significant difference between the Wilderness Society's proposed extensions to Ben Lomond National Park and the relevant ENGO-proposed reserves with no apparent rationale.

### *Nile River forests*

This block of forests is on the slopes below the western boundary of Ben Lomond National Park. Information available about the rationale for the ENGO-proposed reserves in this locality has presented a number of questions and apparent anomalies, namely:

- The protection of FID 137 or its addition to Ben Lomond National Park creates several enclaves of state forest between FID 137 and the park. There appears no logic in the delineation of FID 137. Is this a mapping error or is there some aspect of this exclusion which has not been provided?
- FID 117, FID 119 and FID 126 together all but create a third large enclave, albeit mostly of private land. FID 119 would appear to offer little conservation benefit and create an unnecessary management problem. Again the logic of FID 117 and FID 119 is not clear.

FID 145—although data on heritage is deficient, this narrow strip would improve the park boundary, changing it from a straight line across a rocky slope to a road (in part).

The above anomalies do impact on assessing the conservation value of the ENGO-proposed reserves. For example, FID 137, which if considered as only indirectly connecting to the national park, has less significance than if it is part of a continuous tract of protected forest linking to an existing protected area.

All of the ENGO-proposed reserves adjoining or adjacent to Ben Lomond National Park, as prospective additions to the park in effect 'retro fit' the park. The existing park is all higher than 600 m above sea level. All of the ENGO-proposed reserves would have the effect of extending the park to lower elevations and hence incorporating vegetation and habitat not presently represented in the park—a very commendable and much needed redesign of the existing protected area. This consideration is relevant to assessing heritage significance as the assessed areas can be valued for their 'value adding' potential rather than in isolation.

Capturing lower elevation forests in the reserve system is also likely to be useful to assist adaptation to climate change and would likely increase the proportion of 'source' (higher productivity) habitat for a range of species in the reserve system.

## Heritage assessment

### *Geoconservation*

Not surprisingly, the Ben Lomond mesa (plateau) landform is regarded as being of particular geological and geographic interest. The formation, including the immediate slopes below the escarpment, falls within a number of recognised listings in the Tasmanian Geoconservation Database (LISTmap), namely:

- 'Ben Lomond Terrain', geographical significance. Continent (national) (TGD)
- 'Ben Lomond Glacial Ice Margins', geographical significance sub-region, notable example of type (TGD)

- ‘Ben Lomond and other Dolerite Horst Mountains’, geographical significance, regional  
Statement of Significance: These dolerite horst mountains form the major ‘up thrown’,  
fault controlled landforms in north-east Tasmania associated with the Tertiary NNW  
faulting. Listed (TGD)
- ‘Ben Lomond Dolerite Horst Mountain’, geographical significance regional, Statement of  
Significance: dolerite horst mountain which forms a major up thrown, fault controlled  
landform in north-east Tasmania associated with the Tertiary NNW faulting (TGD)
- ‘Ben Lomond Dolerite Periglacial System’, geographical significance, sub-region  
Statement of Significance: Ben Lomond illustrates typical features of periglacial terrain in  
north-eastern Tasmania (TGD)
- ‘North-east Tasmania Dolerite Periglacial Systems’, geographical significance, sub-  
regional significance. Statement of Significance: illustrates typical features of periglacial  
terrain in north-eastern Tasmania (TGD).

Although most listings are only of local or regional significance, the ‘Ben Lomond Terrain’ is regarded as being of ‘continent’ or national significance.

The Tower Hill to the east (ENGO FID 156) is geologically related to Ben Lomond and has been assigned its own geoconservation recognition:

- ‘Tower Hills Dolerite Residual Peak’, geographical significance, sub-regional  
significance (TGD)
- ‘Tower Hills Dolerite Periglacial System’, sub-regional significance (TGD)
- ‘North-east Tasmania Dolerite Residual Peaks’, sub-regional significance (TGD)
- ‘North-east Tasmania Dolerite Periglacial Systems’, sub-regional significance (TGD).

## **Biodiversity**

### **Vegetation**

The vegetation map below illustrates the concentric vegetation pattern centred on the Ben Lomond plateau (pink), which closely coincides with the Ben Lomond National Park. The surrounding vegetation (light green) is dominated by a single forest community, ‘*Eucalyptus delegatensis* dry forest and woodland’. Most of the ENGO-proposed reserves on the west and south side of Ben Lomond comprise *E. delegatensis* dry forest and woodland. This forest community is only poorly represented in the national park so that any additions of this to the park would make a very significant contribution to its biodiversity integrity.

### **Threatened vegetation community**

*Eucalyptus amygdalina* forest and woodland on sandstone (DAS in TasVeg 2.0)

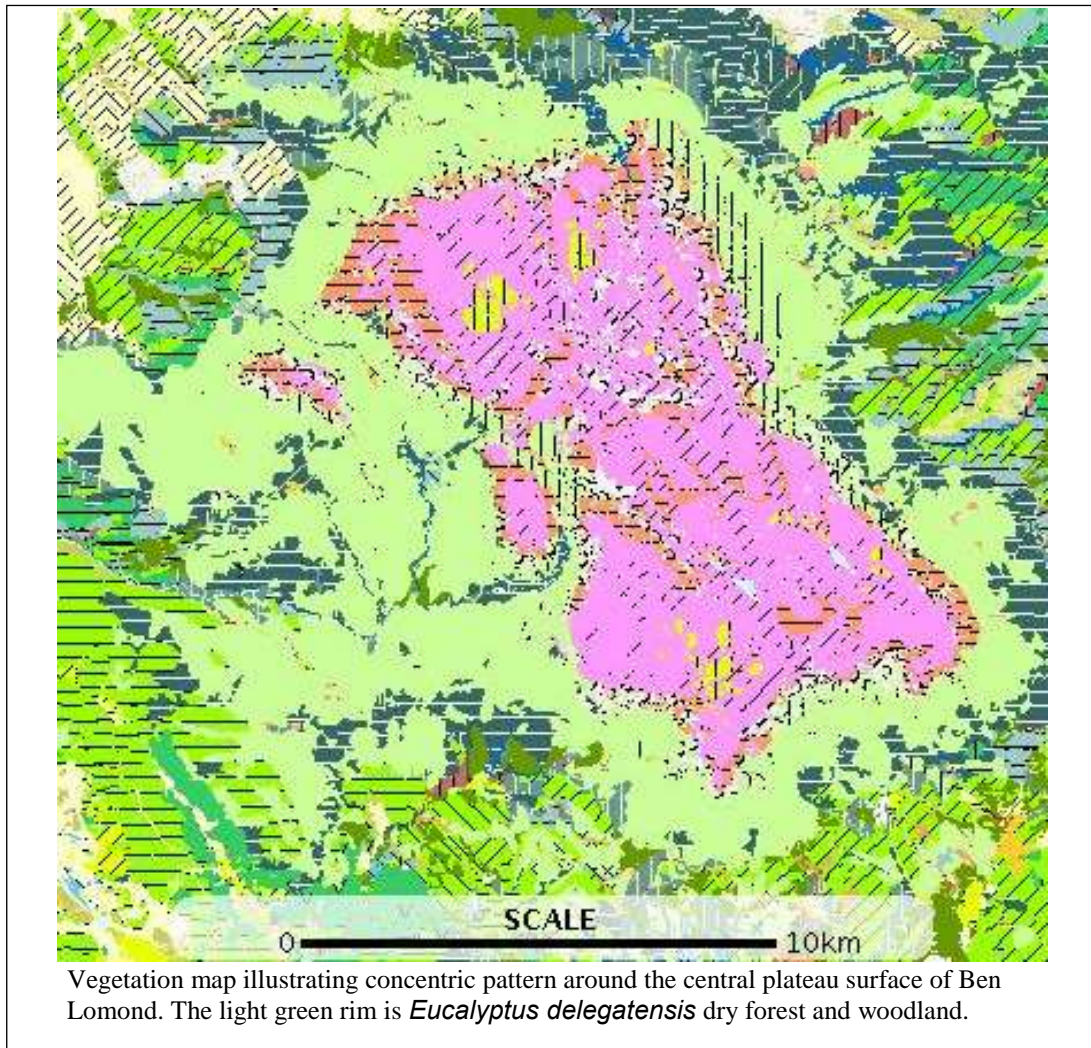
This is the main threatened vegetation community relevant to the forested ENGO-proposed reserves adjoining or adjacent to Ben Lomond National Park. Plotting of the LISTmap data revealed that almost all of this community is outside the ENGO-proposed reserves lands, on private land and has been extensively clear felled.

### **Rare, threatened species**

The following list was provided in ENGO documentation:

- *Acacia pataczekii* (wally's or pataczek's wattle)—rare; verification check—Tasmanian endemic, rare, NE of Tas. (DPIPWE Tas)
- *Bossiaea obcordata* (spiny bossiae)—rare; verification check—status is rare in Tasmania but is common in NSW, Qld and Vic. (DPIPWE Tas and PlantNET)
- *Hierochloe rariflora* (cane holy-grass)—rare

- *Pimelea axiflora axiflora* (bootlace bush)—rare
- *Prasophyllum stellatum* (Ben Lomond leek orchid)—endangered
- *Pterostylis atrans* (dark-tip greenhood)—rare; verification check—rare in Tasmania, not endemic in Tasmania
- *Teucrium corymbosum* (forest germander)—rare
- *Aquila audax fleayi* (wedge-tailed eagle)—critically endangered.



None of the data contained in the ENGO material is specific to any of the ENGO-proposed reserves so that it is not possible, based on that data, to identify any specific values at the individual area level. General conclusions can be drawn at the landscape level, that all of the ENGO-proposed reserves surrounding Ben Lomond are vegetated with *Eucalyptus delegatensis* dry forest and woodland. At the local level, this would make an important conservation contribution to the park, if added.

Despite the general assessment that can be made at the vegetation community level, the extraordinary configuration of ENGO-proposed reserves raises the appropriateness of the resultant boundaries and indeed the heritage value of the individual areas.

The various ENGO-proposed reserve can be summarised as follows:

ENGO-proposed reserves	Heritage significance	Remarks
FID 145	Not known. Addition to park would improve boundary (move to road).	Small but useful eucalypt forest addition to Ben Lomond National park.
FID 137	Significant: poorly represented <i>E. delegatensis</i> dry forest and woodland. State significance only.	Adding this area to the park is ONLY supported subject to review of the 4 enclaves that would be created (parts of FID 137 are only 250 m wide strip).
FID 124	Only significant (state) if connected to the park.	Addition to the park only supported if physically connected to park.
FID 117	Little heritage significance without protection of adjoining forest enclaves. Local significance only.	Add section south of road to Castle Carey Regional Reserve.
FID 118	Small strip of forest. No identified heritage value.	Small but may be useful forest addition to adjoining reserve and to improve boundary.
FID 119	Limited heritage value without connectivity to park. Local significance only.	No connectivity with park. Parts only 200 m wide. Addition to park not supported unless the enclave to the east is also considered for protection.
FID 126	Comprises poorly represented (in park) <i>E. delegatensis</i> dry forest and woodland. Assessed as important contribution to heritage significance of Ben Lomond National Park. National significance.	Notwithstanding some logging, this forest block represents a high value addition to the national park. The southern panhandle provides connectivity to the Castle Cary Regional Reserve.
FID 127	Token connectivity to park (but scope for improvement) so assessed as part of the Castle Cary/ Sawpit Ridge Forest Reserve habitat island.  State significance.	In terms of land use and management, is much more related to Castle Cary Regional Reserve (west) and Sawpit Ridge Forest Reserve (south-east). If a northward connectivity to park could be achieved (via state forest), heritage conservation value would be greater.

ENGO-proposed reserves	Heritage significance	Remarks
FID 156	<p>Difficult to assess given extraordinary configuration. The convolutions and created enclaves make no sense in conservation planning terms. Western two thirds makes direct beneficial contribution to the park. Eastern third (east of Calders Gully Road and a line between Tyne Road and eastern enclave) is of limited conservation value in its present form as boundaries are most inappropriate.</p> <p>Part (west) state/national significance</p>	<p>If FID 156 were added to Ben Lomond NP, it would create a number of undesirable enclaves.</p> <p>Some high conservation value but needs further review and conservation planning of this locality.</p> <p>Makes a contribution to the North East cluster being national significance.</p>
FID166	Mostly intact eucalypt forest.	<p>Linked to Ben Lomond via Joy Creek Forest Reserve and FID 156. Boundary trade-offs could be made to improve width of connectivity corridor to Joy Creek Forest Reserve.</p>

## Recommendations

1. Add FID 145 to Ben Lomond National Park (boundary improvements).
2. Comprehensively review the prospect of a consolidated tract of forest, including FID 137, for a single addition to the western side of the park, avoiding enclaves.
3. Add FID 124 to park only if intervening land is available to establish full connectivity to park.
4. Add section of FID 117 south of road to Castle Cary Regional Reserve.
5. Add whole of FID 126 to Ben Lomond National Park.
6. Conduct a conservation planning process to optimise conservation benefits and enhancements to the national park.

## Conclusions on ENGO-proposed reserves associated with Ben Lomond National Park

All of the ENGO-proposed reserves directly linked to the Ben Lomond National Park are verified to be of conservation importance and of at least state significance and likely national significance.

In (heritage) conservation planning terms, there is a clear-cut case for extending the Ben Lomond National Park to include areas of the otherwise poorly represented *E. delegatensis* dry forest and woodland. What is in question is just what form those park additions might take. Adopting all of the ENGO-proposed reserves as additions to the park without further



consideration could seriously compound boundary management. The author is of the opinion that there is a prima facie case for further planning in the area to ensure that all additions to the park are consolidated and that boundaries are appropriate.

Examining the ENGO-proposed reserves lands associated with Ben Lomond National Park raised some serious questions about the merits of specific parcels of land and some of their boundaries. The reasoning behind the boundaries of some of the selected areas is not apparent.

## Conclusions on Ben Lomond core area

The Ben Lomond 'core area', comprising Ben Lomond National Park and associated ENGO-proposed reserves, was confirmed as an area of high conservation significance, independent of other protected lands in the North East. The Ben Lomond core area makes an important contribution to the aggregate of protected lands and proposed protected lands in the North East cluster.

## Mount Maurice cluster

FID 187, 202, 205, 208, 213, 216, 221, 236

## Introduction

The Mount Maurice cluster is an aggregate of ENGO-proposed reserves centred on the existing Mount Maurice Forest Reserve, a reserve previously identified as being of high conservation value, especially because of the stands of cool temperate rainforest.

Vegetation is a mix of rainforest and eucalypt forest, including some tall eucalypt forest. The main eucalypt dominant is *E. delegatensis* but there is some *E. regnans*.

## Context for assessment

Mount Maurice Forest Reserve is easily recognised as being one of a number of important 'core areas' in the North East cluster, importantly, retaining physical habitat links to adjacent remnant forest areas in the region.

Although the 'Ben Nevis' block [FID 208] has limited connectivity to Ben Lomond National Park, its intimate connection to the Mount Maurice Forest Reserve to the north is much more important in assessing heritage values and significance. The Mount Maurice Forest Reserve, added to by the Regional Forest Agreement (RFA) process, is a substantial block of forest in formal and informal reserve. The reserve in turn has prospects of being able to maintain its connectivity northward to other remnant habitat so that a regional 'linking of landscapes' is still an option.

The Mount Maurice Forest Reserve has previously been specifically recognised for its high conservation value, including as part of the RFA. A rapid appraisal by the author verified the high conservation value of the reserve in its present form, particularly for its combination of:

- rainforest
- tall eucalypt forest
- threatened plant communities
- geoconservation sites.

The various ENGO-proposed reserves, which directly link to the Mount Maurice Forest Reserve need to be assessed in the context of that link to the existing high value protected area.

## Assessment

All of the ENGO-proposed reserves, which directly link with the Mount Maurice Forest Reserve, have the potential to enhance the conservation value of the existing reserve and to contribute independent conservation value (see *Linking landscapes*).

FID 208 is one of the three largest of the ENGO-proposed reserves in the North East cluster and deserves some specific consideration. It is a sizable block of mainly forested lands linking Mount Maurice Forest Reserve in the north to Ben Lomond National Park in the south. It provides reasonably effective connectivity between Ben Lomond National Park and Mount Maurice Forest Reserve. Topography is mostly steep to moderately steep and includes two well-known dolerite capped residual peaks, Ben Nevis and Mount Saddleback. FID 208 contributes critical connectivity between the Ben Lomond and Mount Maurice Forest Reserve 'core areas'.

Similarly, on the north side of Mount Maurice Forest Reserve, ENGO-proposed reserve FID 236 is extensive and effectively links the reserve northwards to other nodes of natural habitat in the region. It provides critical connectivity northward from Mount Maurice, ultimately to the Cameron Regional Reserve.

FID 208 and FID 236 are therefore of particular conservation value because of their contribution to connectivity of regional-scale habitat of conservation importance.

Both FID 208 and FID 236 are substantial parcels of forest, which independently have significant conservation values but also substantially enhance the conservation value of Mount Maurice Forest Reserve and so make a significant contribution to the overall aggregate of remnant native forest habitat in the North East of the state.

The conceptual as well as actual connectivity contributed by FID 208 and FID 236 is a physical habitat link between the Ben Lomond core to the Cameron Regional Reserve in the north, northern-most of the North East cluster and representing a link distance of more than 75 km. Without such critical connectivity, the heritage conservation value of the North East cluster would be greatly diminished.

Other smaller ENGO-proposed reserves parcels [FID 187, 205, 213, 216 and 221] directly adjoining Mount Maurice Forest Reserve, all qualify as potential additions to that reserve and would significantly enhance the already high conservation importance of the reserve. As such, these parcels would make an important contribution to the heritage value and integrity of the Mount Maurice Forest Reserve 'core area'.

In summary, all of the ENGO-proposed reserves that link to the Mount Maurice Forest Reserve:

- represent tracts of mostly native forest habitat of importance for species and communities of conservation importance—regional or state significance
- contribute to the value and integrity of the already recognised high conservation value of Mount Maurice Forest Reserve—at least state significance
- contribute critical connectivity between Mount Maurice Forest Reserve and other habitats of conservation value across the region.

The ENGO-proposed reserves, together with the Mount Maurice Forest Reserve (Mount Maurice cluster) represent a substantial habitat aggregate of even greater conservation value than the existing reserve—a case of the conservation value of an area being greater than the sum of the parts—a product of the habitat connectivity between components.

The Mount Maurice cluster is therefore verified as an area of high heritage conservation value. It is of at least state significance and likely of national significance. Further, the cluster makes a major and critical contribution to the high heritage conservation value of the whole

North East cluster. Collectively these lands are of at least state and probably National Heritage significance.

**NOTE:** This assessment is based on retaining and permanently protecting of the existing informal and formal reserves within and adjoining each of the assessed ENGO-proposed reserves, for example, Ringarooma River, Tombstone Creek, Paradise Plains, South Esk and Mount Victoria Forest Reserves are integrally related to FID 208 and it is the aggregation of FID 208 and these reserves that represents an area of high conservation value.

### Boundary considerations

Study of the ENGO-proposed reserves lands associated with Mount Maurice Forest Reserve raised a number of concerns about the appropriateness of the boundaries in the event all ENGO-proposed reserves land parcels are adopted in their entirety as part of the protected area system in the region.

### Recommendations

1. Explore opportunities to establish formal reserve connection between Mount Barrow State Reserve and the Mount Maurice-Ben Lomond habitat network. (It appears that there are no existing formal reserves or ENGO-proposed reserves that establish connectivity with Mount Barrow—some token informal corridors are apparent)

Heritage summary—North East cluster		
NATIONAL HERITAGE		
Attribute	Relevant criterion	Value
Region of high biodiversity* *(including species, plant communities) (95 recognised vegetation communities, including 17 'threatened vegetation communities')	(a) Events and processes	An area that contains a high level of biodiversity at both species and ecological levels, in a diverse landscape, with altitude ranges from sea level to 1,573 metres (Legges Tor, second highest mountain in Tasmania).  <i>a.5 Centres for richness and diversity (natural values)</i>

Regional of geological and geomorphological significance	(a) Events and processes	Dolerite capped landforms, which demonstrate all stages of erosion from plateau through mesa, butte and residual.  Region of limited to marginal glaciation and periglacial landforms remote from main glaciated areas in western Tasmania (Ben Lomond demonstrates glacial landforms).  <i>a.1 Geomorphology, landscape and landform</i>
A region of aesthetically diverse and attractive mountains, forests and coasts.	(e) Aesthetic characteristics (' <i>exhibiting particular aesthetic characteristics valued by a community</i> ')	Dolerite capped plateau and associated cliff lines, residual dolerite capped 'castle' type mountains. Aesthetically outstanding forests (rainforest, <i>E. regnans</i> , <i>E. viminalis</i> e.g. The White Knights).  <i>e.1 Features of beauty, or features that inspire, emotionally move or have other characteristics that evoke a strong human response.</i>

## Summary of heritage values

While there may be some elements of World Heritage significance to be found in the North East cluster, particularly Ben Lomond plateau, the area was not assessed against World Heritage criteria.

Assessed against the National Heritage criteria, the North East cluster assessment area readily meets two criteria and could well meet a third.

The region is physiographically diverse with an impressive altitudinal range of more than 1,500 metres. A series of prominent plateau and mountains are characterised by cappings of the once huge dolerite sill that in geological antiquity extended across most of Tasmania.

## Boundary considerations

Notwithstanding the collective assessment of the North East cluster of ENGO-proposed reserves and associated existing protected areas as being of national significance, some boundary issues need to be addressed. Some have already been addressed in the sections on the Ben Lomond and Mount Maurice 'core area' clusters. Others have been identified in the summary table.

Some apparent inappropriate boundaries of ENGO-proposed reserves were satisfactorily resolved when details of existing adjoining informal and formal reserves were taken into account.

### 'Missing Links'

A number of apparent 'missing links' were identified and remain unexplained. Reference is made in the Mount Maurice section of the apparent lack of formal connectivity to Mount Barrow State Reserve. This deserves close attention so as to effectively physically connect the state reserve into the otherwise regional scale 'linked landscapes'.

Another important missing link is inland of the Bay of Fires Conservation Area where a potential direct link between FID 231 and Doctors Peak Forest Reserve–Mount Pearson Reserve–Bay of Fires Conservation Area ‘core cluster’ of protected areas and FID 258 and westward to Blue Tier Forest Reserve. It is apparent that a substantial corridor of unlogged/old growth forest could provide high quality connectivity between FID 231 and FID 258. Consideration should be given to exchanging some logged/plantation sections of FID 258 for the proposed corridor of unlogged forest. A corridor could be designed from Mother Logans Road south west to FID 258 (use centre line from 596226.26 E 5435338.13 m S to 597550.52 m E to 5435820 m S).

Another apparent missing link is between Little Beach State Reserve and FID 129 (link is state forest, mostly unlogged) north of Douglas Apsley National Park.

## Recommendations

1. Explore opportunity to address ‘critical missing link’ between FID 231 and FID 258 by adopting a substantial connecting corridor of intact forest from Mother Logans Road, south-west to FID 258. (Consider exchanging some of the regrowth/plantation in FID 258 for the unlogged forest in the proposed connecting corridor)

## Conclusions on heritage assessment of North East cluster

Faced with such a large number of individual parcels of ENGO-proposed reserve land to be assessed, a holistic approach was valid in lieu of a reductionist approach of separately assessing each individual parcel.

The heritage assessment of the North East cluster involved an initial assessment at the regional landscape level, moving to a selection of core areas or ‘sub-clusters’ as the need emerged.

The substantial number of formal protected areas combined with the numerous ENGO-proposed reserves is a very substantial network of native vegetation. Collectively it is an important conservation resource. The North East cluster contains many conservation attributes including rare and endangered species, threatened plant communities, regionally uncommon vegetation, outstanding scenery and more.

With the help of the ENGO-proposed reserves all of the larger and more important formal reserves in the region would be linked by one or more corridors of native habitat. This connectivity would greatly enhance the value and significance of each protected area as well as the collective value and significance of the remnant native habitats of the region. This is a clear case of the value of the whole being greater than the sum of the individual parts. Instead of being a cluster of separate, relatively small, protected areas, if effective connectivity is ensured, the collective protected lands virtually become a single large regional protected area and can be legitimately considered as such. **Instead of a geographic cluster of reserves of mostly state significance, the ‘regional protected area’ becomes an ecologically linked protected area system, one of the major protected area entities of Australia, and so deserves to be recognised as being of National Heritage significance.**

Comprehensive assessment against the National Heritage criteria of the North East cluster, including all existing formal reserves, was not a part of the assigned terms of reference would not have been possible in the available time. However, the author has no doubt that if considered as a single protected area, it would readily qualify as being of national significance.

Assessing some ‘core areas’ (e.g. a cluster around the Mount Maurice Forest Reserve), confirmed the high to very high conservation values of key components of the North East cluster. Some of the ‘core areas’ in the cluster are of state and in some cases national

significance, for example Ben Lomond (glacial) and Mount Maurice (rainforest–tall eucalypt forest).

Where relevant and necessary, findings were made for individual parcels and recommendations made on their future. Details are summarised in the summary table (see Section 11).



CHAPTER 9

South East

## Chapter 9

### South East

#### ENGO-proposed reserves in South East not associated with TWWHA

The ENGO-proposed reserves were assessed both in recognisable cs and for some, at the individual parcel level.

#### Contents

##### East Coast corridor cluster

- Douglas Apsley Landscape
- Mount Elephant

##### Bruny Island

#### East Coast corridor cluster

The ‘East Coast corridor cluster’ extends from St Marys (Saint Patricks Head State Reserve) in the north to the Tasman Peninsula in the south. The greater part of the ‘cluster’ is within the South East Bioregion. A narrow coastal strip in the far northern section is mapped as being within the Flinders (coastal) bioregion.

Preliminary investigation revealed that a series of ENGO-proposed reserves extending south from near St Mary’s township in the north to near the Arthur Highway in the south were part of an essentially continuous tract of sub-coastal forested lands. Several other parcels of land, not physically linked to the main tract of forest occupied the Forestier and Tasman Peninsulas, were assessed separately as they lacked the physical connectivity to the main corridor.

Technically this ‘East Coast corridor’ is physically linked to the ‘North East cluster’ through the Saint Patricks Head State Reserve, which straddles the Esk Highway. This regional connectivity was considered to be a vital element in assessing heritage conservation values and heritage significance.

#### Context for assessment

The most important element of the context for assessing the ENGO-proposed reserves in the ‘East Coast corridor’ is the potential role that those lands play in linking existing protected areas and hence providing effective habitat connectivity at both a local and regional scale.

Assessing the conservation value and heritage significance of the proposed reserves, both individually and collectively required an understanding of the context of adjoining and adjacent protected areas, both formal and informal. Many formal forest reserves and reserves of other designations as well as a substantial number of informal reserves were evident on LIST Map.



## Douglas Apsley landscape cluster

### Introduction

The series of ENGO-proposed reserves clustered in near the Douglas Apsley National Park were found to have physical habitat connectivity to the ‘North East cluster’. For heritage assessment purposes they could also have been included in that same cluster. For convenience the Douglas–Apsley cluster was treated separately although for overall assessment the proximity and connectivity to the North East cluster is an important contextual consideration.

The lands that make up the Douglas Apsley Landscape assessment area comprise:

#### **Existing protected areas:**

- Douglas Apsley National Park
- St. Patricks Head State Reserve
- Little Beach State Reserve
- Apslawn Forest Reserve
- Hardings Falls Forest Reserve
- Saint Pauls Regional Reserve
- Dog Kennels Regional Reserve

#### **ENGO-proposed reserves:**

- FID 129 (Mount Elephant)
- FID 93
- FID 123
- FID 103
- FID 113

### Context for assessment

The existing Douglas Apsley National Park was central to assessing the Douglas Apsley landscape cluster, as it is a major ‘core area’ of mostly intact natural eucalypt forest in a hilly to mountainous landscape.

Several of the larger ENGO-proposed reserves immediately adjoin the national park and are assumed to have been conceived as additions to that park. Others are only indirectly connected to the park.

Importantly, all of the above listed parcels of land are interconnected and hence retain natural habitat connectivity throughout.

#### **FID 129 Mount Elephant**

This is an unusually complex looking parcel of land on Mount Elephant. The complex boundary derives from the extensive interface with small private land parcels.

Mount Elephant has a collar of karstic limestone known as the Mount Elephant Karst, which is listed for geoconservation significance (regional on Tasmanian Geoconservation Database—TGD). Mount Elephant is a distinctively-shaped mountain, no doubt contributing to its popular name. The area is fully forested, including significant areas of the rare and threatened plant community ‘rainforest fernland’.

Much of the forest on the steep slopes is unlogged wet sclerophyll *E. delegatensis* and *E. obliqua* with rainforest in the many steep gullies, including rainforest fernland.

The blind velvet worm *Tasmanipatus anophthalmus*, a listed endangered species, has a very localised distribution, the core area being 40 km<sup>2</sup> around Mount Elephant and the catchments on its eastern slopes. The giant velvet worm, *T. barretti* (rare) is found in areas nearby but does not overlap with *T. anophthalmus*.



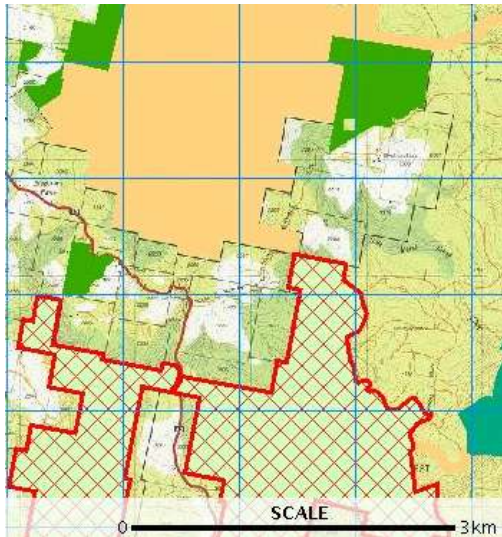
Threatened plant community 'rainforest fernland' on Mount Elephant Mountain [FID 129]

Preliminary assessment of the Mount Elephant FID 129 area is that it has independently important conservation values and is significant at the state level and potentially also national level. FID 129 has habitat links to both the north and south. In the north there is limited connectivity to Saint Patricks Head State Reserve—in the south, to the Lower Marsh Creek Forest Reserve.

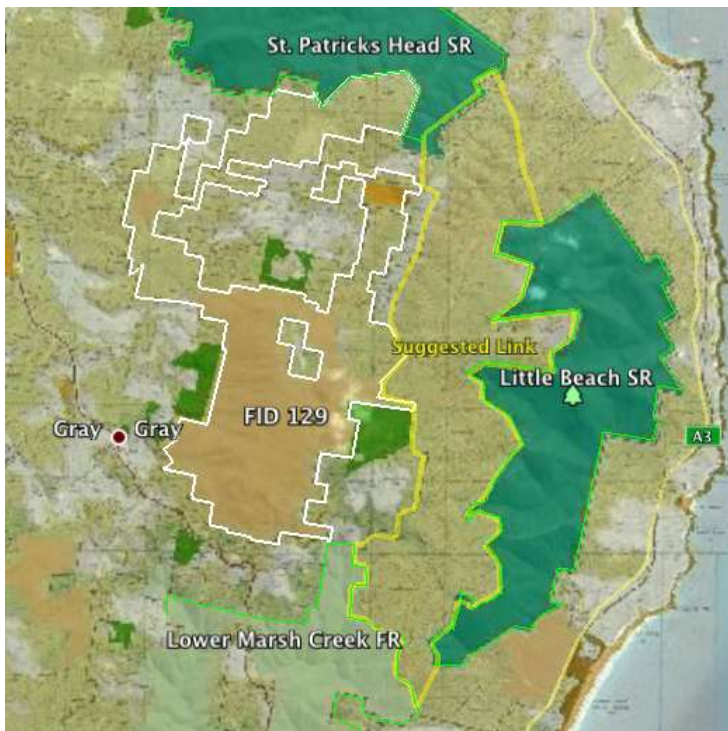
FID 129 is already an informal reserve on state forest.

The assessment identified an apparent missing link—the lack of connectivity between Mount Elephant [FID 129] and Little Beach State Reserve to the east. Little Beach State Reserve is key to achieving more robust and effective connectivity between the North East cluster and the Douglas–Apsley cluster rather than relying on the Mount Elephant link, which offers minimal connectivity.

Notwithstanding that the strip of forest between Mount Elephant and Little Beach State Reserve has been selectively logged, as a longer-term proposition it would make an important contribution to a critical connection between the two regions.



There is only a token link between FID 129 (green) (Mount Elephant) and Lower Marsh Creek Forest Reserve (hatched). A much more robust link would be available via state forest and Little Beach State Reserve to the east.



The suggested connectivity link (yellow edge) between FID 129 and Little Beach State Reserve would greatly improve connectivity between the forests of the North East and the Douglas Apsley.

## Heritage assessment summary by ENGO-proposed reserves

Douglas Apsley landscape cluster		
ENGO-proposed reserves	Heritage significance	Remarks
FID 129	High (endangered species, threatened plant communities, karst) see above. Conservation values confirmed.	Mount Elephant
FID128	-	Very small detached area, not recommended as National Heritage
FID 93	Wet <i>E. sieberi</i> , wet <i>E. delegatensis</i> , <i>E. obliqua</i> dry forest and dry forests including <i>E. delegatensis</i> dry forest and woodland, <i>E. amygdalina</i> forest and woodland on dolerite forest. Makes very important contribution to catchment protection of existing Douglas Apsley National Park (value adding). Many Aboriginal sites. High conservation value, national significance	Large intact natural forest and woodland. Very logical addition to Douglas Apsley National Park  Provides critical connectivity to Apslawn and Hardings Falls and hence onwards to Swan River and Cygnet River Forest Reserves.
FID 123 (east)	Wet <i>E. sieberi</i> , wet <i>E. delegatensis</i> , <i>E. obliqua</i> dry forest and dry forests including <i>E. delegatensis</i> dry forest and woodland, <i>E. amygdalina</i> forest and woodland on dolerite forest.  Seven or more Aboriginal sites. Various including threatened plant community <i>E. brookeriana</i> , rainforest fernland. Makes very important contribution to catchment protection of existing Douglas Apsley National Park (value adding). Conservation values confirmed.	The eastern section was considered separately from the western section.  Potentially very important addition to Douglas Apsley National Park and would contribute substantially to the integrity of the park (catchment, wilderness, natural processes etc.)

Douglas Apsley landscape cluster		
ENGO-proposed reserves	Heritage significance	Remarks
FID123 (west)*	Conservation values not established.	West of Break O'Day Forest Reserve.  A problematic area. Significant amounts of coupe logging. Value for connectivity needs further analysis, and knowledge regarding the future of the forest to the south (Break O'Day)
FID 103	Data limited. Requires further investigation.	Linked back to FID 123 and Douglas Apsley National Park via Mount Puzzler FR (small gap?). About half has been logged. Linked westward to FID 113 via Dickies Ridge FR, onwards to St Pauls Regional Reserve.
FID 113	Data limited. Requires further investigation.	Extensively logged (coupe logging?).  Could be useful addition to adjoining St Pauls Regional Reserve.

## Conclusions

**CAVEAT:** Data on parts of this cluster of ENGO-proposed reserves was limited so the assessment is therefore provisional for some parts, especially the more western parts (FID 103 and FID 113).

Mount Elephant [FID 129] is considered sufficiently distinctive and with identified rare and endangered local endemic animals (blind velvet worm), threatened plant communities (rainforest fernland) and well-developed tall eucalypt and rainforest on very steep terrain as to be independently assessed as being of high heritage conservation value. FID 129 can also contribute significantly to sub-regional connectivity between the North East cluster and the Douglas Apsley Landscape cluster. (**NOTE:** A superior connectivity option has been identified above)

The ENGO-proposed reserves immediately adjoining the Douglas Apsley National Park have recognisable conservation values, including the contribution that they could make to the integrity of the national park. The two large ENGO-proposed reserves immediately adjoining the park have their own conservation attributes (e.g. threatened plant community *E. brookeriana*, rainforest fernland, Aboriginal cultural sites) but their greatest conservation value comes from their juxtaposition with Douglas Apsley National Park and the substantial contribution they can make to the park's integrity, including protecting the headwaters of the catchment of the Apsley and Douglas Rivers. FID 93 and FID 123 (east section) are considered to be of high heritage conservation value.

The author has reservations about the western part of FID 123 and FID 103, and FID 113 and recommends further investigation of these lands.

Overall, the eastern most ENGO-proposed reserves in the Douglas Apsley Landscape cluster (as outlined above), together with associated forest reserves, state reserves and regional reserves and Douglas Apsley National Park represent a potentially very important protected area complex of state and national significance. **The heritage conservation significance of Douglas Apsley National Park would be considerably enhanced by protecting the ENGO-proposed reserves, more than doubling the effective area of Douglas Apsley National Park.**

FID 93, FID 123 (east section) and FID 129 are verified as being of high heritage conservation value and contribute substantially to the Douglas Apsley Cluster as being of national significance.

### **Boundary considerations**

If FID 93, FID 123 (east section) and FID 129 were added to Douglas Apsley National Park, a number of boundary issues would arise. Some of these issues could be solved by also adding the other closely associated protected areas, so as to consolidate the protected areas into one management block. In particular these are:

- St Patricks Head State Reserve\*
- Little Beach State Reserve
- Apslawn Forest Reserve
- Hardings Falls Forest Reserve

**\*NOTE:** the need to consider a superior connectivity link between St Patricks and Little Beach State Reserves.

### **Recommendations**

1. Add FID 123 (east section) and FID 129 to Douglas Apsley National Park.
2. Add Apslawn Forest and Hardings Falls Forest Reserves to Douglas Apsley National Park.
3. Add FID 93 and Lower Marsh Creek Forest Reserve to Douglas Apsley National Park.

### **Other ENGO-proposed reserves**

A series of mostly smaller and sometimes isolated parcels of ENGO-proposed reserves are summarised in the following table.

East Coast corridor cluster		
ENGO-proposed reserves	Heritage significance	Remarks
FID 87	Threatened plant community. Small areas of threatened community 'Eucalyptus amygdalina forest and woodland on sandstone' (DAS), small area of rainforest scrub.	Campbells Hill. Mostly intact forest, wet and dry eucalypt with rainforest gullies. Some parts selectively logged. Extensive areas informal reserves. Adjoined on north by Royal George Forest Reserve and south by Snow Hill Forest Reserve.  Network of narrow corridors linking eastwards to Cygnet River Forest Reserve (Douglas Apsley)
FID 82	Open finding. Conservation significance not assessed due to limited information.  No decision	Part selectively logged (40%)  Adjoins Cygnet River Forest Reserve. No particular benefit as an addition to that reserve—much longer boundary with no connectivity to west evident.
FID 77	Not assessed.	Small parcel immediately adjoining Cygnet Hill Forest Reserve. Logical addition (if not already in reserve). Mapping error?
FID 76	<i>Eucalyptus tenuiramis</i> forest and woodland on dolerite. <i>Eucalyptus pulchella</i> forest and woodland. Need to establish the conservation value of <i>E. tenuiramis</i> and <i>E. pulchella</i> .  Eastern and north-eastern sections make significant contribution to value of adjoining Cygnet River Forest Reserve and Wye River State Reserve.  Important contribution to regional connectivity.  Data inadequate to fully assess conservation value.	Mostly eucalypt forest, about half of which have been selectively logged.  The enclave in FID 76 is a puzzle because it is very little different to the surrounding FID 76 (mapping error?).  Adjoins Wye River State Reserve, Wye River Conservation Area and Cygnet River Forest Reserve.  <b>Recommendation:</b>  Review to establish conservation values.
FID 70	Intact forest. No connectivity benefits.  Local significance only.	Adjoins Wye River State Reserve.
FID 72	Significant conservation values not established.	Very small area. No apparent heritage benefit from protection.

East Coast corridor cluster		
ENGO-proposed reserves	Heritage significance	Remarks
FID 68	<p>Two Aboriginal sites. <i>Eucalyptus pulchella</i> forest and woodland</p> <p><i>Eucalyptus delegatensis</i> dry forest and woodland</p> <p>Potential contribution including boundary improvement to adjoining protected areas.</p> <p>Not high value.</p> <p>Local significance.</p>	<p>Closely associated with Cygnet River Forest Reserve, Lost Falls Forest Reserve and a large unnamed Conservation Area. A very strangely shaped parcel of land.</p> <p>(Heritage significance?)</p>
FID 60	<p>No specific in-situ values identified.</p> <p>Likely same values as adjoining protected areas.</p> <p>Likely important conservation values based on contribution to surrounding reserves.</p> <p>Inadequate data for full assessment. Needs more detailed evaluation.</p>	<p>About 30% recently logged.</p> <p>Protected area on three sides (unnamed conservation area, Cygnet River Forest Reserve)</p> <p>Adding at least the unlogged (informal reserve) to the adjoining protected area would contribute to consolidating and improving boundaries.</p>
FID 55	<p>Not assessed. Useful contribution to consolidation of surrounding informal reserves.</p>	<p>Small area.</p>
FID 48 FID 49 FID 53 FID 56 FID 57	<p>Inadequate data for full assessment.</p> <p>Indicative assessment is that the areas are not of high heritage conservation value.</p>	<p>Small slivers of land along south-western boundary of Cygnet River Forest Reserve. Benefits of adding to Forest Reserve not immediately obvious and does not make any significant contribution to connectivity.</p>
FID 51 FID 47	<p>Moorland and unlogged forest.</p> <p>Inadequate data for full assessment.</p> <p>Preliminary assessment is that the areas potentially contribute to connectivity.</p> <p>Indicative assessment is that the areas do not contain important heritage conservation values.</p>	<p>Narrow strip adjoining Tooms Lake Forest Reserve. Useful addition to reserve but connectivity to protected areas to the north needs further investigation to bridge an obvious break in connectivity.</p>

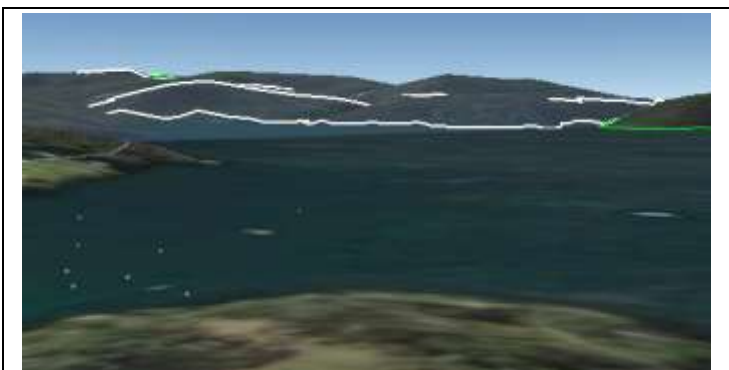


East Coast corridor cluster		
ENGO-proposed reserves	Heritage significance	Remarks
FID 45	<p>North-western sector logged. Mostly wet sclerophyll forest. Enclave is mostly logged and replanted.</p> <p>Eastern half very important for connectivity at regional scale. Western (logged) part subsidiary importance for connectivity to Tooms Lake Forest Reserve and conservation areas.</p> <p><b>Critically important</b> contribution to regional connectivity and hence to the heritage value and significance of other protected areas.</p> <p>Verified that FID 45 contains significant conservation values.</p>	<p><b>Recommendations:</b></p> <p>Add south-eastern half (south-east of enclave) to Butlers Ridge Nature Reserve.</p> <p>Explore an alternative substantial connectivity to Tooms Lake.</p>
FID 40, 41, 42	<p>Intact forest. Some broadleaf scrub. No connectivity benefits. No boundary benefits.</p> <p>FID 40,41,42 may be of local significance.</p>	<p>Narrow strips adjoining Butlers Ridge Nature Reserve.</p> <p>While the Butlers Ridge Nature Reserve may benefit from these additions in terms of extent of intact forest, it would be a case of swapping one poor boundary for another.</p> <p>Higher priority additions in the area would be to add areas of tall eucalypt forest and rainforest/broadleaf scrub to increase the ecological integrity of the Butlers Ridge Nature Reserve.</p>

East Coast corridor cluster		
ENGO-proposed reserves	Heritage significance	Remarks
FID 39 (Buckland)	<p>Threatened plant community <i>Callitris rhomboidea</i> forest</p> <p>Mostly intact forest. A few patches on western side have been coupe logged.</p> <p>Critically important contribution to regional connectivity (part of east coast corridor)</p> <p>Based on connectivity, condition of forest, threatened plant community, assessed as: important for conservation. (2,3)</p> <p><b>NOTE:</b> Critical missing link between FID 39 and Three Thumbs State Reserve (Wielangta area) to the south. Habitat connectivity still exists but probably private land either side of Tasman Highway.</p>	<p>Large tract of mostly intact dry eucalypt forest and woodland with a few pockets of wet sclerophyll forest in contrast to area immediately adjoining to the west where there are many stands of wet forest including <i>E. regnans</i>.</p> <p>Several private nature reserves provide invaluable connectivity across the Little Swanport River—a vital link between the extensive protected areas to the north and the Wielangta forests to the south, which includes FID 39.</p> <p><b>Recommendations:</b> Formally protect. Augment this corridor in the narrowest section.</p>
FID 27	<p>Small parcel of intact forest adjoined by logged lands to north-west and south.</p> <p>No formal connectivity to other protected areas.</p> <p>Inadequate data for full assessment.</p>	<p><b>Recommendation:</b> Further investigate values.</p>
FID 29	<p>Reference was made to document 'Wielangta WildCountry Conservation Plan'. Deeply dissected forest country with mosaic of wet and dry forests. Some areas logged, including coupe clear fell logging and significant proportion already informal reserve.</p> <p>Rare opportunity in eastern Tasmania for protected area extending from coastline into wet forest.</p> <p>Provisional assessment is that area is of conservation importance. State level significance.</p>	<p>Sandspit River FR forms an enclave in FID 29.</p> <p>In the east, FID 29 borders on Cape Bernier Nature Reserve.</p> <p>FID 29 would be a critical core of any sizable permanent protected area to be established in the area.</p>

East Coast corridor cluster		
ENGO-proposed reserves	Heritage significance	Remarks
FID 22	<p>Threatened plant community <i>Eucalyptus globulus</i> dry forest and woodland. (Habitat tree for endangered swift parrot)</p> <p>No formal connectivity to other protected areas but prospects for connection to Woodvine Nature Reserve.</p> <p>High heritage conservation values present.</p>	Part of a tract of forest otherwise extensively logged.
FID 21	<p>Dry forest and woodland.</p> <p>No significant heritage conservation values identified.</p> <p>Provisionally assessed as not containing significant heritage conservation values.</p>	Appears surrounded by private land
FID 17	<p>Threatened plant community <i>Eucalyptus amygdalina</i> forest and woodland on sandstone.</p> <p>The forests of the Forestiere Peninsula are a microcosm of the southern forests of Tasmania with the three 'tall eucalypt' species—<i>E. regnans</i>, <i>E. delegatensis</i> and <i>E. obliqua</i> together with minor occurrences of <i>Nothofagus</i> rainforest.</p> <p>Of conservation importance.</p>	Adjoins Tasman National Park in the east and Yellow Bluff Creek Forest Reserve in the north.
FID 07	<p>Contributes to existing national park, including significant improvement to the boundary.</p> <p>Verified as containing significant heritage conservation values</p>	<p>These three ENGO-proposed reserves all adjoin the southern section of Tasman National Park.</p> <p>Addition to Tasman National Park would significantly improve the boundary and is recommended.</p>

East Coast corridor cluster		
ENGO-proposed reserves	Heritage significance	Remarks
FID 10	<p>Scenic forested foreshore that contributes significantly to the scenic integrity of the adjoining Tasman National Park.</p> <p>Contributes to protecting the scenic backdrop—and hence authenticity—of World Heritage listed Port Arthur (see simulated view from Port Arthur).</p>	<p>Already informally reserved.</p> <p><b>Recommendation:</b> Add to Tasman National Park.</p> <p>Further extend the park along the foreshore, to incorporate informally reserved lands as far west as Andersons Road.</p>
FID 14	<p>Mostly wet forest of <i>E. delegatensis</i> and <i>E. obliqua</i>.</p> <p>Contributes to the ecological integrity of Tasman National Park.</p> <p>Contributes to protection of the scenic backdrop of World Heritage listed Port Arthur (ditto for FID 10).</p>	<p><b>Recommendation:</b> Add to Tasman National Park.</p>
FID 09	<p>Inadequate data for full assessment.</p> <p>Indicative assessment is that the area is not of heritage conservation importance.</p>	<p>Small area of regrowth forest surrounded by more regrowth.</p>
FID 12	<p>A tract of mostly natural regrowth wet eucalypt forest (<i>E. delegatensis</i> and <i>E. obliqua</i>) but with some old growth surviving in gullies. May be important habitat.</p> <p>Inadequate data for full assessment.</p>	<p>Only small proportion already under informal reservation.</p> <p>Requires access to further relevant data and more detailed review.</p>
FID 08	<p>Appears to be intact forest.</p> <p>Inadequate data for full assessment.</p>	<p>Tract of mostly dry <i>E. obliqua</i> eucalypt forest immediately adjoining Tasman National Park.</p> <p>Addition to park would provide a more appropriate boundary (mostly along cleared private land)</p>



FID 10 (white edge) viewed from Port Arthur—part of the Australian Convict Sites World Heritage Property. Protection of FID 10 contributes to the authenticity and scenic integrity of this important historic site.

## Summary of heritage assessment

The assessment area, which is described as the East Coast corridor cluster, extends from Saint Patricks Head State Reserve in the north to the Tasman Peninsula in the south.

Compared with the network of connectivity opportunities in the North East cluster, for the greater part the connectivity options in the East Coast cluster were found to be limited to a single linear although mostly broad corridor. As a consequence, a number of the ENGO-proposed reserves were found to be critically important for formal protection of the single connectivity corridor. Omission of any one of those critical parcels would have the effect of breaking regional habitat connectivity, potentially permanently.

Importantly, it was found that:

1. Some individual parcels of ENGO-proposed reserves had independently high heritage conservation values and were worthy of formal protection.
2. A physically continuous connection of native habitat extends from near St Marys on the Esk Highway south to near the Arthur Highway.
3. The existing series of protected lands, both formal and informal, do not provide complete protection for the identified regional connectivity corridor.
4. Protection of most of the ENGO-proposed reserves in the ‘East Coast cluster’, together with confirmation and/or formalisation of existing formal protected lands in that corridor would essentially\* achieve permanent protection of a regional scale habitat connectivity. (\*There are several localities where the protection link is not assured and some attention is needed to resolve these anomalies or to improve the connectivity through additional protection.)
5. The East Coast connectivity corridor (E3C) is further enhanced by being physically connected to the North East cluster, essentially establishing a major habitat connection across the north-east and down the east coast of Tasmania—a latitude range of more than two degrees.
6. Formal protection of the East Coast connectivity corridor would have manifold conservation benefits including:
  - a. enhancing the ecological value of existing protected areas

- b. facilitating ongoing wildlife movement and recruitment in response to natural disasters and climate change
  - c. protecting new and additional habitats of conservation value.
7. In the case of some individual parcels of ENGO-proposed reserves, time limits prevented full discovery of data necessary to complete a full assessment of their conservation value. They have been identified for further investigation. Some smaller parcels, which appeared to not have recognisable conservation attributes, let alone important conservation values, were assessed as not having heritage conservation value of significance.
8. Whereas many parcels of ENGO-proposed reserves were considered to have conservation values of state significance, overall assessment of those parcels forming the East Coast connectivity corridor have been assessed collectively to have National Heritage significance—one of the more important latitudinally connected tracts of native habitat in Australia.

## **Forestier Peninsula and Tasman Peninsula**

Although lacking connectivity to the East Coast Corridor there are important conservation values on the Forestier Peninsula and Tasman Peninsula, only parts of which have been formally protected.

At least three of the four ENGO-proposed reserves adjoining the Tasman National Park independently have high heritage conservation values and more importantly have the potential to make valuable contributions to the value and integrity of the park.

One area, FID 12, requires further investigation to establish if it contains conservation values. It is remote from the park and so is unlikely to make any direct contribution to its value.

## **Bruny Island assessment area**

### **Introduction**

The ENGO-proposed reserves on Bruny Island are mostly forested lands and represent about half of the forested lands on the island. Much of the balance is made up of three forest reserves and one national park in three parts.



The ENGO-proposed reserves on Bruny Island adjoin or surrounds three forest reserves and two parts of South Bruny National Park.

## Context for assessment

The one ENGO-proposed reserve on Bruny Island (FID 05) needed to be assessed in the context of the aggregate of public forested lands, namely:

- FID 05
- Mount Mangana Forest Reserve
- Mount Midway Forest Reserve
- Mount Bruny Forest Reserve
- South Bruny National Park.

The conservation attributes of Bruny Island are well-documented including an important publication by the Department of Primary Industries, Water and Environment, Tasmania, cited as Cochran 2003.

## Assessment

Forest types include *E. obliqua* and *E. delegatensis* and occur as both ‘wet’ and ‘dry’ communities. Bruny Island is the type locality for *E. obliqua*, the very first eucalypt species to be scientifically described (site near Waterfall Reserve).

Swift parrot *Lathamus discolor* is a nationally listed endangered species and a national recovery plan is in place. The assessment area is critical habitat for the endangered swift parrot *Lathamus discolor* and is listed as a ‘Swift Parrot Important Breeding Areas’ (SPIBA).

The swift parrot undertakes the longest migration of any parrot species in the world but breeding is restricted to eastern Tasmania, mainly in old or dead trees in dry forest on ridges by the sea. Nesting is largely restricted to old eucalypt trees, and the blue gum, *Eucalyptus globulus* is a very important species for feeding during the breeding season.

In Crossley 2011, citing *Species Habitat Planning Guideline for the conservation management of Lathamus discolor (swift parrot) in areas regulated under the Tasmanian Forest Practices System*, An internal report prepared for the Forest Practices Authority, November 2010, p.19.[This document is still in draft form and has not yet been finalised].

During the breeding season swift parrots use a narrow near-coastal band of blue gums in south-east Tasmania. This habitat is mainly between Swansea and Dover including the Forestier and Tasman Peninsulas and Maria and Bruny Islands (Parks and Wildlife Service 2012).

The annual Tasmanian swift parrot survey was conducted on 24–25 October 2009 under the auspices of the Threatened Species Unit and Birds Australia. Parrots were recorded at 39 of 86 sites surveyed on Bruny Island, compared with records at only 32 of 600 sites elsewhere in eastern Tasmania. On South Bruny, concentrations of at least 10–20 birds were recorded at five sites, and smaller numbers at eight additional sites. (Spirit of Bruny 2011)

‘Mount Mangana stag beetle *Lissotes menalcas* is a species found on and named after Bruny Island’s highest point’ (Cochran 2003). It is not confined to Bruny Island and is currently state listed as endangered but it has been proposed to change that from endangered to rare.

The delicate *Euphrasia fragosa* is only known from three populations, and Bruny Island has the only protected population in Tasmania.

One of Australia’s rarest birds, the endangered Forty-spotted pardalote, has half of its entire population living on Bruny Island, with its largest colonies carefully protected on both reserved and private land.

—Cochran 2003)

The Tasmanian Department of Primary Industries, Water and Environment has given particular attention to biodiversity conservation on Bruny Island, engaging the community to participate in species conservation on the island.

This floral diversity, combined with its isolation from the Tasmanian mainland, has resulted in a very rich, diverse and abundant animal and plant life. Approximately forty species of threatened plant and animal species have thus far been recorded on Bruny Island, it is the stronghold for several threatened species such as the Mt Mangana stag beetle, the Forty-spotted pardalote and the seastar *Smilasterias tasmaniae*.

—Cochran 2003.

The department, in Cochran 2003 lists a total of 39 species recorded on Bruny Island as ‘threatened’ under Tasmanian legislation, and 13 listed under the national EPBC Act (see tables below).



FLORA				
Dicotyledons	1	1	-	2
Monocotyledons	2	-	-	2
Ferns	-	-	-	-
<b>Sub-total</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>TOTAL</b>	<b>3</b>	<b>6</b>	<b>4</b>	<b>13</b>

## Verification of the heritage value of ENGO-proposed reserves

**Table 2** Summary of species on Bruny Island that are listed on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (as of September 2003)

	CRITICALLY ENDANGERED	ENDANGERED	VULNERABLE	TOTAL
<b>FAUNA</b>				
Mammals	-	1	2	3
Birds	-	3	-	3
Reptiles	-	-	1	1
Fish	-	1	1	2
Invertebrates	-	-	-	-
<b>Sub-total</b>	<b>0</b>	<b>5</b>	<b>3</b>	<b>9</b>
<b>FLORA</b>				
Dicotyledons	1	1	-	2
Monocotyledons	2	-	-	2
Ferns	-	-	-	-
<b>Sub-total</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>TOTAL</b>	<b>3</b>	<b>6</b>	<b>4</b>	<b>13</b>

## Conclusions

The forests of South Bruny contain nationally significant concentrations of biodiversity values in the form of:

- critical habitat of a nationally endangered species of parrot *Lathamus discolor*
- important habitat of nationally endangered forty spotted pardalote *Pardalotus quadragintus*
- state and nationally listed threatened species (13 national, 39 state)

The forests of the assessment area of South Bruny Island are assessed as high conservation value and of national heritage significance.

The ENGO-proposed reserve [FID 05] is a major part (about 40%) of the important wildlife habitat on South Bruny and [FID 05], and is part of an integrated package also comprising:

- Mount Mangana Forest Reserve
- Mount Midway Forest Reserve
- Mount Bruny Forest Reserve
- South Bruny National Park.

It makes a critical contribution to the forests of South Bruny being assessed as being of national heritage significance. Most importantly, protecting the ENGO-proposed reserve [FID 05], together with the three forest reserves would represent a major consolidation of protection on the island, providing direct connectivity with three forest reserves and the national park.

ENGO-proposed reserve [FID 05] is verified as having conservation values and it is considered of National Heritage significance.

**NOTE:** FID 04 is a small parcel of land, presently an informal reserve, and was not assessed.

## Boundary considerations

Although not ideal, the external protected area boundary that would be created by the protection of FID 05 would be appropriate under the circumstances.

## Recommendations

1. Recognise the whole of the ENGO-proposed reserve [FID 05] as having important conservation value and contributing to National Heritage significance.
2. Add the whole of FID 05 to South Bruny National Park\*, together with the three closely associated existing forest reserves:
  - Mount Mangana Forest Reserve
  - Mount Midway Forest Reserve
  - Mount Bruny Forest Reserve.

\*It is suggested that the new park be named simply 'Bruny' or 'Bruni' National Park to make a more direct reference to Bruni D'Entrecasteaux, who named the island.)

### **Bruni D'Entrecasteaux on Bruny Island**

When French explorer Bruni D'Entrecasteaux first saw this island in 1792 it was the forests that impressed him. He wrote of ...

... trees of an immense height and proportionate diametre, their branchless trunks covered with evergreen foliage, some looking as old as the world;

'closely interlacing in an almost impenetrable forest, they served to support others which, crumbling with age, fertilised the soil with their debris;

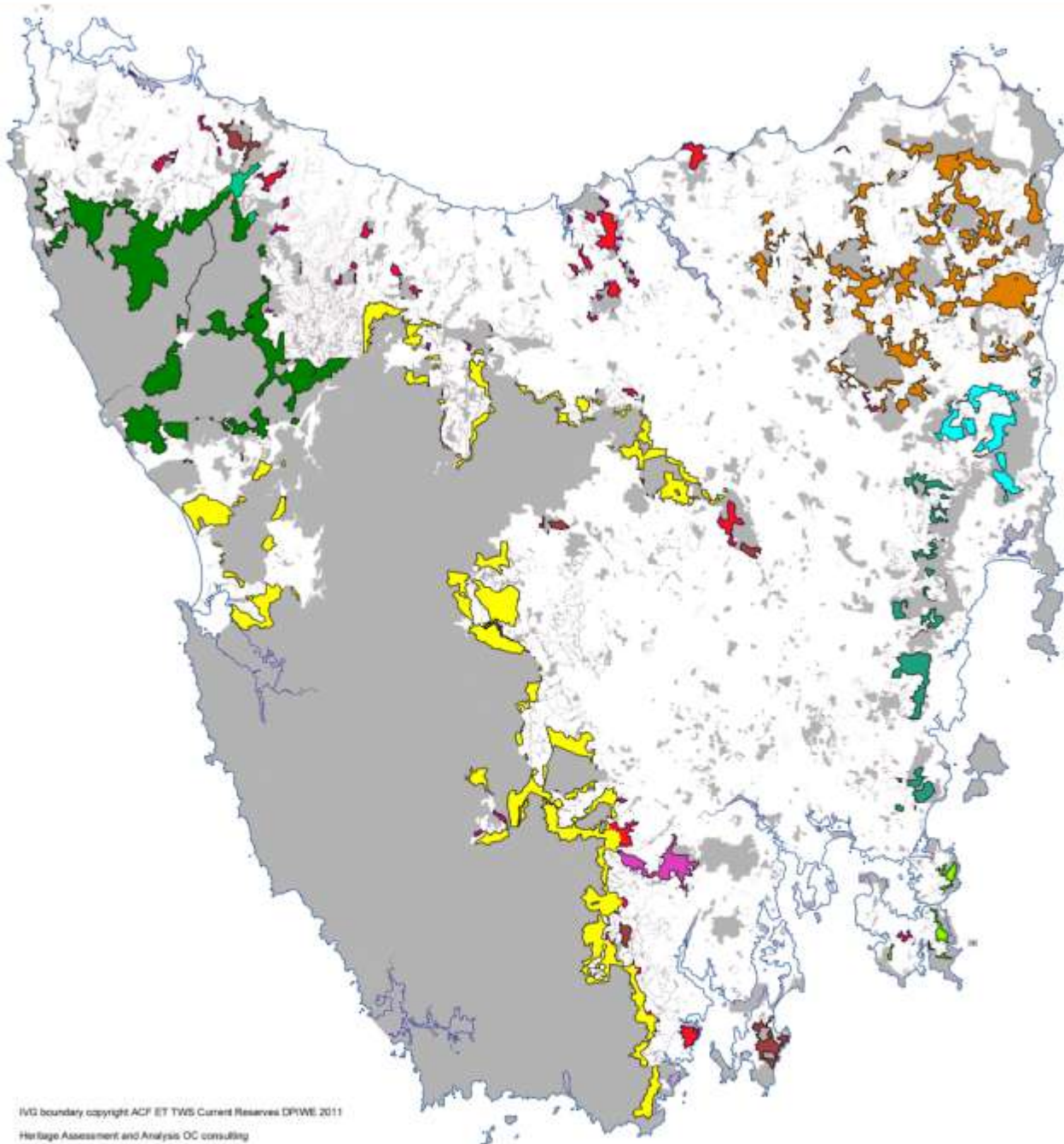
... nature in all her vigour, and yet in a state of decay, seems to offer to the imagination something more picturesque and more imposing than the sight of this same nature bedecked by the hand of civilised man.

Wishing only to preserve her beauties we destroy her charm, we rob her of that power which is hers alone, the secret of preserving in eternal age eternal youth.

—Wikipedia

Map 1: Heritage areas and ENGO-proposed areas

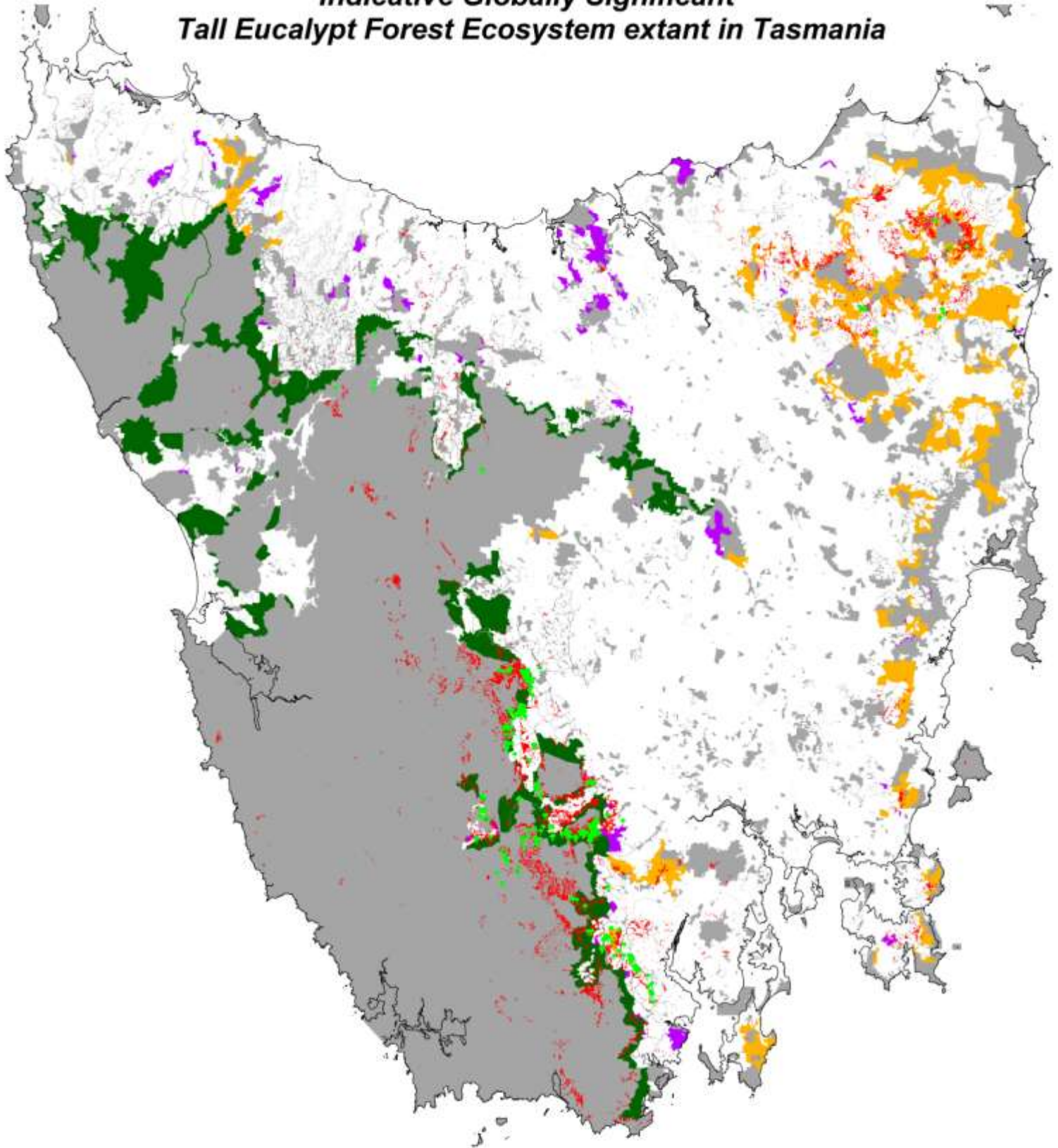
reserves



IVG boundary copyright ACF ET TWS Current Reserves DPWE 2011  
 Heritage Assessment and Analysis DC consulting  
 Analysis and map preparation C&N consultancy Feb 2012 for the IVG



# Giant Trees and Indicative Globally Significant Tall Eucalypt Forest Ecosystem extant in Tasmania



### Legend

- |  |  |
|--|--|
|  Giant_trees.shp                                  |  Proposed national Heritage Areas       |
|  Indicative Extant Tall Eucalypt Forest Ecosystem |  National Heritage                      |
|  Proposed additions to World Heritage Area        |  All Reservation Tenures                |
|  Proposed additions to World Heritage Area        |  No Identified National Heritage Values |
|  World Heritage                                   |  |

Data Sources:  
Proposed INGO reserves ACF ET TWS 2011  
Heritage identification OC Consulting  
Disturbance: Forestry Tasmania 2011  
Height Potential classes Forestry Tasmania 2011  
Forest Type Forestry Tasmania 2011  
Old-growth Forestry Tasmania 2011  
Giant Trees Data Base FI 2011  
Tasmanian Forest Group Dataset known as FORGROUP11 FT & PFT  
TASVEG 2010 DPIPWG

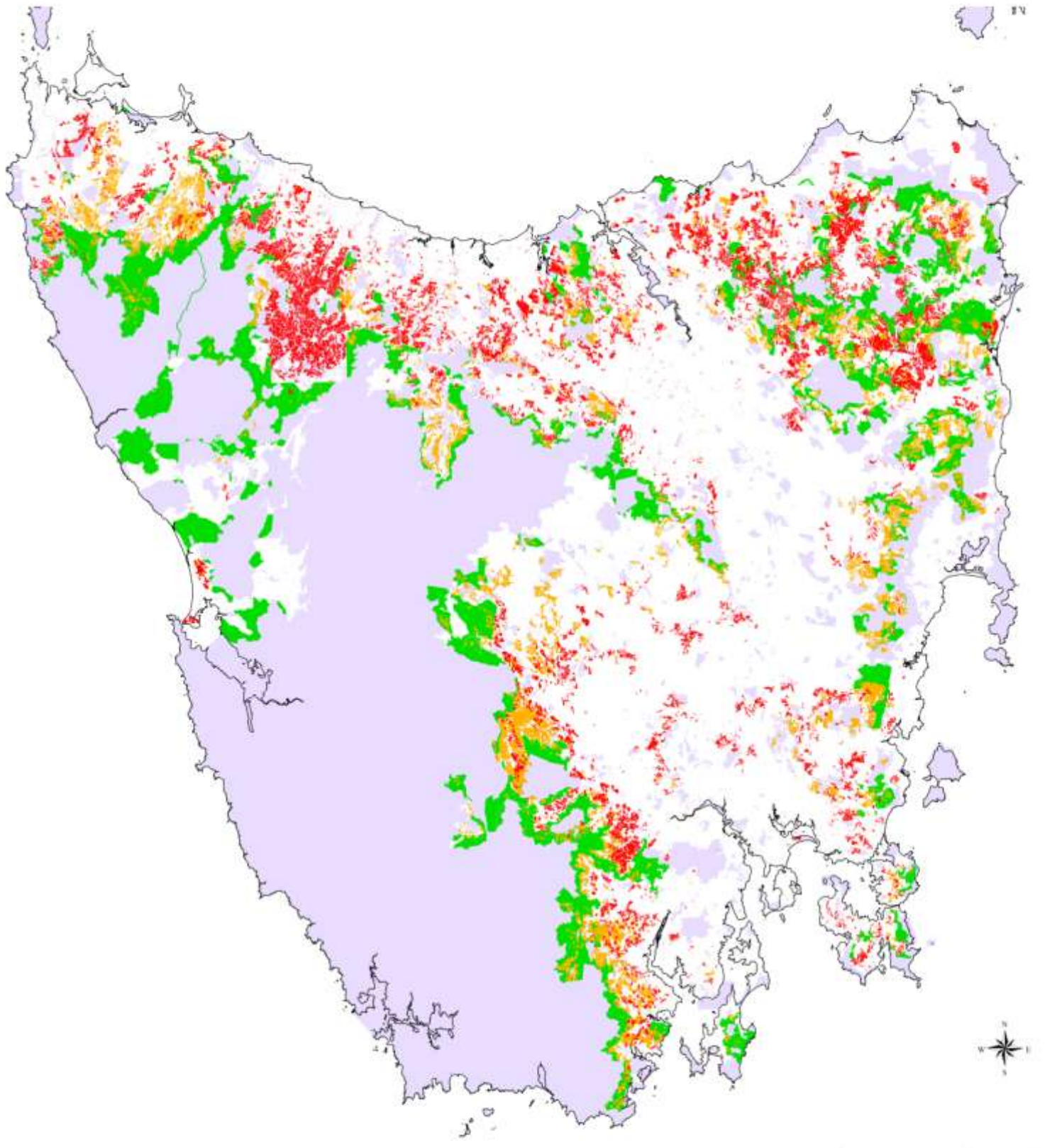
Map production and Analysis C&N consulting Feb 2012



0 5 10 20 Kilometers

Map 3

### Area Regenerated on State Forest since 1960 and Plantations on all Tenures (current)



#### Legend



Plantations All Tenures



Proposed ENGO Reserves



Areas of State Forest Regenerated since 1960



All Reservation Classes

ENGO Proposed Reserves, ACP ET, TWS 2011  
Tasmanian Forest Group Dataset known as  
FORGROUP11 FT&MFT 2011  
Regeneration data derived from  
Disturbance FT 2011  
Tenures derived from log\_tenure14  
Natural Management Planning Pty Ltd 2011  
Map Preparation and analysis C&N Consulting Feb 2012

## **Appendix 1:**

### **Spatially Identifying Tall Eucalypt Forests in Tasmania.**

#### **Methods Paper**

Sean Cadman February 2012

#### **Introduction**

In order to spatially identify tall eucalypt forest a conceptual model has to be adopted, Hitchcock 2012 (in prep) has reviewed current thinking, research and methods for considering the 'tall forest ecosystem'. While acknowledging that a definition is not yet possible there are three components identified which can be used to establish an indicative spatial layer for this ecosystem in Tasmania.

The three components that can be spatially identified using current available data are: Vegetation Community, Height Potential, (by using height potential data the analysis is constrained to public land), old-growth and Forestry Tasmania's disturbance classes. Old-growth and regeneration year are surrogates for condition.

The most utilitarian spatial layer for use in determining the floristic component is TASVEG V2.0 the most recent iteration of which is Tasveg\_2010\_prototype. Descriptions of the TASVEG classes (Harris and Kitchener 2005) are given and can be used to set decision rules.

For the purpose of identifying the floristic component of an indicative 'tall forest ecosystem' five classes were chosen, two *Eucalyptus regnans* wet forest and *E. viminalis* wet forest are not sub categorized and are typically associated with a rainforest and or fern understory in addition those wet forest classes identified as having a rainforest understory were chosen: *Eucalyptus delegatensis* over rainforest, *E. nitida* over rainforest; *E. oblique* over rainforests. It needs to be acknowledged that there are mapping biases evident in these classes with poor mapping particularly in the NW of the state. However the alternative would be to use the undifferentiated class for these wet eucalypt forest species which while certainly containing areas with a rainforest understory also reflects a much larger area of true wet sclerophyll forest..

#### **Methods**

The selected Tasveg classes were unioned with FT pi-type data, forest with a height potential greater than 41m this is in two classes E1 and E2. All areas of E1 (height potential greater than 55m) were accepted, only areas of E2 that intersected with the selected TSVEG classes were accepted. ?

This was then intersected with all areas of State forest where regeneration has been undertaken since 1960. These areas were removed from the data. This was then intersected with the updated FT Old-growth layer to provide context.

In order to undertake further analysis the data was clipped using the 270 ENGO polygons, then cleaned using the Mtools Arc View extension. The resulting product was then simplified by removing redundant table fields. This was then unioned with the ENGO polygons (ivg\_rsfinal) and a spatial index created. Several mapping products were generated.

**Discussion**

The methodological approach produced a coherent output consistent with expectations. The statistical breakdown is shown in tables 1 -3. The outputs were mapped as a spatial index normalized for area of the ENGO proposed reserves polygons (figure 1 below) and onto contextual layers to show the relationship to proposed World and National heritage areas (figure 2). The results demonstrate strongly the relationship of the indicative tall eucalypt forest ecosystem with the existing WHA, particularly in the Southern Forests. There is a large and important remnant in and around the Blue Tier. Other remnants are small and partially reflect mapping deficiencies, for example in the NW of the State, but also likely to be indicative of areas where this ecosystem was once more widespread and probably capable of recovering for example in the Mersey Valley and along the northern fall of the Great Western Tiers.

**Results**

*Table 1 Public Land Indicative Tall Eucalypt Forest Ecosystem*

Total all public tenures ha	Old-growth all public tenures	E1 greater than 55 m public land	E2 41 – 55 m Public land
95,700 ha	52,396 ha	26,892	69,123 ha

*Table 2 ENGO proposed reserves Indicative Tall Eucalypt Forest Ecosystem*

Total all public tenures ha	Old-growth all public tenures	E1 greater than 55 m public land	E2 41 – 55 m Public land
25,464 ha	11,872 ha	9,544 ha	15,920 ha

Table 3

*ENGO Proposed reserve polygons containing the Indicative Tall Eucalypt Forest Ecosystem*

ENGO polygon	Area of ENGO polygon	No of TEF polygons	TEF_HA	% TEF
115	2008.918	3	1.7720	0.09
252	60250.455	55	70.8900	0.12
135	0.773	2	0.0010	0.13
244	5178.569	6	8.8840	0.17
136	3514.553	2	8.0210	0.23

5	6338.380	33	20.6030	0.33
130	2119.294	7	7.0240	0.33
2	5256.599	30	19.1240	0.36
31	73.608	3	0.2740	0.37
206	16.789	1	0.0640	0.38
198	37239.439	89	171.2100	0.46
43	184.661	1	0.8580	0.46
186	1879.180	2	9.9750	0.53
114	433.692	2	2.4960	0.58
193	14280.267	33	89.0860	0.62
176	10593.246	29	70.4990	0.67
54	11518.676	30	82.5050	0.72
156	7937.327	26	61.4780	0.77
23	1034.297	5	8.9150	0.86
239	5929.145	53	57.6330	0.97
137	2533.653	9	25.7700	1.02
235	227.378	10	2.6990	1.19
243	1388.910	27	19.7740	1.42
133	0.280	1	0.0050	1.79
28	13.339	5	0.2740	2.05
39	9819.531	22	205.6850	2.09
17	2300.911	19	49.1030	2.13
233	1011.499	19	22.5590	2.23
200	198.060	1	5.5170	2.79
14	2046.760	36	57.5230	2.81
173	860.147	10	24.1930	2.81
91	155.074	8	4.5880	2.96
197	6287.827	152	189.7110	3.02
203	303.440	5	10.5470	3.48
58	5861.572	66	237.7090	4.06
212	3161.653	36	129.1650	4.09
191	416.244	5	17.2060	4.13
37	116.259	6	4.8880	4.20
184	1567.348	52	66.3810	4.24
207	1769.059	31	76.7810	4.34
107	784.253	24	35.8870	4.58
187	946.442	49	45.7270	4.83
44	8145.817	118	446.2690	5.48
112	3326.899	74	183.7400	5.52
34	926.652	19	51.5650	5.56
32	146.216	14	8.9380	6.11
208	16894.514	782	1088.8180	6.44
204	143.866	21	9.5190	6.62
181	2536.892	115	202.0360	7.96
33	15776.453	225	1295.2260	8.21
29	4418.232	83	378.2890	8.56
12	820.162	33	77.2930	9.42
209	468.666	29	44.9040	9.58
236	3191.027	101	311.4940	9.76
166	1093.888	66	122.0130	11.15
211	572.191	34	72.0670	12.59



225	1343.303	87	170.9520	12.73
24	76.430	6	10.5820	13.85
16	12.809	2	1.8220	14.22
222	32.047	8	4.7590	14.85
25	60344.791	2790	9024.7330	14.96
258	25482.140	813	3965.7400	15.56
182	175.712	13	27.5770	15.69
250	416.250	37	76.3180	18.33
30	2775.309	242	552.2820	19.90
158	124.417	1	26.7030	21.46
19	2664.679	327	665.0160	24.96
131	2.281	9	0.7200	31.57
13	1869.678	51	614.3430	32.86
35	3025.552	188	1032.2530	34.12
224	1376.305	84	485.7500	35.29
216	46.182	7	16.5980	35.94
18	389.058	65	143.8470	36.97
242	91.738	8	35.0590	38.22
26	1873.720	310	737.7300	39.37
226	453.493	13	179.2320	39.52
237	1470.215	144	606.8780	41.28
20	794.452	240	353.9440	44.55
247	270.372	25	125.2840	46.34
202	51.296	6	25.7660	50.23
205	143.347	29	75.4280	52.62
221	358.828	52	197.7650	55.11
220	21.341	1	13.9860	65.54
213	37.727	7	28.1010	74.49
36	5.581	7	4.2470	76.10
11	51.027	11	44.9630	88.12

Figure 1

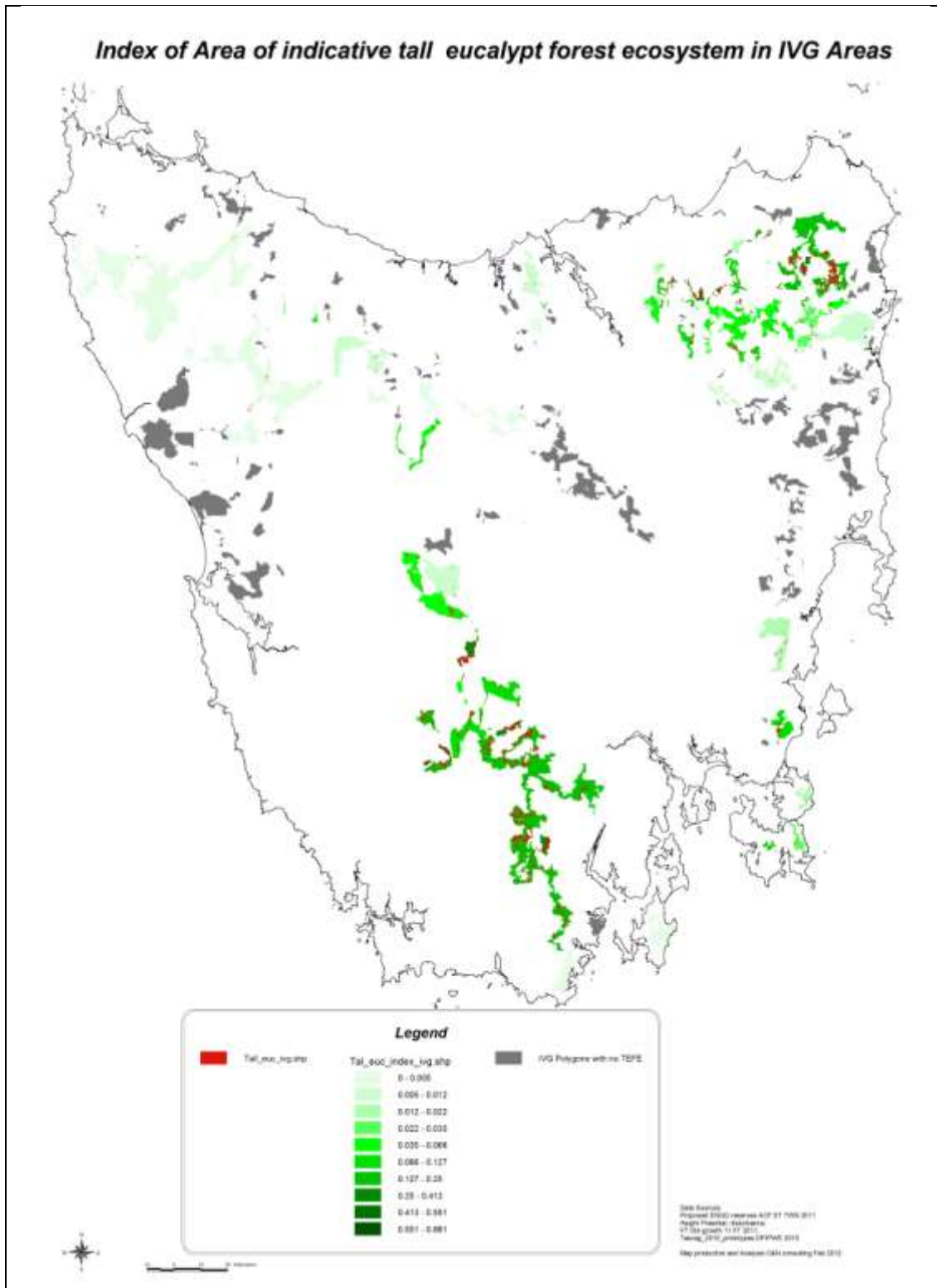
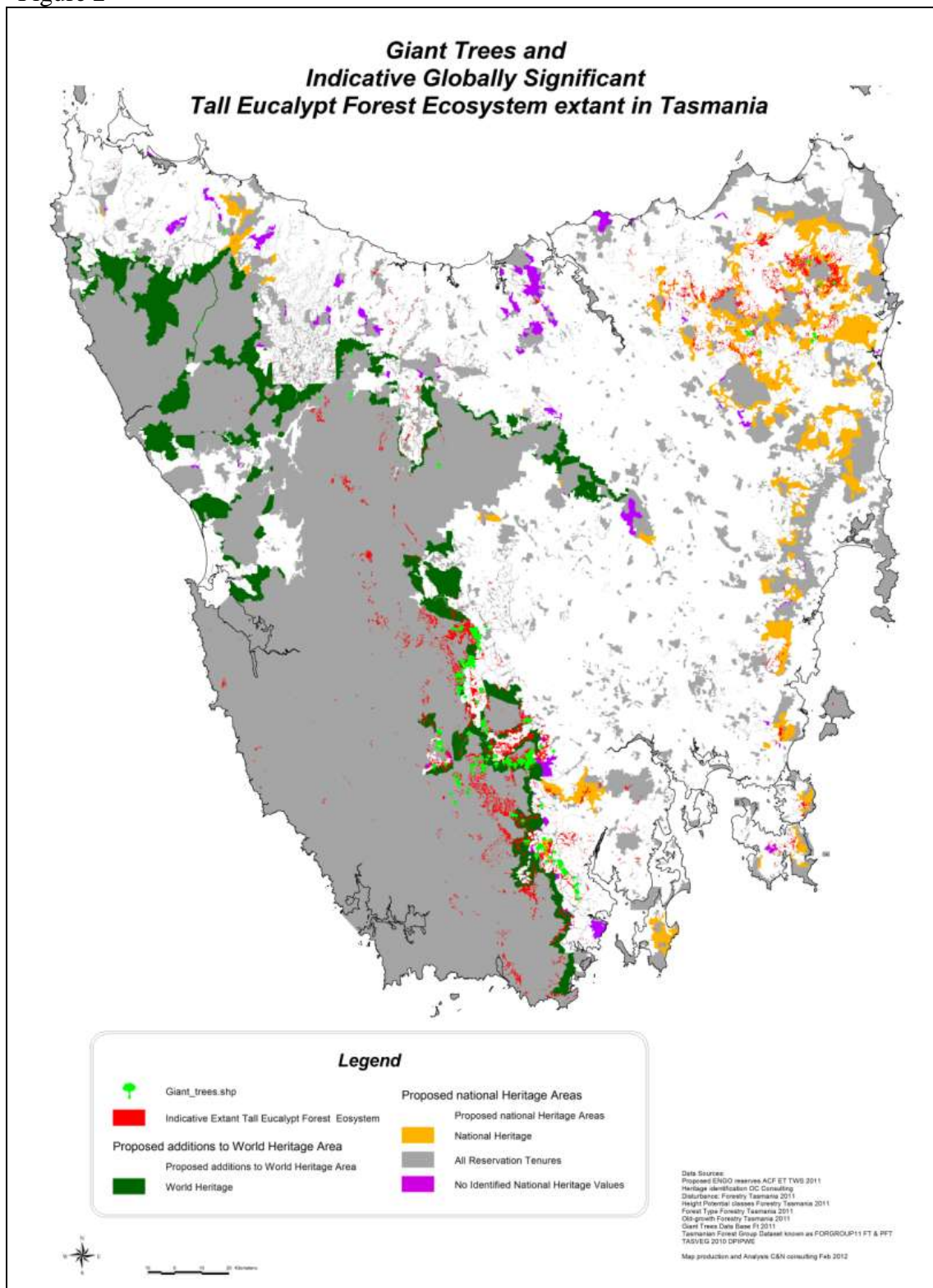


Figure 2



**References:**

- Hitchcock, P 2012 in prep Tall eucalypt forests as World Heritage
- Harris, J and Kitchener, A 2005: From Forest to Feljdmarm

