FPA

FOREST PRACTICES AUTHORITY

State of the forests Tasmania 2017

A report to the Minister for Resources and to be laid on the table of each house of parliament pursuant to section 4Z of the *Forest Practices Act 1985*.

Submitted by the Forest Practices Authority in cooperation and consultation with the Department of Primary Industries, Parks, Water and Environment, Sustainable Timber Tasmania[1], the Department of State Growth, Private Forests Tasmania and the Australian Government Department of Agriculture and Water Resources.

The report covers the period 1 July 2011 to 30 June 2016 and follows the format previously agreed with the Commonwealth Government for reporting on sustainability indicators under the Montreal Process and for the five yearly reviews of the Tasmanian Regional Forest Agreement.

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Minister for Resources
Parliament of Tasmania

Dear Minister,

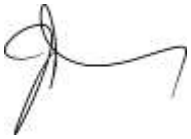
The Forest Practices Authority has pleasure in submitting the State of the forests Tasmania 2017 report pursuant to section 4Z of the *Forest Practices Act 1985*.

The reporting period is 1 July 2011 to 30 June 2016, although there may be some overlap up to six months at either end of the reporting period with previous and future reports.

The report was prepared by the Forest Practices Authority in cooperation and consultation with the Department of Primary Industries, Parks, Water and Environment, Sustainable Timber Tasmania (formerly Forestry Tasmania), the Department of State Growth, Private Forests Tasmania and the Australian Government Department of Agriculture and Water Resources. I take this opportunity to acknowledge the tremendous goodwill and cooperation of all of the parties in compiling this detailed and comprehensive report.

The report follows the format previously agreed with the Commonwealth Minister for Agriculture and Water for reporting on sustainability indicators under the Montreal Process and for the five yearly reviews of the Tasmanian Regional Forest Agreement. The information in this report constitutes Tasmania's contribution to the Australian State of the Forests Report 2018 which is compiled by the Australian Bureau of Agriculture and Resource Economics and Sciences (ABARES).

A summary report with graphical representation of data and figures will be produced.



John Ramsay
Chair, Forest Practices Authority

October 2017

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Contributors to this report

The content of this report was primarily provided by the following Tasmanian agencies:

- Forest Practices Authority
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- Department of State Growth
- Forestry Tasmania
- Private Forests Tasmania.

Other Tasmanian and Commonwealth agencies also contributed information when requested by the Steering Committee. Private-forestry sector information was provided through Private Forests Tasmania. Data reported, to the extent possible, are for the period 1 July 2011 to 30 June 2016 however in all cases the best available data (which may be for shorter periods) have been used. Where data prior to 2011 are presented they have been included to assist in illustrating longer term trends.

The format of this report is similar to the 2002, 2007 and 2012 reports and uses the indicator numbering system and indicator names as shown in the Table of Contents.

Acknowledgements

The following people contributed to the Steering Committee and production of the report:

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ABBREVIATIONS AND ACRONYMS

ABARES	Australian Bureau of Agricultural Resource Economics and Sciences
ABS	Australian Bureau of Statistics
AFS	Australian Forestry Standard
ALCT	Aboriginal Land Council of Tasmania
ANZSIC	Australian and New Zealand Standard Industrial Classification
APVMA	Australian Pesticides and Veterinary Medicines Authority
AWOTE	average weekly ordinary time earnings
CAR	comprehensive, adequate and representative
CRC	Cooperative Research Centre
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DFTD	devil facial tumour disease
DPIPWE	Department of Primary Industries, Parks, Water and Environment
EMS	Environmental Management System
EOI	Expression of Interest
EPBC	Environment Protection and Biodiversity Conservation (Act)
ESFM	ecologically sustainable forest management
FPA	Forest Practices Authority
FPO	Forest Practices Officer
FPP	forest practices plan
FPPF	future potential production forest
FSC	Forest Stewardship Council
FT	Forestry Tasmania
FTE	full time equivalent
GIS	Geographic Information System
GPS	Global Positioning System
Ha	hectares
IBRA	interim biogeographic regionalisation for Australia
IPM	integrated pest management
ISO	International Standards Organisation
IUCN	International Union for the Conservation of Nature
LGA	Local Government Area
LIDAR	LiDAR aerial surveying method
LTER	long term ecological research

MDC	Management Decision Classification
MIS	Managed Investment Schemes
MLD	*Mycosphaerella* leaf disease
MOU	memorandum of understanding
MRT	Mineral Resources Tasmania
MTB	mountain bike
MVEP	Tasmanian Monitoring Vegetation Extent Program
NE	north-east
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NRM	natural resource management
NSR	not separately reported
NW	north-west
NVA	Natural Values Atlas
PEFC	Programme for the Endorsement of Forest Certification Scheme
PNFE	permanent native forest estate
PFT	Private Forests Tasmania
PTPZ	permanent timber production zone
PWS	Parks and Wildlife Service
RAA	reserve activity assessment
R&D	research and development
RFA	Regional Forest Agreement
RMS	Resources Management Services LLC
SAC	Scientific Advisory Committee (under the TSPA)
SCU	Parks and Wildlife Service State Compliance Unit
SE	south-east
SETAC	South East Tasmanian Aboriginal Corporation
SNC	spring needle cast
TAC	Tasmanian Aboriginal Centre
TASVEG	1:25000 statewide vegetation map of Tasmania
TERN	Terrestrial Ecosystem Research Network
TFA	Tasmanian Forest Agreement
TFIA	Tasmanian Forests Intergovernmental Agreement
TFS	Tasmania Fire Service
THPI	Tasmanian Historic Place Index

THR	Tasmanian Heritage Register
TIMO	Timber Industry Management Organisations
TPC	Tasmanian Planning Commission
TSP	Threatened Species Protection
TSPA	*Threatened Species Protection Act 1995*
TWWHA	Tasmanian Wilderness World Heritage Area
WHA	World Heritage Area
WONS	Weeds of National Significance

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STATE OF THE FORESTS REPORT TASMANIA 2017

EXECUTIVE SUMMARY

The Forest Practices Authority is required to report every five years on the state of Tasmania's forests pursuant to section 4Z of the *Forest Practices Act 1985*. Previous such reports have been prepared and released in 2002, 2007 and 2012.

The reporting period for this report is nominally 1 July 2011 to 30 June 2016.

The Tasmanian Regional Forest Agreement (RFA) between the State of Tasmania and the Commonwealth of Australia was signed on 8 November 1997. Clause 91 of the RFA required the Parties to develop agreed sustainability indicators. A key requirement was that the indicators should have regard to the Montreal Process Criteria and Indicators[2] as amended from time to time.

A set of indicators was developed and released in June 2000. It was also agreed that the Governments would prepare a joint report against the indicators on a five yearly basis timed to inform each five year review of the RFA as required by clause 45 of the RFA. The *State of the forests Tasmania 2017* has as its framework 42 Sustainability Indicators, and therefore also serves to meet the requirements for reporting under the Montreal Process for the five yearly reviews of the Tasmanian RFA.

Major changes have occurred in Tasmania's forests and forest industry since the previous reporting period (2006-11), and these have impacted on the structure of the data presented in this report. A summary of the legislative, tenure and forest management changes which have occurred is given in the Introduction.

Criterion 1: Conservation of Biological Diversity

- Tasmania had an estimated 4 822 200 hectares of native forest in 1750, of which 64.5% remained in 2006, 63.8 % remained in 2011 and 63.2% remained in 2016.
- The current forest extent in Tasmania decreased since 2011 due to losses of both native forests and plantations. The native forest extent decreased by 22 000 hectares and the plantation extent decreased by 12 000 hectares.
- At June 2016 Tasmania had 3 052 000 hectares of native forest, 226 000 hectares of hardwood (eucalypt) plantation and 76 000 hectares of softwood (radiata pine) plantation.
- The current extent of native forest is 95.2% of the area that was first reliably reported in 1996.
- Seven native forest communities have decreased their extents by at least 2% over the reporting period; two of these are wet eucalypt forest communities and four are dry eucalypt forest communities, and one is a non-eucalypt forest community.
- Fourteen native forest communities listed as threatened under Schedule 3A of the *Nature Conservation Act 2002* have decreased in area since 2011. The threatened

[2] https://www.montrealprocess.org/Resources/Criteria_and_Indicators/index.shtml

communities with the greatest percentage loss are: Wet *E. viminalis* forest on basalt (-15.0%), shrubby *E. ovata* forest (-9.8%), *E. brookeriana* wet forest (-3.6%).

The extent of forest (native forest and plantations) in Tasmania is 3.35 million hectares, with 1.25 million hectares in conservation and public reserves, 0.71 million hectares in permanent timber production zone (PTPZ) land, and 1.03 million hectares on private freehold land. Of this total forest area, the area of plantation is 0.3 million hectares.

Of the 3.05 million hectares of native forest of known growth stage, 1.6 million hectares (71%) is categorised as mature, 0.1 million hectares is regeneration (5%), and 0.55 million hectares is regrowth (24%).

1.78 million hectares of native forest (58.2%) is now protected in formal and informal CAR reserves on public and private land, an increase of 0.26 million hectares since 2011.

Of the 50 mapped native forest communities, 39 have at least 15% of their estimated pre-1750 extent protected in reserves.

Seven communities, mainly from the dry eucalypt group, have less than 7.5% of their estimated pre-1750 extent protected in reserves. For most of these communities, the remaining extent is primarily on unreserved private land. Over 73% of Tasmania has native vegetation cover, and there is a high degree of connectivity across the landscape. There is a higher proportion of forest (more than 72% in patches greater than 10 000 hectares) when compared with the landscape nationally.

1.05 million hectares (87%) of old-growth forest are in CAR reserves. This represents an increase in reservation of 32% since 1996.

A review of ecological information available to guide the management of vertebrate fauna and vascular plants has been completed. Partial or comprehensive information was available to assist forest managers for nearly 100% of vascular plants and vertebrate fauna. This knowledge base has increased slightly since 2012.

An additional fourteen species have been listed under the *Threatened Species Protection Act 1995* of which all were plant species. Twenty-three taxa, all plants, were de-listed. Three species were down-listed (including two plant and one animal species) and eight species were up-listed (including six plant and two animal species).

No forest dwelling species is believed to have become extinct in the reporting period.

One new forest- dwelling vertebrate fauna species– *Antechinus vandycki* (Tasman Peninsula dusky antechinus) was identified during this time.

Long-term monitoring of fauna abundance has been carried out for the brushtail possum, the Tasmanian pademelon, Bennetts wallaby, the Tasmanian devil, and the common wombat. There has been no decline in abundance for three of the five monitored species. The abundance of the Tasmanian devil has declined markedly due to Devil Facial Tumour Disease.

Conservation of environmental diversity, including genetic diversity in Tasmania's forests is principally catered for in a systematic reserve system on public land, by a voluntary private land reserve system and by management by prescription in production forests.

Planning tools and field assessment procedures allow threatened species to be considered when forestry operations are planned and undertaken. Management actions are developed to mitigate the impact of forest operations on a species or its habitat. The FPA reports on the implementation of these procedures on an annual basis.

Criterion 2: Maintenance of Productive Capacity of Forest Ecosystems

Public native forest land potentially available for timber production has decreased by about 33% over the last five years. The area of native forest potentially available for timber production on public land at 30 June 2016 is 376 000 ha, down from 563 000 ha in June 2011. Most of this change arises from the legislative changes embodied in the *Tasmanian Forest Agreement Act 2013* and the *Forest Management Act 2013*. Changes to *Forest Practices Code* requirements and assessments that some forest cannot be physically or economically harvested explain a small component of the change.

Under the RFA the State is obliged to review the sustainable level of high-quality eucalypt sawlog production from public land every five years. This figure has been revised downward from 300 000 cubic metres to 137 000 cubic metres per year, primarily as a result of the legislative changes in 2013 which reduced the area of forest from which timber could potentially be harvested.

Native forest cover on private land was estimated at 840 000 ha (27% of the native forest resource). The area available for timber production is determined by owner intent, which varies over time and thus cannot be reliably reported.

The area of native forest on public land harvested annually was at an historic low at the start of the reporting period (2 400 ha) but had doubled by the end of the reporting period to 4 900 ha in 2015–16. However, this figure is still less than half the yearly average recorded over the previous reporting period (11 200 ha per year in 2006–11).

Across all tenures, the average number of hectares of native forest approved for harvesting under forest practices plans annually during 2011–16 (7 800 ha) was less than one third of that reported in the previous reporting period (26 300 ha).

The latter half of the 2006–11 reporting period saw a major decrease in the annual rate of new plantation establishment, due to the collapse of some private Managed-Investment-Scheme companies and the phasing-out of native forests conversion to plantation forests. In the 2011–16 reporting period, Tasmania's hardwood plantation extent decreased by approximately 4% while softwood plantation areas remained static. On public land the average harvest of high quality eucalypt sawlogs from native forest for the period was 121 000 cubic metres per year, which was below the legislated sustainable yield of 137 000 cubic metres per year. On private land the average harvest of eucalypt sawlogs (all grades) and veneer logs from native forest for the period was 27 000 cubic metres per year. There is no sustainable sawlog cut determined for private land. The harvest during the reporting period was about 55% of the sawlog volume cut in the previous reporting period.

Pulpwood yields from public eucalypt plantations averaged 206 000 tonnes per year during the period, which represented a 30% increase during the previous reporting period.

Pulpwood yields from private eucalypt plantations averaged 785 000 tonnes per year but increased substantially during the reporting period. The veneer (export peeler) log yield rose rapidly in the last two years of the reporting period.

Yields from softwood plantations were quite consistent over the reporting period and averaged 423 000 and 25 000 cubic metres of sawlogs per year and 303 000 and 247 000 tonnes of pulplogs per year, on public and public land respectively.

Non-timber forest products assessed under this criterion included honey, tree ferns, seeds and game. Beekeeping remains a relatively small-scale industry in Tasmania, with seven commercial honey operations among 215 registered beekeepers. This is a 23% increase in the number of operators since the last reporting period. The number of registered hives on

public land has increased by 9%, suggesting that the bulk of the increase has been in small-scale beekeeping operations.

Since 2006 there has been a steady decline in the sale of tree fern tags compared to previous reporting periods, reflecting a major downturn in demand from domestic and European markets, as well as the lack of native forest harvesting operations from which ferns can be sourced.

Given the reduction in native forest harvesting over the reporting period, especially using silvicultural methods for which supplementary seeding is required, demand for seed was low. This is reflected in average annual collection rates by Forestry Tasmania of 787 kg during the current reporting period, a decrease of 84% from 2006–11.

Hunting or culling has not impacted on population levels of wallabies, pademelons or brushtail possums across Tasmania indicating that current harvesting of these species is within sustainable levels. The harvest of deer and the number of licences sold has steadily increased over the last ten years, with a 2016 high of 5165 deer licences issued. Approximately 2000 male deer are estimated to have been taken under licence in this year.

Ensuring the regeneration of native forest or the re-establishment of plantation is an essential requirement for sustainable long-term wood supply. Forest Practices Authority annual assessments indicate that over the five year reporting period on average the regeneration of native forests or re-establishment to plantations has been achieved across all tenures.

During the reporting period, Forestry Tasmania consistently exceeded its regeneration success target of 85% of the regenerated area meeting prescribed stocking standards.

In the plantation estate, harvesting and re-establishment were extremely low during the first two years of the reporting period, reflecting the lack of certainty during the resolution of Managed Investment Scheme assets. 2014 onwards saw an increase in plantation harvesting, peaking in 2015–16 with 11 879 hectares harvested and re-established, much of it on private land. This period also saw an increase in plantations being clearfelled and not re-planted, as lease agreements were concluded and some plantations sites reverted to agriculture.

Criterion 3: Maintenance of Ecosystem Health and Vitality

Active management of pests and pathogens is primarily focused at protecting commercial values in plantations. Browsing by native mammalian herbivores (Brushtail possum, Tasmanian pademelon and Bennetts wallaby) and fallow deer is a major factor affecting the successful reafforestation of native forest and the establishment of hardwood plantations. Control methods such as shooting and trapping have proven effective.

A range of insects including chrysomelids, scarabs, psyllids, sawflies, moths and weevils invade eucalypt plantations. Only chrysomelids caused enough damage to warrant active control during the reporting period and infestation magnitude varied widely year by year. Integrated pest management strategies are used to monitor and control defoliating insects in eucalypt plantations.

Climatic stresses (particularly associated with drought and water stress) were also identified as the agent responsible for the formation of timber kino veins and pockets in some lowland plantations.

Myrtle rust (*Puccinia psidii*) was first identified as being present in Tasmania in February 2015, but symptoms of the disease have not been detected in surveys of native forest regeneration or plantations.

Pine and eucalypt plantations are monitored for a range of damaging agents and diseases which are controlled when necessary. Other damaging agents include drought and water stress, windthrow and stem breakage in storm events.

The root-rot pathogen *Phytophthora cinnamomi*, remains the most significant biotic threat to the health of the native forest in Tasmania with the potential to affect broad areas. Management strategies are in place across all tenures which include hygiene measures such as washdown of equipment and foot traffic management in recreational areas.

Some forests have suffered severe dieback, triggered by prolonged drought, and exacerbated by browsing. Affected areas include *E. coccifera* and *E. gunnii* forests on the Central Plateau, and trees and understorey species in eastern, north-eastern and midlands forests.

Wet forests are highly resistant to weed invasion beyond the post-fire/harvesting disturbances, although bird dispersed species such as holly are capable of invading undisturbed wet forests. Dry forests are threatened by a greater range of invasive species, however they still retain a high proportion of their native species diversity. Grassy, dry forests tend to have a greater diversity of weeds than those with shrubby or heathy understoreys.

Wildling pines are still a significant invasive threat in dry forests adjoining pine plantations. Infestations are impacting several forest reserves. In national parks and reserves priorities for weed management are determined using both weed-based and site-based criteria with an aim for local area eradication.

Fire is co-managed under the Inter-Agency Fire Management Protocol. This operates seamlessly across land tenures and provides a best practice model for such activity in Australia.

Planned fires are defined as those started in accordance with a fire management plan or some other type of planned burning program or wildfire response procedure. The annual area of planned fires ranged from 4 000 to 22 000 hectares per annum over the reporting period. A coordinated smoke management strategy is used to minimise the risk of high concentrations of smoke from planned fires within airsheds.

In the reporting period there were two severe bushfires (large-scale wildfires); the Dunalley bushfire in 2012–13 and the north-west bushfires in 2015–16. About 120 000 hectares were burnt in 2015/16, 78 000 of which were forested. This is the greatest area burnt since the 1971/72 fire season (44 years ago) when over 140 000 hectares were burnt.

Criterion 4: Conservation and Maintenance of Soil and Water Resources

The total area of native forest where timber harvesting is excluded has increased by 127 000 hectares to 2 037 000 hectares since 2011. The tenure of much of this excluded area has changed from multiple-use forest to other publicly managed land (largely future potential production forest (FPPF) land). The exclusion of land from timber harvesting represents a reduction in the risk of potential disturbance to water supply catchments.

Several companies planted streamside reserves with native species on ex-pasture sites and on second rotation plantation sites originally planted prior to the introduction of the Forest

Practices Code. Approximately 500 hectares of such plantings were established over the 2011-16 period.

Monitoring by DIPWE indicated that streams within catchments with a history of forestry operations showed no significant impacts in terms of river health and macroinvertebrate communities compared to streams without such operations.

The use of triazine herbicides in plantation forestry has significantly reduced and no records of triazine contamination of streams in forested catchments were reported to the Forest Practices Authority over the 2011-16 period.

Soil properties and erosion risks have been documented for 95 soil types throughout the State. The knowledge base is well developed for permanent timber production zone (PTPZ) land; adequate, but less complete, for most private forests; and quite limited for nature conservation reserves.

Comprehensive legal and non-legal mechanisms exist for managing soil and water values for forestry operations in native forests and plantations on public and private land. Annual compliance assessments of 10-15% of certified Forest Practices Plans indicated that aspects of operations concerning soil and water values were generally carried out to a high standard over the reporting period.

Criterion 5: Maintenance of Forest Contributions to Global Carbon Cycles

The carbon content of vegetation in Tasmania has remained relatively stable over the three reporting periods. Total biomass carbon in vegetation has been approximately 1900 million tonnes since 2006, with approximately 790 million tonnes in above-ground living biomass. Tasmania's forest management system promotes and enforces sustainable forest management practices, ensuring that the contribution of Tasmanian forests to global carbon cycles has been maintained.

Criterion 6: Maintenance and enhancement of long term multiple socio-economic benefits to meet the needs of societies

The beginning of the reporting period was marked by significant challenges, among them the comparatively high value of the Australian dollar against the US dollar, in which international wood exports are traded, and the collapse of the largest private forestry business, Gunns Limited.

The quantity of wood produced from Tasmania's forests increased from an historically low 2.5 million tonnes in 2011–12 to 4.4 million tonnes in 2015–16. The increase is largely attributable to an increase in harvesting of hardwood plantation pulpwood and sawlogs, and to a lesser extent native forest pulpwood. During the reporting period, a number of hardwood plantation estates established under MIS schemes were purchased by institutional investors through Timber Investment Management Organisations (TIMOs) such as New Forests and Resource Management Service (RMS Timberlands Australia).

The value of the native forest hardwood harvest in 2015–16 ($78 million) was 54% less than the 2010–11 value ($170 million). The value of native forest hardwood logs harvested has stabilised over the last three years of the reporting period. The value of hardwood plantation logs harvested has increased ten-fold to $149 million over the reporting period, although the volume of logs harvested increased six-fold to 2 million tonnes per annum.

The value of wood product manufacturing, after a severe decline in 2012–13, has steadily increased to $389 million. Furniture and other manufacturing, and pulp and paper manufacturing have remained relatively stable for the years for which data are available.

Obtaining any contemporary data on forest products other than timber, such as the apiary industry, is difficult. The number of registered beekeepers utilising forests has increased by 27% over the period, but the number of registered hives has increased by 15%, suggesting the bulk of the increase has been in small-scale beekeeping operations. Statistics regarding the apiary industry are incomplete due to the lack of compulsory registration of beehives and lack of information about honey production. The sale of tree ferns has continued to decline over the reporting period, primarily due to loss of export markets and changes in silvicultural practice.

The export of woodchips has increased approximately three-fold during the reporting period to 2.6 million tonnes in 2015–16 and is now primarily sourced from hardwood plantations. The export of veneer in 2015–16 was less than half that in 2011–12 as a result of reduced supply of peeler logs from public native forests due to the reduction in native forest estate available for wood production. The volume of roundwood log exports has increased, primarily to China, where they are used for veneer production. Paper and newsprint production has remained relatively stable over the reporting period. Tasmania is a net exporter of wood products, with the main imports being manufactured furniture products.

Investment in active forest management is undertaken by a wide range of government agencies, private companies, community groups and associations and individuals. The level of management ranges from specific projects to integrated approaches that are funded by grants, budgetary appropriation, commercial operations and private donations. The complexity of organisations and funding models means that comprehensive data on the level of this investment in forest management is not readily available.

Forestry Tasmania has maintained a high level of annual expenditure for wood production and conservation activities, totalling $148 million in 2015–16. Expenditure by the Parks and Wildlife Service on the management of public land, which includes the majority of public forests, was approximately $60 million for the same period. There is no estimate available for expenditure across the private sector, although there has been considerable investment by private forest managers and companies in rebuilding the forest industry.

At June 2016 the area of public forests available for recreation and tourism was 2.32 million hectares, an increase of 5 000 hectares since 2011. Ninety-nine percent of RFA-identified high-quality wilderness was protected within the CAR reserve system. This is an increase of 39 600 hectares since 2011.

Major investments in walking tracks, huts and mountain bike facilities in forested environments were a feature of the past 5 years. The much anticipated Three Capes Track in the Tasman National Park opened in 2015. Major new mountain bike facilities were developed in north-east Tasmania. Pumphouse Point Lodge opened at Lake St Clair in 2015.

Over the nearly 20-year period since the 1997 RFA, the tourism industry has grown substantially in Tasmania, with forested reserves a key attraction. Visitor numbers to Tasmania have increased from 485 000 in 1997–98 to over 1.168 million visitors in 2015–16 (up 141%).

Over the five year period from July 2011 to June 2016, 103 new Aboriginal heritage sites were identified in the course of surveys required under the *Forest Practices Act 1985.*

As at 30 June 2016, about 20 000 ha of permanent timber production zone land is zoned for Indigenous and non-Indigenous cultural heritage special management, 19 000 ha lower than that reported for State forest in 2011. The drop is largely attributed to tenure changes.

The *Forest Practices Code* requires that all non-indigenous heritage sites found in the preparation of a forest practices plan are reported. During the reporting period 2011–16, Forestry Tasmania identified 77 new non-Indigenous cultural heritage sites.

The economic climate over the previous five years has been difficult, which is reflected in the wages for employment in the forestry sector. Wages have, at best, tracked with inflation over the past five years, with increases ranging from 11 to 14%. Injury frequency rates have increased in some areas of the forestry industry, and decreased in others, based on the number of claims per million hours worked. The forestry sector recorded no fatalities over the five years, a marked improvement compared with four in the previous reporting period.

Estimates of employment to May 2016 indicate that Tasmanian forest industry employment has increased by approximately 1000 full-time equivalent (FTE) employees since November 2013. The forestry sector represented a total of 1.6% of all persons employed in Tasmania in 2016, a decline from ten years ago, when approximately 5% of the workforce was in the forestry sector. However, it remains a major employer in regional communities, and there are flow-on effects to other economic sectors.

Direct employment in reserve forest management includes 297 full time equivalent (FTE) staff in the Parks and Wildlife Management Service, as well as the people employed in the 263 businesses operating in reserves and indirect employment in regional businesses which are enhanced by reserve visitation.

Criterion 7: Legal, Institutional and Economic Framework for Forest Conservation and Sustainable Management

Tasmania has a strong legal framework to support forest conservation and sustainable management. The *Forest Management Act 2013* and the *National Parks and Reserves Management Act 2002* are the principal Acts that set out the management objectives of permanent timber production zone land and conservation reserves. The *Forest Practices Act 1985* is the legislation under which forest practices are regulated on all tenures.

As at June 2016, 40% of the total area of private forests were registered as Private Timber Reserves (PTRs), compared to 44% at June 2011. Part of this reduction can be attributed to the dissolution of some managed investment schemes, resulting in a reduced interest in ongoing plantation forestry by private landowners, and the return of land to non-forestry uses.

During the reporting period 2011–16, new registration of land under conservation covenants totalled 19 423 ha. This area includes both forest and non-forest vegetation.

In June 2016 the timeframe for implementation of bans on broad-scale clearing and conversion of native forest was extended to July 2017 to allow completion of a review of the *Policy for Maintaining a Permanent Native Forest Estate*.

During the reporting period, several organisations which held ISO 14001 accreditation have made the business decision to no longer maintain it, as they now hold Australian Forestry Standard (AFS) or Forest Stewardship Council (FSC) certification. At 30 June 2016 in Tasmania approximately one million hectares were covered by AFS Forest

Management certification and almost 260 000 hectares were covered by FSC Forest Management certification.

Analysis of the scope of ecologically sustainable forest management (ESFM) provisions found that the legal framework for public land has been established at a high level. The framework for private land is also comprehensive, but slightly less than for public land.

The Tasmanian forest practices system has evolved over more than thirty years to become a sophisticated, robust system which is applied across all tenures. The system has an emphasis on planning, training, education and continuous improvement. Assessment of Certificates of Compliance for completed Forest Practices Plans indicates a high level of compliance with the system.

In 2011–16 there were 13.8 full-time equivalent personnel engaged in forest-related research working within Forestry Tasmania, DPIPWE, the FPA, and private industry. During the reporting period the CRC for Forestry concluded its activities, and was replaced by the National Centre for Future Forest Industries during 2012–2014, followed by the creation of the ARC Centre for Forest Value in 2015.

There were 1010 research publications relevant to forests in Tasmania produced during 2011-16 on the following topics: biodiversity and conservation management (38%), silviculture, tree growth and productivity (16%), social and economic analysis, forest policy and education (8%), pests and diseases (8%), fire (7%), wood products, wood properties and utilisation (5%), soil and water conservation (5%), non-wood values of forests (4%), carbon budgets (4%), harvesting and transport (3%) and heritage conservation (3%).

INTRODUCTION

The Forest Practices Authority is required to report every five years on the state of Tasmania's forests pursuant to section 4Z of the *Forest Practices Act 1985*. Previous *State of the forests* reports have been prepared and released in 2002, 2007 and 2012.

The reporting period for this report is nominally 1 July 2011 to 30 June 2016.

The Tasmanian Regional Forest Agreement (RFA) between the State of Tasmania and the Commonwealth of Australia was signed on 8 November 1997. Clause 91 of the RFA required the Parties to develop agreed sustainability indicators. A key requirement was that the indicators should have regard to the Montreal Process Criteria and Indicators[3] as amended from time to time.

The internationally recognised Montreal Process has a membership of 12 countries, including Australia. The member countries occur in five of the seven continents and together represent about 90% of the world's temperate and boreal forests, as well as areas of tropical forests, and 60% of the world's forests. The group works, through a policy level Working Group and a Technical Advisory Committee, to advance the development and implementation of internationally agreed criteria and indicators for the conservation and sustainable management of temperate and boreal forests (outside Europe) at the national level. The criteria and indicators under this process provide a common understanding for sustainable forest management and an agreed framework for assessing the state of Tasmania's forests.

A set of indicators were developed and released in June 2000. It was also agreed that the Governments would prepare a joint report against the indicators on a five yearly basis timed to inform each five year review of the RFA as required by clause 45 of the RFA. The *State of the forests 2017* has as its framework 42 Sustainability Indicators, and therefore also serves to meet the requirements for reporting under the Montreal Process for the five yearly reviews of the Tasmanian RFA.

Major changes have occurred in Tasmania's forests and forest industry since the previous reporting period, and have impacted on the structure of the data presented in this report. A summary of the legislative, tenure and forest management changes is given below (for further information see the Department of State Growth – Forest policy web page: http://www.stategrowth.tas.gov.au/forestry).

It is important to bear in mind the distinction between land tenure and RFA Reservation status when considering the categorisation of forest areas. For example, private freehold land is a tenure category, but the forest on that land may also be in a CAR reserve. The various tables in this report address either forest tenure or forest RFA reservation status, as stated in their respective titles.

The Tasmanian Forestry Agreement and changes in forestry legislation

On 7 August 2011, the Prime Minister of Australia, Julia Gillard and Premier of Tasmania, Lara Giddings signed the Tasmanian Forests Intergovernmental Agreement (TFIGA)[4], designed to support the forest industry to progressively transition to a more sustainable and diversified footing to build regional economic diversity and community resilience.

[3] https://www.montrealprocess.org/Resources/Criteria_and_Indicators/index.shtml

[4] http://www.environment.gov.au/land/forests/intergovernmental-agreement

On 19 January 2012, in accordance with Clause 36 of the Tasmanian Forests Intergovernmental Agreement, the Australian Government, Tasmanian Government and Forestry Tasmania negotiated and signed a Conservation Agreement[5] under the *Environment Protection and Biodiversity Act 1999* (EPBC Act) to provide legally binding protection for an interim area of almost 430,000 hectares.

On 22 November 2012 industry representatives (Australian Forest Contractors Association, Australian Forest Products Association, Construction, Forestry, Mining and Energy Union, Forest Industries Association of Tasmania, Tasmanian Forest Contractors Association, Timber Communities Australia and Tasmanian Sawmillers Association) and environmental groups (Australian Conservation Foundation, Environment Tasmania Inc., The Wilderness Society Inc. and The Wilderness Society (Tasmania) Inc.) signed the Tasmanian Forest Agreement[6]. The signing of the Tasmanian Forest Agreement led to the Australian and Tasmanian Governments signing a second TFIGA which outlined the significant funding and projects to help assist industry transition.

The signing of the TFIGA(s) required legislation in the Tasmanian Parliament to implement large parts of the Tasmanian Forest Agreement.

The *Tasmanian Forests Agreement Act 2013* received Royal Assent on 3 June 2013. It is an Act to amend (and effect repeal of) the *Forestry Act 1920* in relation to continuing wood supply, and to enable certain land to be reserved, for the purposes of the Tasmanian Forests Intergovernmental Agreement entered into by the Commonwealth of Australia and the State of Tasmania dated 7 August 2011, to create reserves and to amend the *Nature Conservation Act 2002* for the purposes of benefiting economically from the carbon in Tasmania's forests, and to amend certain other Acts.

The TFA Act also prohibited forestry operations in approximately 495 000 hectares of forest, classified as the Future Reserve Land. The legislation also established a process by which the Future Reserve Land may be proclaimed as reserves under the *Nature Conservation Act 2002*.

Six months after the *Tasmanian Forests Agreement Act 2013* was proclaimed, approximately 95 700 hectares of Future Reserve Land was declared as reserves under the *Nature Conservation Act 2002*.

At the 37th session of the World Heritage Committee in 2013 the Australian Government submitted and was granted a minor boundary modification which added 172 276 ha to the Tasmanian Wilderness World Heritage Area (TWWHA) of which 121 851 ha was formerly State forest. There had been previous additions to the TWWHA in 2010 (20 096 ha) and 2012 (3 823 ha)[7].

The making of further reserves under the *Tasmanian Forests Agreement Act 2013* was contingent upon Forestry Tasmania achieving Forest Stewardship Council (FSC) certification, and additional pre-conditions specific to different parcels of the Future Reserve Land.

The *Forest Management Act 2013* (FM Act) received Royal Assent on 6 November 2013. It provided for a transition of Forestry Tasmania's business model to ensure sustainability

[5] http://www.environment.gov.au/land/forests/intergovernmental-agreement/conservation-agreement

[6] http://www.parliament.tas.gov.au/CTEE/Council/TermsofReference/Tasmanian Forest Agreement 2012.pdf

[7] https://www.legislation.gov.au/Details/C2013G01198

of the business into the long term and ensure greater clarity of focus for Forestry Tasmania on its commercial functions.

The core elements of the *Forest Management Act 2013* are that it:

- Repealed the *Forestry Act 1920* but continued the Forestry corporation (that is, Forestry Tasmania[8]) and brought the governance and operational structure of the Forestry corporation fully under the *Government Business Enterprises Act 1995*
- Provided for the future management of the permanent timber production zone land by Forestry Tasmania as the Forest Manager
- Set the annual minimum wood production supply requirements for high quality sawlog and veneer logs at 137 000 cubic metres
- Continued rights of access to the permanent timber production zone land where it is not incompatible with the functions or responsibilities of the Forest Manager
- Reinforced that the Forest Manager must manage permanent timber production zone land consistent with the principles of forest management established under the *Forest Practices Code*
- Declared approximately 221 000 hectares of forest reserves to be either regional reserves or conservation areas under the *Nature Conservation Act 2002*, and responsibility for this land was transferred to the Department of Primary Industries, Water and Environment (DPIPWE)
- Preserved and continued a range of authorisations, entitlements and arrangements with respect to land that is either permanent timber production zone land or land to be declared as reserves under the *Nature Conservation Act 2002*
- Ensured that the "future reserve land" continues to be managed by and subject to the *Tasmanian Forests Agreement Act 2013* and does not interfere with the TFA process
- Strengthened the capacity of the Forest Manager to manage access to the land under its control so that it can undertake its responsibilities and ensure the safety of people on and within that land
- Continued to provide for the construction of, and access to, forest roads, including those forest roads that are in forest reserves that will become regional reserves or conservation areas
- Ensured that the Forestry Tasmania employees who accept employment offers from DPIPWE to assist in the implementation of the reserve land transition have their leave and superannuation entitlements upheld.

A change of Tasmanian government in March 2014 gave rise to new forestry legislation being proclaimed to abandon the Tasmanian Intergovernmental Agreement and to replace the *Tasmanian Forests Agreement Act 2013*.

The *Forestry (Rebuilding the Forest Industry) Act 2014* commenced operation on 22 October 2014. The purpose of the Act was to repeal the *Tasmanian Forests Agreement Act 2013* and to provide the invigoration of the forest industry and for related purposes.

Key measures within the Act include:

[8] Forestry Tasmania became Sustainable Timber Tasmania on 1 July 2017

- transferring previous Future Reserve Land to a new category of land, known as future potential production forest land
- transferring administration of the future potential production forest land from Forestry Tasmania to the Department of Primary Industries, Parks, Water and Environment
- no native forest harvesting in the future potential production forest land, except for limited special timbers harvesting and a small number of transitional forestry coupes
- allowance for future potential production forest land to be converted to permanent timber production zone land (where timber harvesting is permitted), after 8 April 2020 subject to a range of conditions and the approval of the Parliament
- provision for land to be exchanged between future potential production forest land and permanent timber production zone land in exceptional circumstances
- provision of forest compensation certificates to maintain certainty for the forest industry.

The *Forestry (Rebuilding the Forest Industry) Act 2014* also provides, in exceptional circumstances, for the exchange of future potential production forest land for permanent timber production zone land. The Minister administering the *Forest Management Act 2013* (Resources Minister) may request the Crown Lands Minister to consider the exchange of the two land types, taking into account:

(a) the reasons for the request being made

(b) the size, location, valuation and conservation values of the future potential production forest land that is the subject of the request

(c) an assessment of forest resources within the future potential production forest land that is the subject of the request and the demand for those resources and an evaluation of the social and economic impacts of the conversion of that land

(d) the Forestry corporation's intention to undertake native forest harvesting, on the land that is the subject of the request, consistent with its forest management certification; and

(e) the implications of the land ceasing to be future potential production forest land for the Forestry corporation's forest management certification

before submitting the request.

Before making a determination in relation to a request the Crown Lands Minister must obtain information from the Resources Minister on the impact of the conversion on the area of land identified under the special species management plan as being available for special species timber harvesting and the production of special species timber.

Special Species Timber Management Plan

In accordance with the requirements of the *Forestry (Rebuilding the Forest Industry) Act 2014*, the Department, in consultation with the Ministerial Advisory Council on Forestry, will prepare a Special Species Management Plan.

The special species management plan must address management of conservation values and other environmental values, and cultural and heritage values, in relation to the harvesting of special species timber on land to which the Management Plan applies.

A draft of the special species management plan is required to be made available for public comment for a period of 42 days. The Management Plan is required to be in place by October 2017.

Work undertaken during the reporting period to June 2016 to inform the development of the Management Plan included the Special Species Timber Resource Assessment, a Market Demand Study and a Celery-top Pine Harvesting Trial.

Special Species Timber Resource Assessment

The initial task in preparing the Management Plan has been an assessment of the special species timber resource available in existing production forest, managed by Forestry Tasmania.

The Resource Assessment was conducted by Forestry Tasmania utilising LiDAR aerial survey information, field plots and historic survey information. A report from the assessment has been prepared.

Special Species Timber Resource Assessment PDF, 1237.9 KB

Market Demand Study

Market research has been undertaken to better understand demand for special timbers, and the supply chains through which special timbers are distributed. This work, underpinned by an industry survey, was undertaken by Indufor.

Market Demand Study PDF, 2436.58 KB
Appendix 1 PDF, 320.78 KB
Appendix 2 PDF, 944.83 KB
Appendix 3 PDF, 1103 KB

Celery-top Pine Harvesting Trial

As part of investigations into alternative harvesting techniques, Forestry Tasmania undertook a trial of group selection harvesting for the target species celery-top pine in coupe EPO48C.

A detailed report has been prepared by Forestry Tasmania of planning, harvesting, transport and segregation of logs harvested.

Harvesting and Sawmilling Trial Report PDF, 8623.12 KB

Management and Utilisation of Forest Residues

Residues Solution Study

The Tasmanian Government commissioned a Residues Solutions Study (the Study), to identify potential options to utilise harvesting and processing residues from Tasmania's forests, including native forest and plantations.

The Study was developed with input from an Advisory Group of government and industry representatives, established specifically for the Residues Solutions Study.

The Study was undertaken by the forestry consulting firm, Indufor, together with its sub-consultants, Enecon. The work consisted of two separate stages:

- Stage 1 – Options identification and initial assessment

- Stage 2 – Detailed consideration of identified highest priority options.

The Stage 1 Report identified and considered 23 separate opportunities. It used a multi-criteria analysis to assess and compare the options. The multi-criteria analysis considered a range of factors, including technical feasibility, market potential, economic viability, social factors, environmental sustainability, and financing requirements.

The Stage 1 Report recommended four key areas be considered in greater detail in Stage 2:

- Processing of residues into timber products, including plywood and Glulam/Cross Laminated Timber (e.g. Hardlam)
- Energy generation options (i.e. biomass), including stand-alone power (small-scale power generation); and industrial co-generation (site-based heating/power generation)
- Biofuels, including biomass-based hydrocarbons (i.e. using residues to develop petrol substitutes)
- Wood pellets (i.e. processed pellets for power generation and heating).

Stage 2 comprised an assessment of markets, price trends, outlook for demand, feedstock availability and economic considerations relevant to the development of different processing options in Tasmania. Stage 2 identified key success factors, key challenges and potential barriers to entry for each of the processing options assessed.

The Stage 2 Report provides insights into the potential opportunities and challenges that may emerge as different processing technologies utilising wood fibre are considered in the Tasmanian context.

Ultimately, the establishment of new processing capacity in Tasmania is one for the private sector to lead.

The Study will be an important reference for the Government but one that will be also considered in light of any outcomes from the Expression of Interest process for Southern Residues (see below).

The Study will inform the Government in its engagement with industry on new investment and provide further guidance to Government on how it can best act to support innovation and new activity in the industry. The Government will, however, continue to assess specific proposals on their own merits and in light of relevant community and market factors of the day.

Links to the Residues Solutions Study reports appear below:

Residues Solutions Study Stage 1 Report final PDF, 1869.41 KB

Residues Solutions Study Stage 2 Report final PDF, 2710.58 KB

Commercial Solutions for Wood Residues in Southern Tasmania

The Government is also, through an Expression of Interest (EOI) process, looking to the private sector to develop independent commercial solutions for the use of wood residues from public forest operations in southern Tasmania.

The existing financial support to industry for transport of southern residues will be phased out in conjunction with the development of an industry-led southern residues solution.

CRITERION 1: CONSERVATION OF BIOLOGICAL DIVERSITY

1.1 Ecosystem Diversity

This sub-criterion measures the current extent of forest cover, by forest type and growth stage, and its distribution across land tenures and reserve types. The focus on the area and growth stage of each forest community provides a measure of the extent and diversity of ecosystems, while the focus on land tenure and reservation status provides a measure of the comprehensiveness, adequacy and representativeness of the conservation reserve system (CAR reserves).

Land tenure broadly reflects the intended use and legislative rights and responsibilities under which land and forests are managed. The tenure groups reported in this sub-criterion reflect the public land classification system implemented by the *Regional Forest Agreement (Land Classification) Act 1998*.

Land tenure is recorded as at 30 June 2016, and is based on Department of Primary Industries, Parks, Water and Environment (DPIPWE) land classification mapping.

Reservation status for conservation purposes is more specifically reported under INDICATOR 1.1.c. Reservation status is recorded as at 30 June 2016 and is based on the DPIPWE Tasmania Reserve Estate dataset. This spatial layer is a composite of public and private reserve data across all land tenures.

The Ecosystem Diversity sub-criterion is broken down into five indicators, each reported separately below.

INDICATOR 1.1.a EXTENT OF AREA OF FOREST TYPES

The extent of each of the different vegetation communities is a measure of the forests' biological diversity at the species and ecosystem levels. As part of the development of the Tasmania Regional Forest Agreement (RFA) in 1996, the state's native forest was classified and mapped into 50 communities as a basis for assessing their extent and conservation status and for monitoring change.

For this reporting period, change data are as at the first quarter of 2015 – not mid-2016 – due to the time required to analyse the satellite imagery. Hereafter in this indicator, the period over which change is reported to have occurred is between the start of the reporting period (July 2011) and end of the reporting period (June 2016) and will be referred to as 2011 and 2016.

Under the RFA, a comprehensive, adequate and representative (CAR) forest-reserve system was established under a revised land-tenure system to ensure that each forest community is securely protected for conservation purposes. Some forest communities are also protected on public land outside the reserve system wherever prudent and feasible. In addition, forest communities identified as rare, vulnerable or endangered (threatened) in the Regional Forest Agreement process are protected from clearance and conversion on both public and private land, under the forest practices system other than in exceptional circumstances. Under the *Policy for Maintaining a Permanent Native Forest Estate,*[9]all of

[9] http://www.stategrowth.tas.gov.au/forestry/native-forest

Tasmania's native forests are to be managed so as to maintain at least 95% of their 1996 state-wide extent as an extensive and permanent native forest estate.

Under the Monitoring Vegetation Extent Project (MVEP)[10] changes in the extent of forest communities were mapped by comparing satellite imagery from two points in time, 2010 and 2015, over private land. All changes greater than 0.5 ha were individually validated by trained operators using the best available high resolution imagery. The MVEP results indicated a decrease in the mapped extent of native forest in the RFA vegetation communities of 22 000 ha.

Following categorisation of changes detected, the information was applied to the 2011 RFA vegetation maps to develop a revised forest extent map as at 2016.

The changes in the extent of communities reflected in this indicator are not readily comparable with data used by the Forest Practices Authority for reporting on the permanent native forest estate (PNFE). The PNFE reporting process involves monitoring the area of native forest types harvested and reserved in each bioregion, and is informed by multi-year forest practices plans (FPPs). Combined, the FPPs give the gross areas planned and approved for future harvesting or clearing for agriculture. Approved FPPs may not be implemented yet or the land manager for a variety of reasons may decide not to implement a particular plan to its full extent. INDICATOR 1.1.a maps the actual forest extent by monitoring woody change using validated satellite imagery.

The workflow now used for analysing Landsat images, developed by the Queensland Remote Sensing Centre (Queensland Department of Science, Information Technology and Innovation, 2016) includes an image compositing technique that enabled the detection of change that would otherwise have been obscured by cloud or cloud shadow. However, there may still be some areas of change that remain undetected. Thus, the INDICATOR 1.1.a data may underestimate, and the PNFE data overestimate the extent of change. Data for each forest type as at June 2016 are summarised in Table 1.1.a below and in greater detail, by RFA vegetation community, in APPENDIX 1.1: – Table 1.1.a. To reflect the resolution of forest mapping, areas are generally quoted to the nearest 1000 ha; areas smaller than 1000 ha are quoted to the nearest 100 ha and areas smaller than 100 ha are quoted to the nearest 10 ha.

The main trends evident from the data are:

- The current forest extent (native forest plus plantation forest) in Tasmania represents no change to the overall total compared to the 1996 extent and 1% decrease compared to the 2011 extent. The trend in total forest extent from 2011 to 2016 reflects losses in the extent of both native forest (reduced by 22 000 ha) and plantations (reduced by 12 000 ha). Total native forest extent has decreased by 155 000 ha (4.8%) since 1996, and by 22 000 ha (0.7%) since 2011. On private freehold land, 1700 ha of native forest was converted to plantation in the 2010 to 2015 period.
- Total plantation extent has increased by 156 000 ha (106.0%) since 1996 and decreased by 12 000 ha (3.9%) since 2011 with the rate of plantation establishment decreasing markedly over the current reporting period in comparison to previous periods.

[10] http://dpipwe.tas.gov.au/conservation/flora-of-tasmania/monitoring-and-mapping-tasmanias-vegetation-(tasveg)/vegetation-monitoring-in-tasmania

- The native forest communities with the largest decrease in area recorded between the first quarter of 2010 and the first quarter of 2015 were wet *Eucalyptus viminalis* forest on basalt (~1000 ha, a decrease of 15.0%), shrubby *Eucalyptus ovata* forest (~1000 ha, a decrease of 9.8%), inland *Eucalyptus amygdalina* forest (~2000 ha, a decrease of 6.3%), and *Eucalyptus pauciflora* on sediments (~1000 ha, a decrease of 4%).
- Seven native forest communities decreased in area by greater than or equal to 2% since the first quarter of 2010; two of these are wet eucalypt forests and four are dry eucalypt forests, along with one non-eucalypt forest community.
- Fourteen native forest communities listed as threatened under Schedule 3A of the *Nature Conservation Act 2002* have decreased in area since 2011: three of these are wet eucalypt forests, six are dry eucalypt forests and five are non-eucalypt forests. The threatened communities with the greatest percentage loss are: Wet *E. viminalis* forest on basalt (-15.0%), shrubby *E. ovata* forest (-9.8%), *E. brookeriana* wet forest (-3.6%), *Banksia serrata* woodland (-1.7%), *Notelaea ligustrina* and/or *Pomaderris apetala* forest (-1.3%) and inland *E. tenuiramis* forest (-1.1%). The area losses for each of these communities, while less than 700 ha, may still be significant.

References

Queensland Department of Science, Information Technology and Innovation, Brisbane. (2016) Land cover change in Queensland 2014–15: a Statewide Landcover and Trees Study (SLATS) report.

Table 1.1.a Extent of forest by tenure [(a)] (in '000s)

	LAND CLASSIFICATION (TENURE)								
	Conservation and Public reserves (ha) [(b)]	Permanent Timber Production Zone land (ha) [(c)]	Other publicly managed land (ha) [(d)]	Private freehold land (ha) [(e]	TOTAL (ha)	Area change since 1996 %	Area change since 2001 %	Area change since 2006 %	Area change since 2011 %
DRY EUCALYPT FORESTS	455	199	171	678	**1503**	-4.3%	-3.8%	-2.7%	-1.1%
WET EUCALYPT FORESTS	287	306	100	110	**804**	-8.0%	-5.2%	-2.1%	-0.3%
SUB-ALPINE EUCALYPT FORESTS	51	3	5	7	**65**	0.0%	0.0%	0.0%	0.0%
NON-EUCALYPT FORESTS	463	91	82	45	**681**	-2.6%	-1.9%	-0.7%	-0.2%
NATIVE FOREST TOTAL	1255	600	358	840	**3052**	-4.8%	-3.7%	-2.1%	-0.7%
PLANTATION	0	111	1	189	**302**	106.0%	54.5%	27.5%	-3.9%
TOTAL	**1255**	**711**	**359**	**1029**	**3354**	0.0%	-0.3%	0.0%	-1.0%

(a) Forest extent is as at the first quarter of 2015 and tenure is as at 30 June 2016
(b) Nature Conservation Act, Crown Lands Act reserves and includes all formal reserve categories within the CAR reserve system on public land
(c) Permanent Timber Production Zone land (public forest)
(d) This category of tenure broadly includes native forest on Commonwealth land, unallocated Crown land and FPPF land
(e) Includes reserved and unreserved private forest

INDICATOR 1.1.b AREA OF FOREST BY GROWTH STAGE

The spread of age classes across forest communities is a measure of ecosystem diversity, since the structure and species composition of forest change as it grows older. Sustainable forest management requires the maintenance of a full range of age-classes across the forest estate.

This indicator is intended to reflect the general distribution of the growth stages of the different forest communities across broad tenure categories.

Mature forest as reported in this indicator is a different concept from what has been defined as old growth forest under the RFA. Old growth forest is defined as having been subject to negligible unnatural disturbance and being in the late mature to over-mature growth stages. The specific reservation status of old growth forest for conservation purposes is reported under INDICATOR 1.1.e.

The overall extent of various forest community groups as at 2015 was updated by applying satellite-detected changes to the 1996 and 2010 RFA mapping, as described under INDICATOR 1.1.a and INDICATOR 1.1.e. However, this community group mapping does not reflect changes in the growth stages of the forest, and must therefore be combined with forest structure ("growth stage") mapping to address this indicator.

The age of a natural forest can be difficult to define, because a stand can contain trees of different ages, understorey species may have colonised well after canopy trees, and precise tree ages are expensive to measure. However, for the purposes of broad-scale categorisation, the crown characteristics of trees are a reliable surrogate for growth stage, particularly for eucalypt species.

In Tasmania, aerial photo-interpretation (PI) has historically been used to classify eucalypt forests into three growth stages: young regeneration, regrowth (typically aged 20–100 years), and mature forest (including over-mature or senescent stands). State forest was historically remapped on a rolling 20-year cycle.

Statewide growth stage mapping of forest on all tenures was last completed in 1996. As there is no longer a current program of growth stage re-mapping over all private property and conservation reserves, the full effects on forest structure of fire and other natural processes are not reflected in the data for these tenures. The gazettal of large areas of State forest to other tenures, eg Nature Conservation Reserves, during the current reporting period means that some of these areas have been re-mapped more recently than others.

Changes in forest structure and type due to harvesting, regeneration, and other forestry operations are also recorded. Forestry Tasmania maps changes in the extent of native forests and plantations on permanent timber production zone land annually using information from ground surveys. Private Forests Tasmania also maps changes on private land due to harvesting, regeneration, and plantation operations annually. For private land, this re-mapping is done using available imagery based on the location and information submitted to the FPA for individual Forest Practices Plans.

The practical limitations of growth-stage mapping continue to limit interpretation of the data. In 1996 there was a high degree of spatial congruence between the RFA vegetation mapping and PI-type mapping, because RFA vegetation mapping was based on PI-type derived polygons. As a result, few areas were then classified as "Unknown". Since then, there have been changes in mapping methodologies. Additionally, because the growth-stage mapping and the forest community group mapping are compiled independently and utilise different definitions and attributes of forests, there are some areas mapped as eucalypt communities for which no

growth-stage can be determined. Lastly, growth stage cannot readily be mapped for most non-eucalypt communities.

Despite these limitations, the data provide a good overview of the 2016 distribution of growth stages by forest type and tenure. The results of the 2016 growth-stage analysis are summarised in Table 1.1.b below and presented in greater detail in APPENDIX 1.1: (Tables 1.1.b.1-3). To reflect the resolution of forest mapping, areas are generally quoted to the nearest 1000 hectares.

Since *State of the forests Tasmania 2012*, the gazettal of large areas of State forest into Nature Conservation Reserves and future potential production forest has resulted in significant increases to the extent of forest in the Conservation Reserves and Other Publicly Managed Land categories (future potential production forest makes up 88% of Other publicly managed Land).

In Conservation Reserves, there were increases of 4600 ha of regeneration, 19 200 ha of regrowth forest; and 45 900 ha of mature forest during the reporting period. Conservation Reserves thus now contain 5% of all forest mapped as regeneration; 23% of all forest mapped as regrowth and 40% of all forest mapped as mature.

Even greater increases have occurred in Other Publicly Managed Land (largely future potential production forest), with increases of 12 000 hectares of regeneration, 42 000 hectares of regrowth, and 148 400 hectares of mature forest during the reporting period. These figures translate to 13% of all forest mapped as regeneration, 9% of all forest mapped as regrowth, and 12% of all forest mapped as mature occurring on Other Publicly Managed Land.

Correspondingly, forested permanent timber production zone land represents only 62% of the forested land which was previously categorized as multiple-use State forest. This represents decreases of 7 000 ha of regeneration, 63 800 ha of regrowth, and 206 100 ha of mature forest. permanent timber production zone land forests of known growth stage now contain 65% of all forest mapped as regeneration, 35% of all forest mapped as regrowth, and 15% of all forest mapped as mature.

Salient points from the 2016 data are as follows:

- 40% of mature eucalypt forests, across all land tenures are in conservation reserves.
- 41% of Tasmania's forest estate is in conservation reserves with representation of each forest type over 30% (dry eucalypt forest - 30%, wet eucalypt forest - 36%, sub-alpine eucalypt forest - 80% and non-eucalypt forest - 68%).
- 43% of dry eucalypt forests are on private land. This does not include dry forests on private land that are in gazetted private reserves according to the Nature Conservation Act.
- 91% of wet eucalypt forests are on publically-managed land (27% on permanent timber production zone land).
- For forests of known growth stage (largely eucalypt forest), 5% are regeneration, 24% are regrowth, and 71% are mature forest.
- In dry eucalypt forests of known growth stage, the proportion of regeneration and regrowth is relatively low, averaging 22% across all tenures. The highest proportion of these younger dry eucalypt forests falls on private land (30%).
- In the wet eucalypt forests of known growth stage, the proportion mapped as younger growth stages (ie. regeneration and regrowth) across all tenures is 42%, which is significantly higher than in the dry eucalypt forests. This is due in part to the ecology

of wet eucalypt communities, which tend to grow in single-age stands in which regrowth is readily identifiable. Dry eucalypt forests usually grow in multi-age stands, so that even forests mapped as mature growth stage usually contain a proportion of younger trees.

- Within the wet eucalypt forests, the highest proportions of younger growth stages are on permanent timber production zone land (53%) and in Conservation reserves (28%), with 18% on private land. On private land only a low proportion (13%) of total forest is wet eucalypt, but over half of this (54%) is in the younger growth stages.

Table 1.1.b.1 Area of native forest types by growth stage and tenure groups [a] (in '000s)

	GROWTH STAGE (in hectares)[c]				
RFA forest type by tenure group [d]	**Regeneration**	**Regrowth**	**Mature (including overmature)**	**Unknown**	**TOTAL**
Conservation Reserves [e]					
Dry eucalypt forest	0	60	384	10	455
Wet eucalypt forest	5	53	225	3	287
Sub-alpine eucalypt forest	0	11	36	4	51
Non-eucalypt forest [b]	0	0	0	463	463
TOTAL	**5**	**124**	**646**	**480**	**1255**
Permanent Timber Production Zone land [f]					
Dry eucalypt forest	15	67	110	7	199
Wet eucalypt forest	49	126	123	9	306
Sub-alpine eucalypt forest	0	0	2	0	3
Non-eucalypt forest [b]	0	0	0	91	91
TOTAL	**64**	**193**	**236**	**108**	**600**
Other publicly-managed land [g]					
Dry eucalypt forest	7	24	133	7	171
Wet eucalypt forest	7	29	63	3	100
Sub-alpine eucalypt forest		1	3	1	5
Non-eucalypt forest [b]	0	0	0	82	82
TOTAL	**13**	**53**	**199**	**93**	**358**
Private freehold land					
Dry eucalypt forest	13	122	484	59	678
Wet eucalypt forest	3	56	40	11	110
Sub-alpine eucalypt forest	0	1	5	1	7
Non-eucalypt forest [b]	0	0	0	45	45
TOTAL	**16**	**179**	**529**	**116**	**840**
Sub-Total of RFA forest type (all tenures)					
Dry eucalypt forest	35	273	1111	83	1502
Wet eucalypt forest	64	264	451	26	805
Sub-alpine eucalypt forest	0	12	46	6	64
Non-eucalypt forest [b]	0	0	0	681	681
TOTAL all tenures	**99**	**549**	**1 609**	**796**	**3052**

Notes:

(a) Native forest growth stage as at 30th June 2016 on publicly-managed land, and 31st December 2015 on private land.

(b) Non-eucalypt communities cannot readily be mapped by growth stage.

(c) Rounded to nearest thousand hectares

(d) Tenure as at 30th June, 2016.

(e) Nature Conservation Act *and* Crown Lands Act*.*

(f) Forest Management Act 2013*.*

(g) Publicly-managed land includes land managed by Public Authorities.

INDICATOR 1.1.c EXTENT OF AREA BY FOREST TYPE AND RESERVATION STATUS

The extent of reservation of different forest vegetation communities is a measure of the degree of protection of biological diversity at the species and ecosystem levels.

Under the Tasmanian Regional Forest Agreement (RFA), a comprehensive, adequate and representative (CAR) forest-reserve system was established under a revised land-tenure system to ensure that each forest community is securely protected for conservation purposes. CAR reserves are those reserves designated to meet the above objective of the RFA and can include both formal and informal reserves and occur on both public and private land. Some forest communities are also protected on public land outside the reserve system wherever prudent and feasible. In addition, forest communities identified as rare, vulnerable or endangered (threatened) under the RFA process are protected from clearance and conversion on both public and private land under the forest practices system other than in exceptional circumstances. Under the *Policy for Maintaining a Permanent Native Forest Estate*, Tasmania has committed to maintaining a permanent forest estate that comprises areas of native forest managed on a sustainable basis both within formal reserves and within multiple-use forests across public and private land. This commitment is to a minimum of 95% of the native forest area of the State to be maintained on a state-wide basis.

The RFA recognised four components of reservation:

- *Formal reserves* are publicly managed land-tenures that cannot be revoked without parliamentary approval.
- *Informal reserves* on public land are protected through administrative instruments by public authorities.
- *Private CAR reserves* are areas of private land that are managed in the long term for the protection of CAR values under secure arrangements, including proclamation under legislation, contractual agreements such as management agreements and covenants, and reserves set aside under independently certified forest management systems.
- *Values managed by prescription* are areas outside of other reserves not recorded as reserves for the purposes of this indicator.

INDICATOR 1.1.a and INDICATOR 1.1.b provide details on how changes in forest extent are mapped over time. Changes in reservation status are recorded within the Department of Primary Industries, Parks, Water and Environment's (DPIPWE) Tasmanian Reserve Estate spatial layer and are recorded as at 30 June 2016. This spatial layer is a composite of public and private reserve data across all land tenures.

Forest extent by the International Union for Nature Conservation (IUCN) categories is summarised in Table 1.1.c.1. The IUCN categories (IUCN, 1994) are as follows:

- Ia – Strict nature reserve: protected area managed mainly for science
- Ib – Wilderness area: protected area managed mainly for wilderness protection
- II – National park: protected area managed mainly for ecosystem conservation and recreation
- III – Natural monument: protected area managed for conservation of specific natural features
- IV – Habitat/species management area: protected area managed mainly for conservation through management intervention

- V– Protected landscape/seascape: protected areas managed mainly for landscape/seascape conservation and recreation
- VI – Managed resource protected areas: protected area managed mainly for the sustainable use of natural ecosystems.

The reservation status of forests whose extent was mapped as at the first quarter of 2015 are summarised in Table 1.1.c.2 and Table 1.1.c.3 below and presented in more detail in APPENDIX 1.1: (Tables 1.1.c.1-5). To reflect the resolution of forest mapping, areas are generally quoted to the nearest 1000 ha; areas smaller than 1000 ha are quoted to the nearest 100 ha and areas smaller than 100 ha are quoted to the nearest 10 ha. APPENDIX 1.1: (Table 1.1.c.4) also reports the area of communities in each IBRA 4 biogeographic region (Thackway and Creswell, 1995) to reflect their spatial distribution in Tasmania.

The CAR reserve system comprises 3.415 million hectares of land, 50.1% of the total land area of Tasmania, and approximately half of which contains forest. Public land reserves comprise 3.264 million hectares and private land reserves 151 000 hectares.

The main contribution to the increase in reserved land (in 2012/2013) was the inclusion in the informal reserves analysis of the Future Reserve Land (now called Future Potential Production Forest) proclaimed under the *Tasmanian Forests Agreement Act 2013*. This resulted in a net increase of 324 000 ha (in 2012/2013), taking into account overlaps with pre-existing informal reserves. (Some of these were later formally gazetted).

Other notable changes in the area of CAR reserves since 2011 were the result of increased area of voluntary conservation of forest on private land through the Forest Conservation Fund Revolving Fund and Protected Areas on Private Land programs, and through covenants arising from rejected forest practices plan applications. The total area of compensation covenants is 755 ha.

The main trends evident from the data are:

- Implementation of the comprehensive, adequate and representative (CAR) reservation framework agreed under the RFA has resulted in an extended system of public and private terrestrial CAR reserves. Within this framework, 1 778 000 ha of forested land, or 58.2%, of Tasmania's native forests are now protected, up from the 1996 extent of 977 900 ha. This represents an increase of 800 000 ha above the 1996 area, and by 265 000 ha since 2011.
- As well as the major changes in public land tenure, progress has been made in implementing protected areas on private freehold land.
- Most protected forests are on public land: 70% of these are in formal reserves, of which 37% is unavailable for mining and 33% is subject to the *Mineral Resources Development Act 1995*. Informal reserves and private CAR reserves account for the remaining 30% of reserved native forests.
- A total of 47 native forest communities, including all subalpine eucalypt and non-eucalypt communities, now have more than 25% of their current areas in reserves.
- Of the 50 native forest communities, 39 have at least 15% of their estimated pre-1750 extent protected in reserves. All sub-alpine eucalypt, all but one non-eucalypt, and most wet eucalypt communities exceed this level of reservation.
- Seven communities, mainly from the dry eucalypt group, have less than 7.5% of their estimated pre-1750 extent protected in reserves. For most of these communities, the remaining extent is primarily on unreserved private land.

Table 1.1.c.1 Area of native forest type protected by IUCN category of reserve [(a)] (in '000s)

RFA Forest Vegetation Community Group	IUCN Category								TOTAL
	Ia	II	II/Ib	III	IV	V	VI	Not Classified [(b)]	
Dry eucalypt	11	75	127	12	137	18	133	199	**713**
Wet eucalypt	1	30	137	3	46	21	55	143	**436**
Sub-alpine eucalypt	0	5	29	0	1	5	11	4	**55**
Non-eucalypt	0	12	230	10	69	23	121	109	**574**
TOTAL	**12**	**122**	**523**	**26**	**253**	**67**	**320**	**455**	**1778**

(a) *Forest extent is as at the first quarter of 2015 and IUCN category is as at 30 June 2016*
(b) *The areas listed having a 'Not Classified' IUCN category are other reserves within the CAR reserve system*

Table 1.1.c.2 Area of native forest type protected by reservation status [(a)] (in '000s)

RFA forest vegetation community group	RFA Reservation Status						TOTAL
	Public land				Private land		
	Dedicated formal reserve	Other formal reserve (b)	Informal CAR reserve[(c)]	Unreserved public land[(d)]	Private CAR reserves	Unreserved private land	
Dry eucalypt	227	224	188	186	73	604	**1503**
Wet eucalypt	165	121	137	270	12	98	**804**
Sub-alpine eucalypt	33	17	4	3	0	6	**65**
Non-eucalypt	242	220	101	72	10	35	**681**
TOTAL	**669**	**583**	**430**	**531**	**96**	**744**	**3052**

(a) *Forest extent is as at the first quarter of 2015 and reserve class is as at 30 June 2016*
(b) *Subject to the* Mineral Resources Development Act 1995
(c) *Includes FPPF land*
(d) *Includes permanent timber production zone land, Commonwealth Defence and vacant Crown lands.*

Table 1.1.c.3 Change in reservation status of native forest types (hectares, in '000s)

RFA forest vegetation community group	Total area	Total area in CAR reserves	Proportion of existing forest now in reserves	Percentage change since 1996	Proportion of pre-1750 forest extent now in reserves	Percentage change since 1996
Dry eucalypt	1503	713	**47.4%**	25.9	**26.6%**	14.0
Wet eucalypt	804	436	**54.2%**	27.9	**34.6%**	16.4
Sub-alpine eucalypt	65	55	**84.9%**	13.5	**78.8%**	12.9
Non-eucalypt	681	574	**84.3%**	32.1	**71.1%**	25.9
TOTAL	**3052**	**1778**	**58.2%**	**27.7**	**36.9%**	**16.6**

References

IUCN – The International Union for the Conservation of Nature and Natural Resources (the World Conservation Union) (1994) Guidelines for protected area management categories. Commission on National Parks and Protected Areas with the assistance of the World Conservation Monitoring Centre. IUCN, Gland, Switzerland.

Thackway R. and Cresswell ID. (Eds.) (1995) An Interim Biogeographic Regionalisation of Australia for Australia: a framework for establishing the national system of reserves, Version 4.0. Australian Nature Conservation Agency, Canberra.

INDICATOR 1.1.d FRAGMENTATION OF FOREST COVER

This indicator is concerned with the size, shape and connectivity of forest. It is also concerned with size of forest remnants and their susceptibility to exotic species invasions; correlation between size of remnants and numbers of species and population viability; and possible impacts on pollination, seed dispersal, wildlife migration and breeding.

Forest fragmentation was not specifically considered during the studies leading to the RFA. Consequently there is very limited information concerning many of those attributes described in the above paragraph that are reported on nationally and internationally.

The information presented is from the TASVEG forest extent layers 2005, 2010 and 2015 which show forest and woodland occurrences down to patches of about one hectare. This mapping provides a good record of forest patchiness but careful interpretation is required.

All patches of forest and woodland within the TASVEG extent layers were allocated to patch sizes consistent with those used in Australia's State of the Forests Report 2003. The proportion of the total area of forest was calculated for all of the patches in each of the patch size classes for the years 2005, 2010 and 2015; the results are presented in Figure 1.1.d (i). If a large area of forest was bisected by a major road or a river, it was counted as two patches.

The graph shows that over 45% of Tasmania's forests occur in patches larger than 50 000 ha. A further 34% of total forest area occurs in patches between 5000 ha and 50 000 ha. The remainder is distributed right across the range of remaining size classes below this. Approximately 7% of Tasmania's total forest area occurs in patches less than 200ha in size.

The graph Figure 1.1.d (i) shows changes in proportions of Tasmanian forest by patch size in 2006, 2011 and 2016 and does not include plantation in forest patches. If plantations were included, the proportions of forest in the five largest patch size classes would increase.

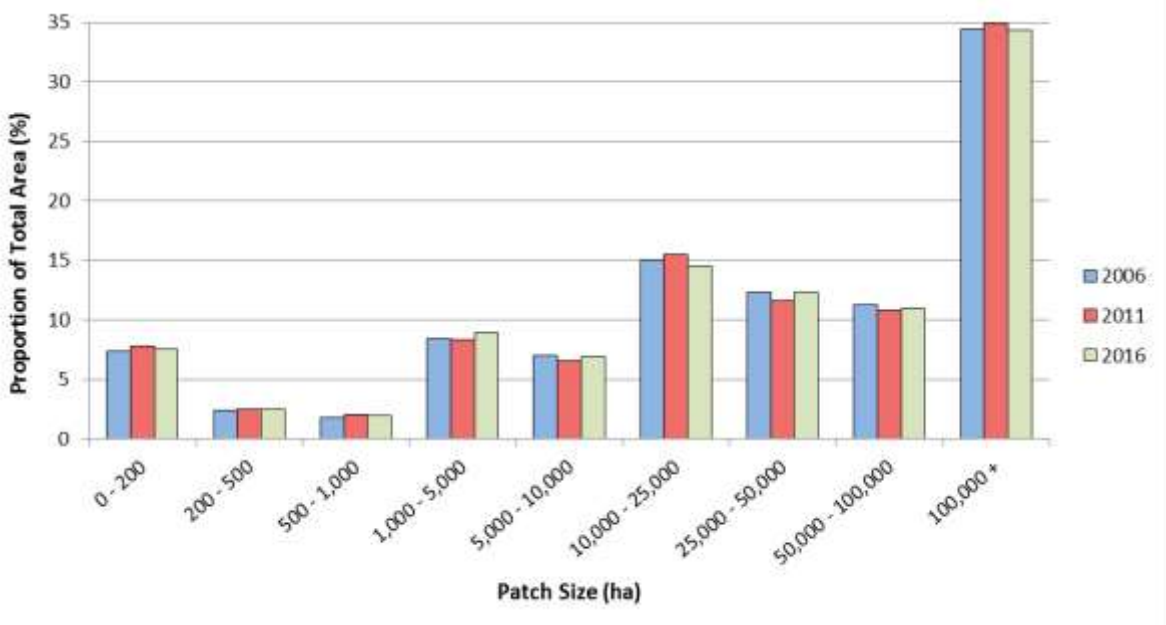

Figure 1.1.d (i) Proportion of total area of Tasmanian forest, by patch size 2006–16

Forests may be naturally fragmented where they occur in a matrix of non-forest communities, as is the case in vast tracts of the Tasmanian Wilderness World Heritage Area. Many of these smaller forest patches are likely to be forest copses occurring naturally amongst native non-forest vegetation such as in south-west Tasmania. In parts of this area, where fire intervals

have been very long, there may also be a process of coalescing forest patches. There may be a qualitative difference between such fragmented patches within contiguous native vegetation and the situation where forest patches have resulted from land use, such as within a farming landscape.

Even in some areas of the dry Midlands, open grasslands have persisted since European settlement interspersed in some cases with dry forest and woodland. Afforestation of some of these grasslands would not necessarily have positive biodiversity outcomes.

Over 73% of Tasmania has native vegetation cover and there is a high degree of connectivity across the landscape. There is a higher proportion of forest in larger patches in Tasmania (more than 72% in patches over 10 000 ha) when compared with the national picture.

INDICATOR 1.1.e AREA OF OLD-GROWTH BY FOREST TYPE BY RESERVATION STATUS

The spread of age-classes across forest communities is a measure of ecosystem diversity, since the age structure and species composition of a forest change as it grows older. Sustainable forest management requires the maintenance of a full range of age-classes across the forest estate.

The concept of 'old-growth' is used as a measure of structural diversity; it is defined as ecologically mature forest where the effects of disturbances are now negligible. During the development of the Tasmanian Regional Forest Agreement (RFA) in 1996, old-growth was mapped by classifying forests according to the proportion of senescent crowns in each stand and their history of disturbance by fire, harvesting and grazing.

There has been no broad-scale re-mapping of old-growth forest since 1996. In the *State of the forests Report 2002*, the area of old-growth forest in 2001 was reported as the 1996 area less the area that had been recorded as harvested since 1996. In *Sustainability Indicators for Tasmanian Forests 2001-2006*, the area of old-growth forest in 2006 was estimated using the same method.

In *State of the forests Tasmania 2012*, the area of old-growth forest in 2010 was reported as the old-growth component of forest vegetation type and extent as described in Indicator 1.1.a in 2012. These data reflected changes from 1996 as identified using a combination of incomplete harvest records and satellite remote sensing of forest change attributed to wildfire, harvesting activity and unspecified disturbance.

For this report, the method as previously used in 2001 and 2006 reports is applied, as per the RFA 5-yearly review indicator criteria. On publicly-managed land the area of old-growth forest in 2016 is reported as the 1996 area less the area that had been recorded as harvested since 1996. On private land, the 2010 area was updated to reflect the area harvested to 2012. The area of old-growth forest at December 2015 is reported as the updated 2012 area less the area that had been recorded as harvested since 2012. This approach allows for uniform assessment of old growth change over the five year reporting period.

The RFA recognised four components of reservation:

- *Formal reserves* which are publicly managed land-tenures that cannot be revoked without parliamentary approval; of these, *dedicated formal reserves* exclude mining
- *Informal reserves* on public land are protected through administrative instruments by public authorities
- *Private CAR reserves* are areas of private land that are managed in the long term for the protection of CAR values under secure arrangements, including proclamation under legislation, contractual agreements such as management agreements and covenants, and reserves set aside under independently certified forest management systems
- *Values managed by prescription*. These areas outside of other reserves are not recorded as reserves for the purposes of this indicator.

Reservation status is recorded as at 30 June 2016 and is based on the DPIPWE Tasmanian Reserve Estate dataset. This spatial layer is a composite of public and private reserve data across all land tenures.

The results as at 30 June 2016 on publicly-managed land, and 31 December 2015 on private land, are summarised in Table 1.1.e.1 , Table 1.1.e.2 and Table 1.1.e.3 below, and presented in more detail in APPENDIX 1.1: (Tables 1.1.e.1-3).

The main trends evident from the data are:

- Within the comprehensive, adequate and representative (CAR) reservation framework agreed under the RFA and the TCFA framework, 1 048 000 ha of old-growth forest, or 86.9% of Tasmania's old-growth forests, are now in reserves, up from the 1996 extent of 681 900 ha or 55%. This represents an increase of 366 400 ha, or 44% of the 1996 area. The main causes for the increase in reserved area of old-growth forest have been the Tasmanian Community Forest Agreement (TCFA) 2005; the *Tasmanian Forests Agreement Act 2013*; the gazettal of new reserves under the *Nature Conservation Act 2002* in December 2013 as part of implementing the TFA. Nine percent of all old-growth forest is found on permanent timber production zone land, and a further 9% of all old-growth forest is found on private freehold land.
- Of the 43 old-growth forest communities mapped for the RFA, 34 have at least 60% of their extent of old-growth reserved, and 14 have over 90% of their old-growth communities reserved. Of the old-growth forest types, 94% of non-eucalypt old-growth forest is reserved; 93% of sub-alpine old-growth forest; 87% of wet eucalypt old-growth forest and 78% of dry eucalypt old-growth forest. Four old-growth communities are nearly 100% reserved – Pencil Pine with deciduous beech; Pencil Pine forest; *E. subcrenulata* and Tall *E. nitida*.
- Three forest communities have less than 30% of their extent of old-growth in reserves, all of which are dry eucalypt forest communities, 98–100% of which is on unreserved private freehold land. 17 000 ha of old-growth forest on private land has now been protected in private CAR reserves.
- The extent of the old-growth forest in Tasmania identified in 1996 has decreased in area by 40,000 ha (3%) over the twenty years to June 2016. However, this 40,000 ha decrease represents more than the area of old-growth forest harvested, as in 2012 the old-growth change mapping also included losses due to fire and other disturbance. The wet eucalypt communities have experienced the greatest losses in old-growth forest area over this period (9%).
- The old-growth forest communities in which the biggest area decreases were recorded over the twenty years were tall *Eucalyptus delegatensis* and tall *E. obliqua*. Twelve old-growth communities have had 0–10 hectares cleared over the twenty years of the RFA.
- Remapping of Tasmania's coastline for the tenure/reservation layer used in 2016 led to the removal of 200 ha of previously mapped old-growth forest communities identified in 1996.

Table 1.1.e.1 Old-growth[(a)] by forest type and tenure[(b)] (hectares, in '000s)

RFA Oldgrowth forest type	Conservation & Public Reserves [(c)]	Permanent timber production zone land[(d)]	Other publicly managed land [(e)]	Private freehold land	TOTAL	% Change in area since RFA (1996)
Dry eucalypt	240	26	53	89	**407**	**-3.3%**
Wet eucalypt	165	36	22	6	**229**	**-8.9%**
Sub-alpine eucalypt	35	1	2	2	**40**	**-0.8%**
Non-eucalypt	423	40	56	10	**530**	**-0.7%**
TOTAL	**863**	**103**	**133**	**107**	**1206**	**-3.2%**

(a) Oldgrowth forest extent as at 30th June 2016 on publicly-managed land, and 31st December 2015 on private land.
(b) Tenure as at 30th June, 2016.
(c) Nature Conservation Act *and* Crown Lands Act*.*
(d) Forest Management Act 2013*.*
(e) Publicly-managed land includes land managed by Public Authorities.

Table 1.1.e.2 Old-growth[(a)] by forest type and reserve type[(b)] (hectares, in '000s)

	Reserve Type					
RFA old-growth forest type	**Public land**				**Private land**	
	Dedicated formal reserve	**Other formal reserve [(c)]**	**Informal Reserve**	**Other publicly managed land [(d)]**	**Private CAR reserve**	**Other private land**
Dry eucalypt	135	104	64	15	12	77
Wet eucalypt	111	54	33	25	1	5
Sub-alpine eucalypt	24	11	2	1	0	2
Non-eucalypt	233	190	70	26	3	7
TOTAL	**504**	**358**	**169**	**67**	**17**	**90**

(a) Old-growth forest extent as at 30th June 2016 on publicly-managed land, and 31st December 2015 on private land.
(b) RFA reservation as at 30th June, 2016.
(c) Subject to mining.
(d) Publicly-managed land includes land managed by Public Authorities.

Table 1.1.e.3 Change in reservation[(a)] status of old-growth[(b)] by forest type (hectares, in '000s)

RFA old-growth forest type	Total area	Total area in CAR reserves	Proportion of existing old-growth forest now in reserves	Increase in reservation since 1996
Dry eucalypt	407	316	77.5%	33.4%
Wet eucalypt	229	200	87.1%	35.4%
Sub-alpine eucalypt	40	37	92.7%	12.4%
Non-eucalypt	530	496	93.7%	31.0%
TOTAL	**1206**	**1048**	**86.9%**	**32.2%**

(a) RFA reservation as at 30th June, 2016.
(b) Old-growth forest extent as at 30th June 2016 on publicly-managed land, and 31st December 2015 on private land.

1.2 Species Diversity

This sub-criterion monitors the knowledge base for forest-dwelling species, the status of these species and the population levels of a range of representative species across a range of habitats at scales relevant to forest management. The focus of reporting is on vertebrates and vascular plants except where species are listed as rare, vulnerable, endangered or extinct.

INDICATOR 1.2.a FOREST-DWELLING SPECIES FOR WHICH ECOLOGICAL INFORMATION IS AVAILABLE

This indicator will, over time, show improvements in knowledge and the capacity to manage the forest-dwelling species in Tasmanian forests. The intent of this indicator is to provide forest managers with sufficient knowledge to ensure that additional species do not reach low population levels and require listing under threatened species legislation.

Vertebrate species and vascular plants were chosen as the indicator species because they comprise a conspicuous and often physically dominant component of forest ecosystems. Research that includes examples from Tasmanian forests has demonstrated that overall biodiversity levels are closely linked to the genetic diversity of dominant species in forests (Whitham 2006). This is because of the reliance of other species in the ecosystem on microhabitats created by dominants as well as breakdown products on which other species depend. In addition, a lack of information on invertebrates and lower plants makes their current use as indicator species problematic and of limited practical use for adaptive management.

A list of forest dwelling vertebrate fauna species is provided in Table 1.2.a.1 of APPENDIX 1.2.a: Species are classified therein according to class (e.g. fish, amphibian, and reptile) and those species whose recovery was implemented between 2011 and 2016 are also noted. This list was derived from the Tasmanian Government's Natural Values Atlas (NVA), a web-based atlas for flora and fauna records maintained by the Department of Primary Industries, Parks, Water and Environment (DPIPWE). New location records are added to NVA from data and incidental observations by DPIPWE staff and others, including regular updates from the Forest Practices Authority, Forestry Tasmania, private consultancies, non-government organisations and individuals. Details of forest dwelling vertebrates are summarised in Table 1.2.a.1 below.

Table 1.2.a.2 of APPENDIX 1.2.a: lists currently known forest-dwelling plant taxa. Of the 1919 vascular plant taxa indigenous to Tasmania (including subspecies and varieties), 1158 (60%) are known to be forest dwelling. These have now been tagged in NVA. This is an increase of 124 species from 2011 as listed in *State of the Forests Tasmania 2012* (1034 species). Of the 156 taxa with changed taxonomy 88 were considered to be forest dwelling species. Reassessment of the forest dwelling status based on updated information of the remaining taxa saw 138 taxa added to the list, and 27 removed. Data quality has improved with the advent of the NVA and the Tasmanian Herbarium's annual census of vascular flora species in Tasmania, enabling accurate counts of taxa in the state for native vascular plant species. These species are summarised in taxonomic groupings by order in Table 1.2.a.1 below.

Table 1.2.a.1 Numbers of forest dwelling taxa within each group

Group	Number of taxa
Vertebrate fauna	**Total 139**
Fish	13
Amphibians	8
Reptiles	15
Birds	69
Mammals	34
Vascular Plants	**Total 1158**
Dicotyledons	724
Monocotyledons	335
Pteridophytes	86
Gymnosperms	13

Between 2011 (as listed in *State of the forests Tasmania 2012*) and 2016, one new forest-dwelling vertebrate fauna species was identified – *Antechinus vandycki* (Tasman Peninsula dusky antechinus). No forest dwelling species is believed to have become extinct in this period.

Table 1.2.a.2 summarises information known for vascular plants and different categories of vertebrates. Even for those groups where a relatively larger amount of information is available, there are still many species for which little is known.

Table 1.2.a.2 Number of native forest associated species and level of information regarding those species available for management decisions

Taxa	Number of native forest associated species	The level of habitat, disturbance and life history information available on which management decisions are based*		
		None (little or no information is available to inform management decisions)	**Partial** (some information is available but some crucial information absent)	**Comprehensive** (adequate to make management decisions)
Fish	13	0%	46%	54%
Amphibians	8	0%	50%	50%
Reptiles	15	0%	73%	27%
Birds	69	3%	30%	67%
Mammals	34	0%	68%	32%
Vascular Plants	1158	3%	70%	27%

* *The percentage estimates are based on publications such as listing statements, note sheets and technical papers with management information included, scientific papers, and expert opinion.*

The percentage of native forest associated vascular plant species with adequate information to make management decisions has increased from 20% (2011) to 27%. The improvement is

largely due to the NVA which holds distribution information on all native vascular plant species in Tasmania and the species profiles in the Threatened Species Link on the DPIPWE website, as well as increased efforts to produce or revise Listing Statements or Note Sheets for listed species. The information situation should continue to improve as data in the NVA and Threatened Species Link increase.

Species that are "possibly threatened" have now been tagged in NVA and those with little or no information to inform management decisions have now been reassessed and tagged in NVA. Taxa that have little or no information available include those deemed extinct, species with uncertain status in Tasmania, very new species, taxa that are difficult to identify, or taxa for which observations have mostly been made at the species level rather than infraspecies (subspecies) level. This should initiate improved information in order to assess the conservation status of these species. Survey guidelines and habitat descriptions for all threatened flora species are now available on the FPA website and will be completed in Threatened Species Link, enabling better focussed surveys and management of priority species.

References

Whitham TG, Bailey JK, Schweitzer JA, Shuster SM, Bangert RK, LeRoy CJ, Lonsdorf E, Allan GJ, DiFazio SP, Potts BM, Fischer DG, Gehring CA, Lindroth RL, Marks J, Har SC, Wooley SC and Wimp GM (2006) Community and ecosystem genetics: a framework for integrating from genes to ecosystems. *Nature Reviews Genetics* 7, 510–523.

INDICATOR 1.2.b THE STATUS OF FOREST-DWELLING SPECIES AT RISK OF NOT MAINTAINING VIABLE BREEDING POPULATIONS, AS DETERMINED BY LEGISLATION OR SCIENTIFIC ASSESSMENT

This indicator is a measure of management effectiveness. Changes to the status of threatened or priority species may indicate whether protection and management measures are improving, maintaining or failing to improve the conservation status of given species. Some species may change listing status as new information is available. Up-listing or down-listing may be independent of the protection or management effort towards a species.

The tables in APPENDIX 1.2.b.1 list the RFA Priority Species, and their status under the *Threatened Species Protection Act 1995* and the *Environmental Protection and Biodiversity Conservation Act 1999* (as at June 2016).

Changes to the status of RFA Priority Species on the *Threatened Species Protection Act 1995* from 30 June 2011 to 30 June 2016 are summarised in Table 1.2.b.1.1, with changes detailed in Table 1.2.b.1.2.

Changes to the status of existing and proposed RFA Priority Species listed under the TSP Act over the last five years were based on information provided to the Threatened Species Scientific Advisory Committee (SAC) through nominations from the community or draft Listing Statements, supplemented by information collated and held by the DPIPWE. The SAC's criteria for listing are based on the International Union for the Conservation of Nature criteria and approved by the Secretary of DPIPWE.

Table 1.2.b.1.1 Summary of changes in listing status under *Threatened Species Protection Act 1995* of RFA Priority Species from 30 June 2011 to 30 June 2016

	Flora	Fauna
Number of species with changed TSP Act listing status	45	3
Number of species which have moved to a higher category of risk	6	2
(including number of species now determined to be extinct)	(0)	(0)
Number of species which have moved to a lower category of risk	2	1
(including number of species rediscovered from extinct status)	(0)	(0)
Number of species added to the TSP Act list	14	0
(including number of species now determined to be extinct)	(1)	
Number of species de-listed	23	0
(including number of species previously listed as extinct)	(1)	

Table 1.2.b.1.2 Summary of changes in listing status under Environmental Protection and Biodiversity Conservation Act from 30 June 2011 to 30 June 2016 (not including ocean fauna or shore birds or Macquarie Island taxa)

	Flora	Fauna
Number of species with changed EPBC Act listing status	6	7
Number of species which have moved to a higher category of risk (including number of species now determined to be extinct)	0	1
Number of species which have moved to a lower category of risk (including number of species rediscovered from extinct status)	1	0
Number of species added to the EPBC Act list (including number of species now determined to be extinct)	1	6
Number of species de-listed (including number of species previously listed as extinct)	4	0

Table 1.2.b.1.3 Details of changes in listing status under *Threatened Species Protection Act 1995* of RFA Priority Species from 30 June 2011 to 30 June 2016

Species	Common name	Change	Reason
Flora			
Agrostis aff. hiemalis	alpine winter bent	delisted from rare	merged into a non-threatened taxon
Arygyrotegium nitidulum	shining cottonleaf	new listing, now vulnerable	newly confirmed as occurring in Tasmania
Arthropodium strictum	chocolate lily	delisted from rare	improved information
Austrstipa nodosa	knotty speargrass	delisted from rare	improved information
Brachyscome aff. radicans	snow daisy	delisted from rare	merged into a non-threatened taxon
Brachyscome siberi var. *gunnii*	forest daisy	delisted from rare	merged into a non-threatened taxon
Cassinia rugata	wrinkled dollybush	new listing, now endangered	newly confirmed as occurring in Tasmania

Species	Common name	Change	Reason
Cynoglossum australe	coast houndstongue	delisted from rare	improved information
Desmodium varians	slender ticktrefoil	new listing, now endangered	new taxon (part of previously listed entity)
Deyeuxia benthamiana	benthams bentgrass	delisted from rare	merged into a non-threatened taxon
Deyeuxia densa	heath bentgrass	delisted from rare	improved information
Euphrasia amplidens	pieman eyebright	new listing, now endangered	new taxon
Goodenia geniculata	bent native-primrose	uplisted to endangered from rare	improved information
Grevillia australis var. linearfolia	narrowleaf grevillea	delisted from rare	varieties no longer recognised and parent species not threatened
Grevillia australis var. planifolia	flatleaf grevillea	delisted from rare	varieties no longer recognised and parent species not threatened
Hydrocotyle laxiflora	stinking pennywort	uplisted to endangered from vulnerable	improved information
Hypoxis vaginata	sheathing yellowstar	delisted from rare	improved information
Isoetopsis graminifolia	grass cushion	downlisted to vulnerable from endanged	improved information
Lachnagrostis scabra subsp. scabra	rough blowngrass	delisted from rare	improved information
Lepidium pseudotasmanicum	shade peppercress	delisted from rare	improved information
Millotia muelleri	clustered bowflower	uplisted to endangered from rare	improved information
Persoonia gunnii var oblanceolata	lanceleaf geebung	delisted from rare	varieties no longer recognised and parent species not threatened
Pimelia spp. (Tunbridge)	grassland riceflower	new listing, now endangered	new taxon
Plantago gaudichaudii	narrow plantain	delisted from vulnerable	records redetermined to belong to a non-threatened species
Poa poiformis var. ramifer	island purplegrass	delisted from rare	improved information
Pomaderris phylicifolia	narrowleaf dogwood	delisted from rare	component taxa reassessed in their own right
Pomaderris phylicifolia subsp. ericoides	revolute narrowleaf dogwood	new listing, now rare	new taxon (part of previously listed entity)
Pomaderris phylicifolia subsp. phylicifolia	narrowleaf dogwood	new listing, now rare	new taxon (part of previously listed entity)
Prasophyllum anoenum	dainty leek-orchid	downlisted to vulnerable from endanged	improved information

Species	Common name	Change	Reason
Pterostylis falcata	sickle greenhood	uplisted to endangered from rare	taxon now more narrowly defined
Pterostylis lustra	small sickle greenhood	new listing, now endangered	new taxon (part of previously listed entity)
Ranunculus sessiliflorus var. sessiliflorus	rockplate buttercup	delisted from rare	improved information
Rumex bidens	mud dock	uplisted to vulnerable from rare	improved information
Rytidosperma popinensis	blue wallabygrass	delisted from rare	redetermined to be an introduced species
Scaevola albida	pale fanflower	uplisted to vulnerable from rare	improved information
Senecio campylacarpus	bulging fireweed	new listing, now vulnerable	new taxon
Senecia georgianus	grey groundsel	new listing, now extinct	new taxon
Senecio psilocarpus	swamp fireweed	new listing, now endangered	new taxon
Senecio velleioides	forest groundsel	delisted from rare	improved information
Sporobolus virginicus	salt couch	delisted from rare	improved information
Stellaria multiflora	rayless starwort	delisted from rare	component taxa reassessed in their own right
Stellaria multiflora subsp. nebulosa	nebulous rayless starwort	new listing, now rare	new taxon (part of previously listed entity)
Vittadinia burbridgeae	smooth new-holland-daisy	new listing, now rare	new taxon (part of previously listed entity)
Westringia brevifolia var. raleighii	greater shortleaf westringia	delisted from rare	varieties no longer recognised and parent species not threatened
Xerochrysum palustre	swamp everlasting	new listing, now vulnerable	assessment of this EPBC Act listed species undertaken
Fauna			
Hypolimnus pedderensis	Lake Pedder Earthworm	uplisted to extinct from endangered	collated information
Migas plomleyi	Plomleys Trapdoor Spider	uplisted to endangered from rare	collated information
Lissotes menalcas	Mount Mangana Stag Beetle	downlisted to rare from vulnerable	improved information

Table 1.2.b.2 Changes to the Environmental Protection and Biodiversity Conservation Act status of RFA-Priority Species

Species	Common name	Change	Reason
Flora			
Pomaderris pilifera subsp. *talpicutica*	Moleskin Dogwood	list as Vulnerable	alignment with TSPA
Argentipallium Xspiceri	Spicer's Everlasting	delist from Critically Endangered	alignment with TSPA (determined to be occasional hybrid)
Epacris acuminata	Claspleaf Heath	delist from Vulnerable	alignment with TSPA
Pterostylis atriola	Snug Greenhood	delist from Endangered	alignment with TSPA
Barbarea australis	Native Wintercress, Riverbed Wintercress	downlist from Critically Endangered to Endangered	alignment with TSPA
Rytidosperma popinesis	Roadside Wallaby Grass	delist from Endangered	alignment with TSPA (determined to be *R. fulvum* a species introduced to Tasmania)
Carex tasmanica	Curly Sedge	Delist from Vulnerable	alignment with TSPA
Fauna			
Dasyurus viverrinus	Eastern Quoll	new listing, now Endangered	collated information
Discocharopa vigens	a charopid land snail	new listing, now Critically Endangered	alignment with TSPA
Lathamus discolor	Swift Parrot	uplisted to Critically Endangered from Endangered	improved information
Micropathus kiernani	Francistown Cave Cricket, Southern sandstone cave cricket	new listing, now Critically Endangered	alignment with TSPA
Oreixenica ptunarra	Ptunarra Brown Butterfly	new listing, now Endangered	alignment with TSPA
Platycercus caledonicus brownii	Green Rosella (King Island)	new listing, now Vulnerable	alignment with TSPA
Strepera fuliginosa colei	Black Currawong (King Island)	new listing, now Vulnerable	collated information

Factors prompting a change of status under the *Threatened Species Protection Act 1995* and *Environmental Protection and Biodiversity Conservation Act 1999* for existing or proposed RFA-Priority plant species over the last five year reporting period include:

- A memorandum of understanding (MOU) for the application of a Common Assessment Method for threatened species assessment, was entered into between the Australian Government and DPIPWE in December 2015. The purpose of the MOU is to provide a consistent approach to assessments in order to align the state and national threatened species lists over time. The common assessment method is based on the best practice standard developed by the International Union for Conservation of Nature (IUCN), as used to create the Red List of Threatened Species, with some amendments to suit the Australian

context. DPIPWE is represented on an inter-governmental Working Group to guide the implementation of the common assessment method.

- A reduction in the number of public nominations for new listings (or a change in the listing status of species), with most new listings under the *Threatened Species Protection Act 1995* arising from the SAC undertaking its role of reviewing information collated by DPIPWE. This process uses the Listing Statement template, and allows for a draft Listing Statement to accompany a recommendation from the SAC to the Minister for new listings.
- Natural Values Reports, a tool from the Natural Values Atlas, allow the easy and rapid identification of natural values in the vicinity of specified locations. The use of these reports significantly improves consideration of threatened plants at sites for proposed management, harvesting or development. The reports allow for the planning of targeted surveys at appropriate times of the year for the identification of threatened plants with the potential to occur at sites. This has resulted in improved knowledge of the distribution of species.
- The inclusion as a condition on permits to collect threatened plants for identification purposes for observations of threatened flora to be submitted to the Natural Values Atlas. The approval process used by DPIPWE for the acceptance of these observations into the Natural Values Atlas allows for significant range extensions or infills to be identified. This quality assurance process can trigger a review of the conservation status of species under the *Threatened Species Protection Act 1995*.
- Nominations for a change in the *Threatened Species Protection Act 1995* or *Environmental Protection and Biodiversity Conservation Act 1999* listing status resulted in increased awareness of species and frequently prompting further survey or research. This has improved information, often resulting in a further change of status.
- Taxonomic review, prompting survey, research and collation of data to allow an assessment of the conservation status of new and revised taxa. Taxonomic review may also lead to changes in the census of vascular plants published by the Tasmanian Herbarium allowing for the delisting of taxa that have been determined to have been recorded for Tasmania in error or that have been determined to be introduced to Tasmania.
- Survey and monitoring activity by the Wildcare Inc group[11] Threatened Plants Tasmania and members of the Tasmanian Flora Network (an email network administered by DPIPWE, Threatened Species Section) which has improved knowledge of the conservation status of species.

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[11] http://wildcaretas.org.au/

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INDICATOR 1.2.c REPRESENTATIVE SPECIES FROM A RANGE OF HABITATS MONITORED AT SCALES RELEVANT TO REGIONAL FOREST MANAGEMENT

This indicator is a broad measure of the conservation status of a variety of representative species across habitats. This measure reflects elements of ecosystem and genetic diversity and can be quantified using population information or information on population level surrogates such as habitat or range.

For vascular flora, population information is collated with the preparation of Listing Statements under provisions of the *Threatened Species Protection Act 1995*, for RFA Priority Species of flora (APPENDIX 1.2.b.1). Listing Statements can be updated every five years or as new information becomes available. The detail contained in flora Listing Statements will be enhanced as the amount of population data for threatened species in the Natural Values Atlas database increases.

For fauna, long-term monitoring of abundance has been carried out for the brushtail possum, the Tasmanian pademelon, Bennetts wallaby, the Tasmanian devil, and the common wombat. The graphs in Figures 1.2.c.1–5 below indicate no decline in abundance for three of the five monitored species. The exception**s** are the brushtail possum, for which the trend is skewed due to a very high estimated population density in 2005 and the Tasmanian devil which in recent years has been severely affected by the Devil Facial Tumour Disease (DFTD**)**. However, the declining population trend evident for the Tasmanian devil does appear to have stabilised in the last 5-10 years. The graphs for the brushtail possum, Tasmanian pademelon and Bennetts wallaby are the output of distance modelling and consequently show a density estimate while the graphs for the common wombat and Tasmanian devil are based on simple encounter rates (records per transect across the state).

State-wide trends in the abundance of the Tasmanian pademelon, Bennetts wallaby, brushtail possum, common wombat, and Tasmanian devil are shown for the period up to 2015 based on the availability of data. State-wide trend lines include 95% confidence limits for brushtail possum, Tasmanian pademelon and Bennetts wallaby (Greg Hocking, DPIPWE, pers. comm.).

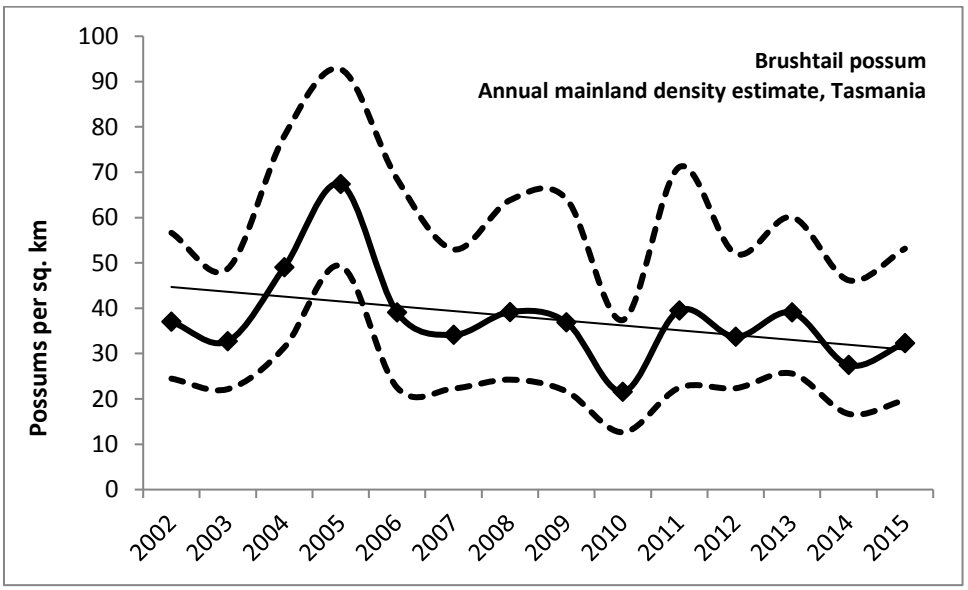

Figure 1.2.c.1 Brush-tailed possum – stable (annual spotlight survey data – 2002–15)

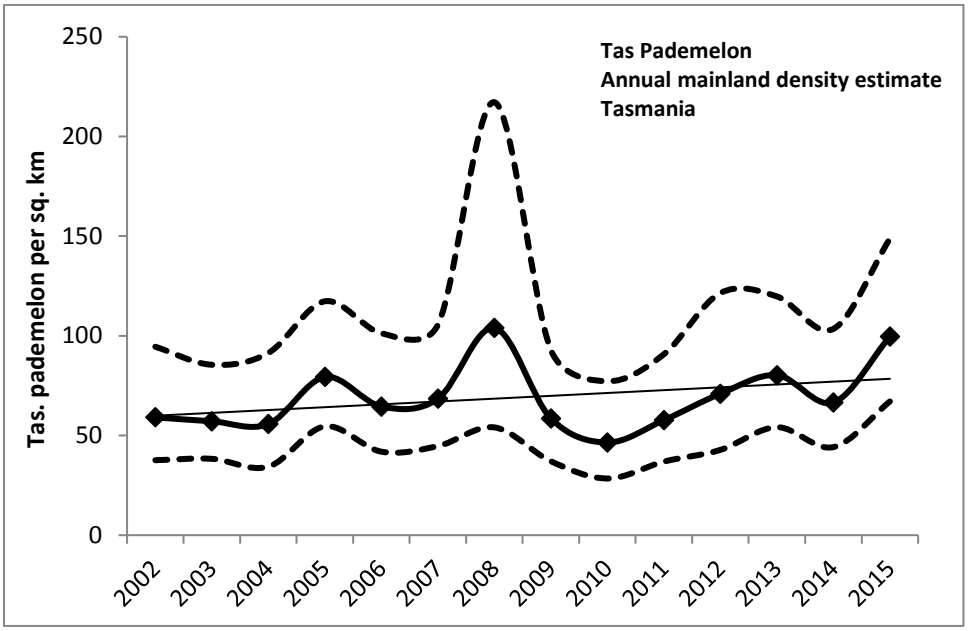

Figure 1.2.c.2 Tasmanian Pademelon – stable (annual spotlight survey data – 2002–15)

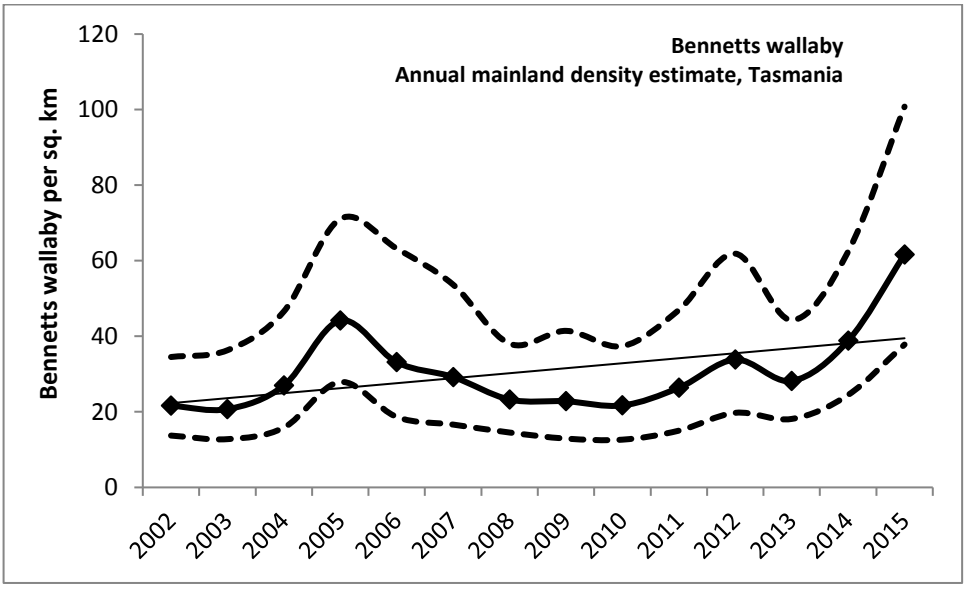

Figure 1.2.c.3 Bennetts wallaby – stable (annual spotlight survey data – 2002–15)

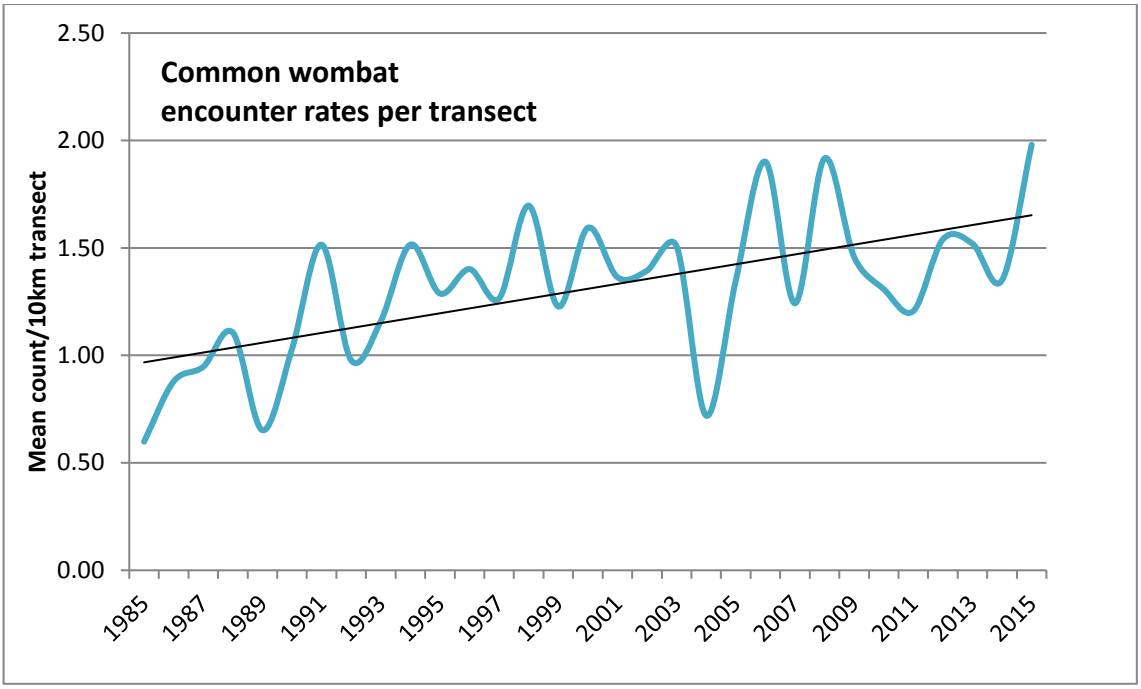

Figure 1.2.c.4 Common wombat encounter rates per transect

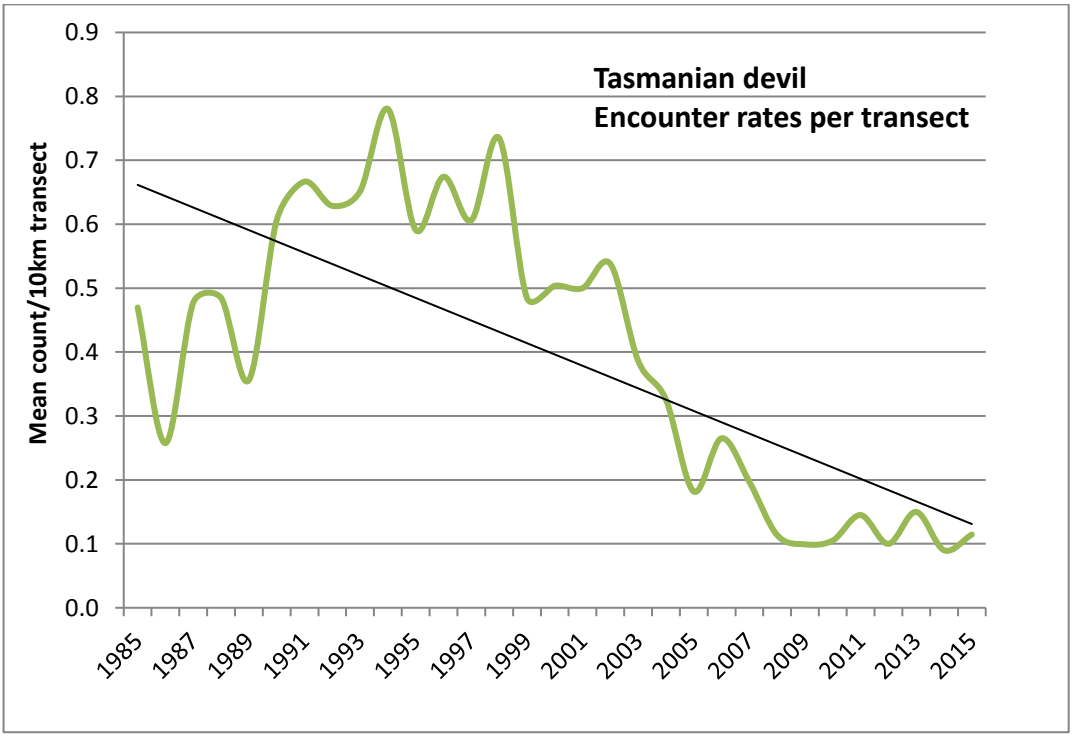

Figure 1.2.c.5 Tasmanian devil encounter rates per transect

Tasmanian devils

Devil Facial Tumour Disease (DFTD) has been confirmed in Tasmanian devils across more than 80% of Tasmania's mainland (Figure 1.2.c.6), and has been demonstrably linked to a decline in the population over the past twenty years (Hawkins et al. 2006). This cancerous

disease (Loh et al. 2006) takes the form of tumours on the head of the devil, which may spread to other parts of the body. Death occurs within months of the first signs of the disease.

The cancerous cells are themselves the agent of infection (Pearse and Swift 2006); no viruses or other disease agents have been identified, despite extensive investigation. While wildlife diseases rarely cause extinction, there is as yet no evidence to suggest that Devil Facial Tumour Disease will not continue to spread across Tasmania, or that populations can recover once infected. To date, Tasmanian devils still exist throughout the mainland of the state, in all rural habitats. No local extinctions have yet been detected. However, a 97% population decline has occurred in some areas where DFTD signs were first reported. The first clear indications of the impact and wide distribution of DFTD emerged in 2003. The Save the Tasmanian Devil program was established in 2004 in response.

A conference of national specialists was organised in Hobart in 2003 to consider the conservation of the devil. It resulted in a strategic plan that has since guided the Save the Tasmanian Devil Program[12]. The strategic plan identifies three key objectives that collectively describe the conditions necessary for achieving the plan's long term vision of '*an enduring and ecologically functional population of Tasmanian devils in the wild in Tasmania*'.

The objectives are to:

- maintain the genetic diversity of the Tasmanian devil population
- maintain the Tasmanian devil population in the wild
- manage the ecological impacts of a reduced Tasmanian devil population over its natural range.

Through the implementation of a diverse range of actions over the period, considerable progress has been made towards these objectives by the Save the Tasmanian Devil Program, including translocations of captive and wild bred devils back into the wild.

The genetic diversity of the Tasmanian devil has been maintained primarily through a captive breeding 'insurance' population. This exceeded 500 at the end of the period, including animals in free range enclosures which have been established to support the captive population in zoos and wildlife parks. A significant component of the Save the Tasmanian Devil Program is to conduct and support scientific research into DFTD and devil ecology in order to better manage both the disease and devils.

Significantly, devils have recently been shown to have a competent immune system, and yet they do not seem to mount an immune response against DFTD. This possibly indicates that Devil Facial Tumour Disease is able to avoid being detected by the devil's immune system – which has implications in the search for developing a vaccine against the disease.

Devils in populations infected with DFTD have been found to reproduce at a younger age. Further research on free-living devils has demonstrated that the animals become increasingly inbred within a few generations of DFTD arriving in a population, probably as a result of reduced dispersal of devils.

There are multiple strains of DFTD across the state. The tumour itself is rapidly evolving and diversifying.

[12] http://www.tassiedevil.com.au/tasdevil.nsf

Devil populations across Tasmania are being monitored to determine how far the disease has spread and the impact that it is having on affected populations.

The spread of the disease across Tasmania is measured annually by detecting the disease front – the point at which disease is first detected in healthy populations. The disease, having started in the north-east corner of the state, has continued to spread west and south and now affects more than 70% of the state. Sightings of devils in DFTD-infected areas have generally decreased by 85% and at the original site of infection sightings have decreased by 97%. However, there has not been any local extinction reported.

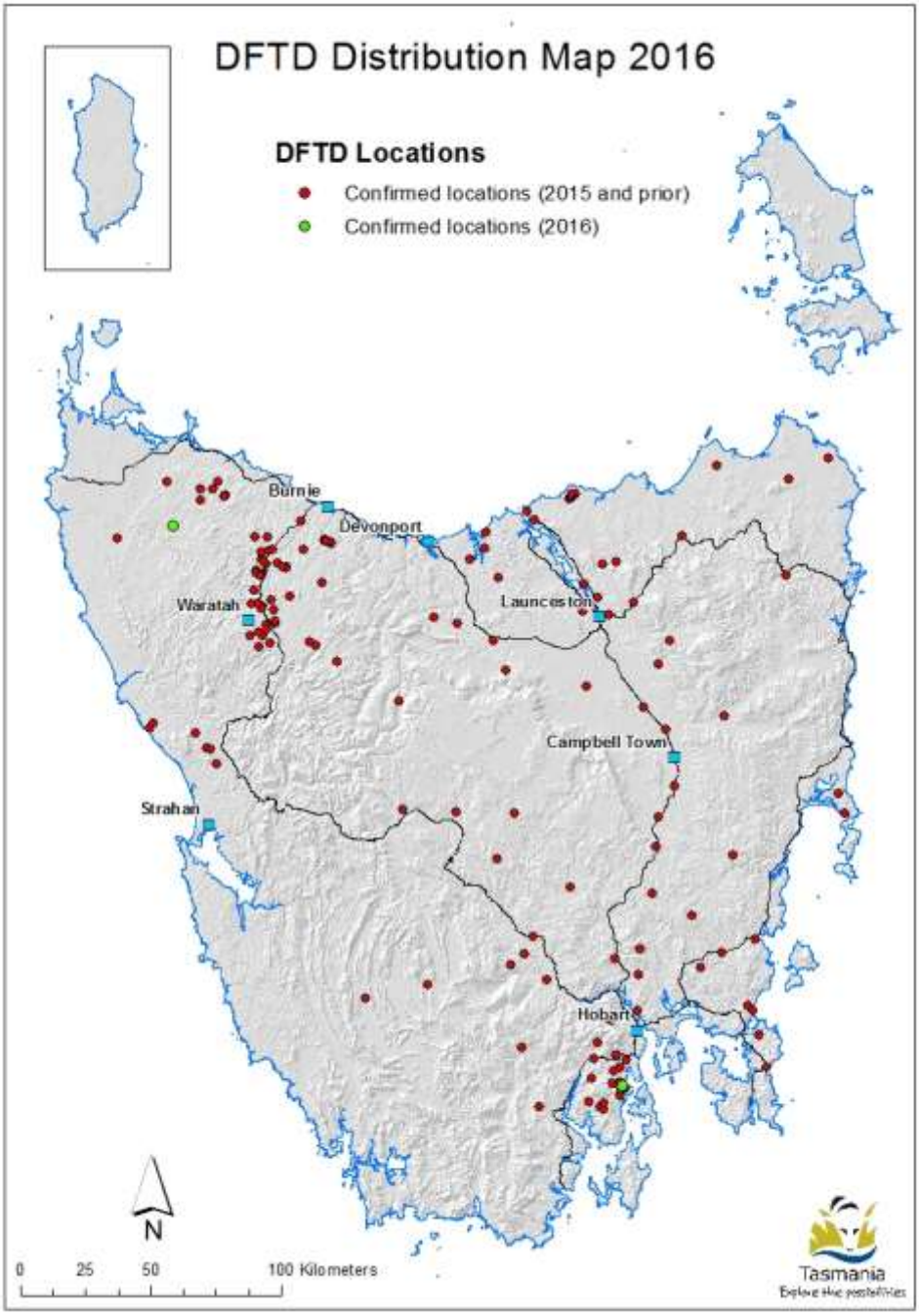

Figure 1.2.c.6 Devil facial tumour disease distribution in 2016

By December 2016, Devil Facial Tumour Disease was confirmed in Tasmanian devils across more than 70% of the Tasmanian mainland (Figure 1.2.c.6).

Other mammals

As described above, DPIPWE is carrying out ongoing monitoring of populations of various non-threatened mammal species, as well as of the Tasmanian devil population. Additionally, one University of Tasmania PhD study included habitat modelling for the spotted-tailed quoll (Troy 2014). The findings have been incorporated into the management actions recommended by the Forest Practices Authority. Troy (2014) provided a population estimate for the spotted-tailed quoll of 5691 individuals (but with large confidence intervals of 1612-14632, so that this estimate itself cannot be used as a baseline for comparison). No evidence for the New Holland mouse has been detected in Tasmania since a hair sample in 2009, but in 2016 DPIPWE initiated a new survey effort.

Birds

Recovery teams for the orange-bellied parrot, swift parrot and the forty-spotted pardalote have met during the reporting period.

The orange-bellied parrot breeding population is counted precisely each year, with monitoring and conservation work in Tasmania currently managed by DPIPWE.

The Australian National University has also built on DPIPWE and the FPA's earlier work on swift parrots, improving on habitat models and developing indicators which will eventually allow the detection of population change (Webb et al. 2014). The Forest Practices Authority has incorporated this information in its recommended management actions to mitigate the impacts of forest practices. Information on population size is approximate, due to the highly variable movements of swift parrots from year to year, but the best current estimate is 'considerably less than 2000 birds' (Threatened Species Scientific Committee, 2016). New information on the severity of threats (Heinsohn et al. 2015), in particular nest predation by sugar gliders, has resulted in the species being uplisted to Critically Endangered under the EPBC Act. (Threatened Species Scientific Committee, 2016).

The Australian National University has also provided new information on threatened forty-spotted pardalotes. A PhD study (Edworthy 2016) supported a population estimate similar to that made by Bryant (2010) of 1500 individuals. Bryant's work had indicated an approximate decline of 60% since an earlier estimate 17 years previously, which was thought most likely to have been driven by prolonged drought, resulting in habitat deterioration; a decline in food resources such as lerps, reduction in white gum health and consequent increases in competing species. Edworthy (2016) also identified a native ectoparasitic fly (*Passeromyia longicornis*) as a major source of nestling mortality. Genetic work suggested a possibility that forest fragmentation on Bruny Island (home to approximately one third of the population) might constrain dispersal and population gene flow (Edworthy 2016). The Australian National University is continuing to monitor this species and study its potential threats. Any new information which is relevant to forest management is used by the FPA and DPIPWE to inform continual improvement of management recommendations delivered through the Tasmanian forest practices system.

No changes to the population estimate for the wedge-tailed eagle have been made in this reporting period (2011–2016), as no new data have become available. The most recent estimate was 1000-1500 birds (DPIPWE, Threatened Species Section, 2006), derived from an estimated 426 territories of which approximately 50% were occupied each year, and

representing 86% of the estimated pre-European settlement population (Threatened Species Section, 2006). DPIPWE and collaborators are now beginning work to develop a citizen science project to monitor wedge-tailed eagle population changes and, if possible, gauge population size.

In 2007 the FPA and DPIPWE established a research and monitoring program to assess if the current management approach was effective in mitigating any adverse effects of forestry activities on breeding eagles. This program includes eight years of annual monitoring of up to 100 nests located around the state, a University of Tasmania honours study (O'Sullivan, 2014) investigating disturbance impacts, and a University of Tasmania PhD study investigating habitat needs and causes of mortality of sub-adult eagles and the impacts of disturbance on breeding success. The annual nest monitoring for the period 2010–2014 indicates a consistent trend of between 20-30 percent of 'successful' nests each year (see Table 1.2.c.1). No 2015 or 2016 data were available at the time of publication of this report.

Table 1.2.c.1 Nest activity of Tasmanian wedge-tailed eagles 2010–14 (numbers in brackets indicate percentage of nests for that category)

	Breeding season					
Nests	**2010**	**2011**	**2012**	**2013**	**2014**	**Average**
Successful	24 (20)	25 (18)	49 (29)	39 (23)	43 (15)	36 (21)
Not active	99 (80)	116 (82)	119 (71)	133 (77)	236 (85)	141 (79)
N=	**123**	**141**	**168**	**172**	**279**	**177**

Not active *– No obvious signs of nesting attempt, i.e. no recent addition of nesting material*

Successful *–- a chick older than three weeks of age was observed in a nest or a fledgling seen in the territory (usually with parents) or evidence (whitewash or prey remains and down) from the nest strongly indicates that fledging was successful.*

The information gathered so far provides some insight into the adequacy of the management approach applied to mitigate impacts of forest practices. The extreme sensitivity of the birds during the early breeding season (O'Sullivan 2014) confirms the need for effective management. While the results indicated that nest reserve design and exclusion zones were effective (Koch et al. 2012), there was information to suggest that the management constraint period and the timing of nest searches and nest inspections may not be sufficient to minimise disturbance to breeding birds.

This resulted in adjustments being made in 2014 to the management recommendations which govern forestry activities during the breeding season. The season is now recognised as starting earlier than previously thought, and there are allowances made for variation in the timing of the breeding season between years. Nest survey techniques have been improved to reduce risk of errors or disturbance to nesting eagles. Overall these adjustments are anticipated to further reduce the impacts of forestry on eagle populations, particularly in terms of allowing eagles to re-use nests each year, resulting in a lower energetic cost of breeding and thereby an increase in overall production of young.

An Australian National University study has established baseline information on the King Island scrubtit population using a repeatable monitoring methodology (Webb et al. 2016). The species was already listed as Critically Endangered, but the authors identified its population size to be smaller than previously assumed, and suggested that there may be fewer than 50 mature individuals remaining. The study found ongoing loss, fragmentation and degradation of

this species' habitat, and also identified previously unrecognised threats in the form of acid sulfate soils, macropod browsing and wind-throw.

A University of Tasmania PhD study supported by the Forest Practices Authority created a habitat model for the threatened Tasmanian masked owl (Todd 2012), and identified possible habitat features that may limit the distribution and abundance of the species. The findings were incorporated into the Natural Values Atlas and the management recommendations delivered through the Tasmanian forest practices system.

Amphibians

DPIPWE has developed a habitat model for two threatened frogs - the green and gold frog and the striped marsh frog (Philips et al. 2010). The range of the green and gold frog was found to have contracted by approximately 50% from 'pre–1995' records to 'current' (2008–2010), with drought suggested as the main cause. It has also been suggested that the endemic Tasmanian tree frog may decline significantly in future due to its high susceptibility to chytrid disease (Voyles et al., 2014).

Fish

Three species of threatened fish (Arthurs paragalaxias, saddled galaxias and Clarence galaxias) are monitored by the Inland Fisheries Service, such that gross population changes would be detected in terms of catch per unit effort; no overall declines or increases have been detected over the reporting period. Additionally, presence/absence surveys for the swan galaxias have indicated the loss of the species from some lakes; this is thought to relate to the dry period, floods and invasions of the climbing galaxias. Recently, additional populations of Arthurs paragalaxias have been located, increasing the extent of occurrence for this species.

Invertebrates

Habitat models for keeled snail, Mt Mangana stag beetle, Simson's stag beetle, giant velvet worm, giant freshwater crayfish and Ptunarra brown butterfly have previously been developed by the FPA and DPIPWE. More recently, FPA effectiveness monitoring surveys for keeled snail across a range of forest types were undertaken and will contribute to refinement of the species' modelling. Additionally, some progress has also been made on reviewing the habitat model for Giant freshwater crayfish in response to new information arising from the recent review of the recovery plan for this species.

Population indices have previously been calculated for burrowing crayfish (three species), cave fauna, Simson's stag beetle, and giant freshwater crayfish. Burrowing crayfish, leaf-litter invertebrates and cave fauna have been surveyed in the past, or continue to be monitored (e.g. Bornemissza's stag beetle, Miena jewel beetle) by DPIPWE to determine population trends in response to forest management at a regional and local level. Selected Ptunarra brown butterfly populations were assessed annually between 1997 and 2002, in 2005 and have continued annually from 2007 at five sites in north-west Tasmania.

Studies that contribute to our understanding of the effectiveness of actions taken for biodiversity values, in areas covered by the forest practices system, have been summarised annually since 2013 in a series of reports (Forest Practices Authority 2014, 2015, 2016, 2017).

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1.3 Genetic Diversity

This sub-criterion focuses on two distinct areas. It monitors the loss of genetic variation in forest associated species, the potential impact on species viability and conservation mechanisms that have been implemented. Secondly, it reports on the development and implementation of genetic resource conservation mechanisms for commercially important native timber species.

INDICATOR 1.3.a FOREST-ASSOCIATED SPECIES AT RISK FROM ISOLATION AND THE LOSS OF GENETIC VARIATION, AND CONSERVATION EFFORTS FOR THOSE SPECIES

Many of Tasmania's species of native flora and fauna will have lost some of their genetic variation in the course of human occupation of the state, and particularly since European settlement. Such loss has mainly resulted from clearing and modification of native vegetation for agriculture, settlement, forestry and other purposes. Other human-induced or natural events (eg wildfire, disease) may have also contributed to loss of genetic variation.

The intention of INDICATOR 1.3.a is to document the level of knowledge about species that now only occupy a small part of their former range, resulting in a greater risk that they may have lost genetic variation. There are considerable difficulties in dealing with this indicator – in part because of lack of detailed information on the past distribution of many of Tasmania's species; and lack of information on genetic variation in past and extant populations. There are also uncertainties about the effects of regulated activities on some species, let alone the impacts of less predictable events (such as the spread of DFTD affecting Tasmanian devil populations).

Analysis is focused on forest-associated species that are identified as threatened (*i.e.* listed under the Tasmanian *Threatened Species Protection Act 1995*) or otherwise of conservation interest (see APPENDIX 1.2.a:). These species are the focus of the indicator because much of Tasmania's conservation-oriented research and management has been directed towards them.

For the purposes of this indicator, the term “species” refers to the taxa as listed. In addition, following the approach adopted in reporting on INDICATOR 1.2.a, the analysis has only considered vertebrate fauna species and vascular plant species (excluding orchids – a family subject to a high degree of taxonomic change which, coupled with the ephemeral nature of most species, makes determination of extant and past distributions particularly difficult).

Knowledge of genetic variation in Tasmanian native species, and conservation measures to maintain that variation, is probably greatest in some non-threatened species which are of economic importance – the most outstanding example being the Tasmanian blue gum (*Eucalyptus globulus*). There is extensive knowledge of the patterns of genetic diversity in this species, and recently the effects of population fragmentation through agricultural clearing have been documented as well as the effect of tree genetic variation on the insect and fungal communities which are dependent on the tree.

Eucalypt species are often capable of cross-pollination within related groups. Such crossing, termed hybridisation, can result in viable hybrid offspring. Such hybrids are sometimes observed in nature or in seed collected from native trees where compatible species naturally co-occur. Hybridisation is a natural process and has played a role in the evolutionary history of eucalypts. Nevertheless, hybridisation can be problematic when the natural distribution of a species is greatly extended by human activities.

The *Forest Practices Code* has provisions to ensure that conservation of genetic resources is considered in the planning of forest practices and Flora Technical Note 12 on the Forest

Practices Authority website was developed to provide more guidance on the management of exotic gene flow. A paper published in 2016 summarises the research carried out over a ten year period which provides the biological data needed to help assess and manage the flow of genes from hardwood plantations into adjacent native forest (Larcombe et al. 2016). This paper also highlights future issues, including the need to re-assess the consequences of exotic gene flow in light of global climate change.

A recent major threat in Tasmania is the arrival of the fungal pathogen myrtle rust (*Puccinia psidii s.l*). This disease affects plants of the family Myrtaceae (which includes eucalypts) and it was detected in Tasmania in 2015. DPIPWE has formally declared Control Areas for the entire state with the aim of stopping the spread of the disease in Tasmania. Myrtle rust was diagnosed from a sample taken from a private residential property near Burnie on Tasmania's north west coast in February 2015. To date myrtle rust has been identified as affecting *Lophomyrtus*, a common hedge, screening and potted plant with common names including: Black Stallion, Red Dragon, Rainbow's End and Krinkly; and also affecting Chilean guava (*Ugni molinae*) also known as Tazziberry™. Restriction on the sale and supply of all *Lophomyrtus* and Chilean guava plants are in force to stop the spread of the disease. The declarations will continue in force until DPIPWE formally amends or revokes the notice following confirmation that *Lophomyrtus* and Chilean guava plants no longer pose a high risk to the spread of myrtle rust in the state (see also INDICATOR 3.1.a).

The threatened species in the subset included in APPENDIX 1.2.a: have been allocated to potential risk categories, on the basis of known or likely loss of habitat and continuing risk of loss of genetic variation. Such risk can be inferred by substantial reduction in range and loss of disjunct populations, but other reasons for loss of genetic variation generally cannot be so readily implied – for example, when species still occur throughout most of their range, but some populations have been reduced substantially in size, or some habitats (e.g. fertile valley flats) have been preferentially cleared while other habitats in the same area (e.g. steeper slopes) remain unmodified.

The categories of potential risk are:

- **Potential High Risk**: Priority species that appear to be at high risk from isolation and loss of genetic variation as a result of past human-induced or natural events. In most instances, these species are known or likely to:
    - have lost substantial areas of habitat or known populations, to the extent that the species is absent from a large part of its former likely range, or significant outlying populations have been lost; or
    - have important populations that are susceptible to a severe and feasible threat (e.g. *Phytophthora cinnamomi* close to a disjunct population of a highly susceptible plant species).
- **Potential Moderate Risk**: Priority species that appear to be at moderate risk from isolation and loss of genetic variation as a result of past human-induced or natural events. In most instances, these species are known or likely to have lost some habitat and known populations, but:
    - the species still occur throughout their former likely range; and
    - important populations are not known to be susceptible to a severe and feasible threat.

- **Potential Low Risk**: Priority species that appear to be at low risk from isolation and loss of genetic variation as a result of past human-induced or natural events. In most instances, these species have lost relatively little habitat and known populations throughout their former likely range, including outlying populations.
- **Unknown Risk**: There are many species that cannot be reasonably placed in one of the above categories. This is mainly because of inadequate information on past or current distribution or threats. Some of these species have only been described in the last few years. These species have not been allocated to High, Medium or Low Risk categories.

It should be noted that some species (particularly plant species) which are classified as Endangered or Vulnerable on Schedules of the Tasmanian *Threatened Species Protection Act 1995* have not been allocated to High Risk or Moderate Risk categories. Many of these species have localised ranges and small populations, but these do not appear to have been adversely affected by past human activities or natural causes, and there is currently a low risk from such events in the immediate future.

It should also be noted that there were difficulties in ascribing a category of genetic risk to some widespread and migratory animal species [mostly birds, such as the swift parrot (*Lathamus discolor*)], which have clearly suffered large population declines since European settlement (and hence loss of genetic diversity) but probably occur across most of their former range. Such species have been allocated to High or Moderate Risk categories.

Results of the analysis are shown separately for fauna and flora species in APPENDIX 1.3.a: and are summarised below in Table 1.3.a. Results for High Risk and Moderate Risk categories have been combined in the table, because the division between species attributed to these two categories is not as clear-cut as the division between Moderate Risk species and Low Risk species.

It is difficult to take account of the short and long-term effects of uncertain or unpredictable events (stochastic or otherwise) on most of the species considered in this analysis, but dramatic reductions in genetic variation in susceptible species could result from some events – they include occurrence of floods, fires at suboptimal intensities, seasons or frequencies; introduction of serious disease or pests [eg *Phytophthora cinnamomi*, myrtle rust (described above), bumblebee (*Bombus terrestris*), European wasp (*Vespula germanica*) and European red fox *(Vulpes vulpes)*] into disease- or pest-free locations; and large-scale geomorphic or climatic events causing disruption to localised populations. The latter could include climatic change associated with global warming, which has the potential to adversely affect small or disjunct populations (eg through effects on pollinator-plant interactions; changes in weather and fire patterns). Such situations have not been incorporated into the analysis for INDICATOR 1.3.a, but it is reasonable to suggest that the species that may be most adversely affected by such scenarios are species that are classified as Endangered or Vulnerable (see INDICATOR 1.2.a and INDICATOR 1.2.b) and species that are listed under INDICATOR 1.3.a as being at High Risk of isolation and loss of genetic diversity (see APPENDIX 1.3.a:).

Formal measures to address the risk of loss of genetic variation have been initiated for many of Tasmania's threatened and priority species. They include development of Recovery Plans (which may include ex-situ breeding and establishment programs); habitat restoration and the 'Seed Safe' seed collecting program for the Tasmanian Seed Conservation Centre, in partnership with the Kew Millennium Seed Bank. Information pertaining to INDICATOR 1.2.b gives more details of programs aimed at recovery of threatened species, and protection of populations and habitat through reservation programs on public and private land.

Table 1.3.a **Forest-associated threatened and priority species potentially at risk* from isolation and the loss of genetic variation, as a result of past human-induced or natural events**

Group	Potential High to Moderate Risk	Potential Low Risk	Unknown Risk	Total
Vertebrate fauna				
Fish	5	5	0	10
Amphibians	2	0	0	2
Reptiles	0	0	2	2
Birds	7	5	0	12
Mammals	2	1	1	4
Total	**16**	**11**	**3**	**30**
Vascular Plants				
Dicotyledons	242	23	0	265
Monocotyledons	71	4	0	75
Pteridophytes	20	0	0	20
Gymnosperms	2	0	0	2
Total	**335**	**27**	**6**	**368**

* A qualitative degree of risk has been estimated for vertebrate fauna and vascular plant groups (excluding orchids) that are listed as threatened in Tasmania, or are identified as RFA Priority species. A full list of species, and their risk assessment, is given in Appendix 1.3.a.

Conservation of environmental diversity, including genetic diversity in Tasmania's forests is principally catered for in a systematic reserve system on public land, by a voluntary private land reserve system, and by management by prescription in production forests. A range of measures are delivered through the Tasmanian *Forest Practices Code* to maintain genetic interchange and generally manage genetic resources. These include a network of strips and patches of unlogged forest throughout the production landscape and management prescriptions for priority forest-associated species. These measures are implemented at multiple spatial and temporal scales through Tasmania's forest practices system.

Databases (e.g. Natural Values Atlas[13], Biodiversity Values Database[14]), planning tools (e.g. Threatened Fauna Adviser[15]) and field assessment procedures allow threatened species to be considered when forestry operations are planned and undertaken. Procedures have been agreed between DPIPWE and FPA to ensure that threatened species are taken into account when forestry operations are planned. Assessments are conducted at a strategic or landscape level, and through pre-operational evaluation of specific areas (e.g. coupes or roadlines) proposed for forestry operations. Management actions are developed to mitigate the impact of a particular activity on a species (or habitat). This may involve input from trained Forest Practices Officers, researchers and specialist staff of the FPA, DPIPWE, Forestry Tasmania, tertiary institutions and proponents of proposed activities. Availability of information to inform management decisions is discussed under INDICATOR 1.2.a.

[13] https://www.naturalvaluesatlas.tas.gov.au/

[14] http://www.fpa.tas.gov.au/fpa_services/planning_assistance/advisory_planning_tools/Biodiversity_values_database

[15] http://www.fpa.tas.gov.au/fpa_services/planning_assistance/advisory_planning_tools/threatened_fauna_advisor

The FPA produces an annual FPA and DPIPWE Agreed Procedures Report (Munks and Bell 2012, Munks and Woolley 2013, Munks and Mendel 2014, Munks and Crane 2015, 2016) which reports on the implementation of procedures for management of threatened species under the forest practices system during the preceding year.

Case studies which detail genetic attributes and risks to two Tasmanian native species, and conservation measures which have been implemented, are given below.

Morrisby's gum

Morrisby's gum (*Eucalyptus morrisbyi*) is an endangered species known from four stands in south-eastern Tasmania. Molecular studies have confirmed two of the occurrences as remnant patches of the larger stand at Calverts Hill at Cremorne – this stand comprised about 1915 adult plants in 1991. The most isolated occurrence in East Risdon Nature Reserve (80 adult plants), some 25 kilometres to the north-west of Calverts Hill, is genetically distinct. The genetic distinctiveness of the East Risdon population could be attributed to genetic drift through isolation and differing selection and hybridisation pressures. This population has developed a greater resistance to possum browsing (perhaps as a result of co-occurrence of a wide choice of eucalypt species) and due to greater edge effects may have been affected by hybridisation with surrounding species. The East Risdon population is at high risk of extinction because of stochastic risk associated with its small size and low competitive ability with surrounding species (which may be further reduced by climate change).

A *Eucalyptus morrisbyi* Recovery Plan has been developed (2004–08). A significant effort has been made to establish ex-situ holdings. Successful community campaigns have resulted in the species being preferentially replanted on rural properties and other sites in the South Arm area. Shrubs and creepers have been removed from the immediate vicinity of trees and regeneration in the reserved East Risdon stand to reduce competition to remaining trees. The largest population, at Calverts Hill, has been reserved with funding from the Private Forest Reserves Program. Seed orchards of diverse germplasm collected from both the Risdon Hill and Calverts Hill populations have been planted and seed has now been successfully collected from a planting from the small Risdon Hills population. This seed has been collected and lodged with the Tasmanian Seed Conservation Centre for long-term storage as the small population is in poor health.

Fairy lanterns

Fairy lanterns (*Thismia rodwayi*) is a subterranean plant that occurs in wet sclerophyll forests in Tasmania, the eastern state of the Australian mainland and in New Zealand. *Thismia rodwayi* was first discovered in the 1800s in Tasmania (Wapstra and Chuter 2013). Since then, it was seldom seen until the early 2000s when the species came to the attention of the Tasmanian botanical community through another sighting in the Hobart area and in a proposed logging coupe in the north of the State. The species was thought to be at risk of stochastic events, such as intensive logging, and actions were implemented to ensure the population of *Thismia rodwayi* within the logging coupe was retained within areas excluded from logging (wildlife habitat clumps), and that the effectiveness of these retained areas was monitored over the next 11 years.

Following the rediscovery in 2002, the raised profile of *Thismia rodwayi* led to an increase in the number of sightings which substantially increased the extent of occurrence and the linear range of the species. The long-term monitoring project, along with other survey work, has found that *Thismia rodwayi* persists in disturbed areas (Merckx and Wapstra 2013, Wapstra and Chuter 2013), and that management by prescription is an appropriate way to manage long-term conservation and genetic diversity of *Thismia rodwayi*.

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INDICATOR 1.3.b NATIVE FOREST AND PLANTATIONS OF INDIGENOUS TIMBER SPECIES WHICH HAVE GENETIC RESOURCE CONSERVATION MECHANISMS IN PLACE

This indicator documents the genetic resource management mechanisms put in place to maintain the range of genetic diversity of indigenous timber species used for rehabilitation or commercial purposes, and to avoid the introgression of genetic resources from plantations into native forest stands, especially of rare and threatened species. Introgression is the movement of a gene (gene flow) from one species into the gene pool of another by the repeated backcrossing of an interspecific hybrid with one of its parent species.

The RFA provides protection through the CAR reserve system, the *Policy for Maintaining a Permanent Native Forest Estate* and the *Forest Practices Code* for all indigenous timber species. The agreement remains as the principle mechanism by which the genetic composition of indigenous timber species is maintained. Seed collections of indigenous conifers and rare eucalypts are undertaken by the Tasmanian Seed Conservation Centre, based at the Royal Tasmanian Botanical Gardens. Collecting priorities for the seed bank are informed and assisted by staff of the Biodiversity and Conservation Branch of Department of Primary Industries, Parks, Water and Environment.

With respect to harvesting activities in native forests and their potential impacts on genetic composition, the *Forest Practices Code* prescribes that sites should be sown with a species composition approximating the natural canopy tree species for the site, making allowance for those species that will regenerate naturally. Seed to be sown should be collected from the stand to be felled or from the nearest similar ecological zone. Where on-site seed is not available the next option is to use seed from the same climatic and environmental zone as the site to be regenerated using the Seed Zoning Rules (Lockett 1991). Forestry Tasmania maintains records for all seed collection, storage and germination activities and actively implements the *Forest Practices Code* prescriptions in all native forest regeneration following harvest.

Indigenous plantations are dominated by plantings of *Eucalyptus globulus.* There are minor plantings of *Acacia melanoxylon* and still smaller plantings of other eucalypts such as *E. regnans* and *E. viminalis.* For plantation *E. globulus*, the National Genetic Resource Conservation Centre at Mt Gambier stores key genetic material for breeding programs. The Southern Tree Breeding Association maintains a breeding program for *E. globulus* that includes base population and advanced breeding population progeny tests on a number of sites throughout Australia (McRae et al. 2004). Here in Tasmania, Forico, Forestry Tasmania and Norske Skog maintain provenance and progeny trials. Studies of the genetic diversity in the native populations and breeding population of *E. globulus* have been under taken at the University of Tasmania and the Cooperative Research Centre (CRC) for Forestry. For plantation A. *melanoxylon* and *E. regnans*, Forestry Tasmania maintains small provenance and progeny trials on permanent timber production zone lands.

The University of Tasmania and the CRC for Forestry have maintained active research programs investigating the genetics of indigenous timber species. Research from the five year period with particular relevance to genetic resource conservation includes:

1. Gauli et al. (2014) assessed seed genetic composition and yield from populations of *E. pauciflora* in fragmented habitats and concluded that, while seed yields from highly fragmented populations were reduced, in most cases the seed obtained was unlikely to be more inbred than that from non-fragmented populations and thus likely to be as suitable for use in local forest restoration.

2. Gosney et al. (2014) assessed the composition of fungal and arthropod communities dependent on two highly differentiated populations of *E. morrisbyi* and established the existence of highly significant differences in community composition, abundance and diversity parameters. These results emphasized the importance of maintaining the populations of this rare species as separate management units, as not only are the populations highly genetically structured, this variation may alter the trajectory of biotic colonization of conservation plantings.

3. Harrison et al. (2014) investigated the role of provenance, seed treatment and seed mass in determining the seed germination success of *E. ovata*. They found that provenance rather than a pre-treatment determines germination success of *E. ovata* seed, but these provenance differences are not predictable and that selection of heavier seeds may increase germination success in the nursery and in direct seeding applications.

4. Larcombe et al. (2014a) assessed the likelihood of gene flow from *E. globulus* to *E. ovata*. They concluded that, while cross-pollination risk is high in small remnants and edge trees, low hybrid fitness makes genetic introgression unlikely. They also identified a low potential for *E. globulus* seedling incursion.

5. Larcombe et al. (2016a) investigated the potential for successful hybridisation between *E. globulus* and *E. nitens*. They found strong mechanical barriers that limit hybridisation. Furthermore intrinsic post-zygotic barriers due to additive inheritance limit hybrid success and maintain species boundaries at zones of secondary contact.

6. Larcombe et al. (2016b) investigated the potential for successful hybridisation between *E. nitens* and a range of indigenous eucalypts. They found that early-acting pre-zygotic barriers had a strong isolating effect, while post-zygotic barriers, affecting early-age hybrid growth and survival, contributed little to reproductive isolation.

7. Larcombe et al. (2013) assessed the invasive potential of *E.globulus* by quantifying plantation wildling establishment in native forests. They found 98% of wildlings occurred within 10m of plantation edges and that wilding establishment rates increased with higher rainfall, lower and mean annual temperatures and later plantation age. They recommended ongoing monitoring as a management prescription given the high spatial variability of the phenomenon.

8. Larcombe et al. (2014b) developed an efficient approach to detecting exotic hybrids between plantation and native eucalypts.

9. Potts et al. (2016) assessed the relative importance of phylogenetic history, habitat, endemism, and range size in predicting susceptibility of indigenous eucalypts to the exotic pathogen *Puccinia psidii* (myrtle rust or guava rust). They found that a significant proportion of the variation in host species susceptibility was explained by phylogenetic history, while factors such as habitat, endemism and range size had no detectable effect. The results highlighted the need for broader resistance screening within and between populations of species of high conservation or economic value.

10. Sakaguchi et akl. (2014) developed nuclear and mitochondrial microsatellite markers to facilitate investigation the speciation and hybridisation processes in the *Athrotaxis* genus, the species' range-wide genetic structure and diversity, and the importance of clonality in maintaining current populations.

11. Yeoh et al. (2013) reconstructed the demographic history of five genetically distinct populations of *E. globulus* at the species and regional levels. Evidence of population

growth throughout the Quaternary signals the ability of the species to persist and thrive under harsh conditions and highlights the need for local demographic history to be taken into account when inferring local adaptation for candidate genes in plant breeding.

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CRITERION 2: MAINTENANCE OF PRODUCTIVE CAPACITY OF FOREST ECOSYSTEMS

INDICATOR 2.1.a NATIVE FOREST AREA AVAILABLE FOR WOOD PRODUCTION, AREA HARVESTED, AND GROWING STOCK OF MERCHANTABLE AND NON-MERCHANTABLE TREE SPECIES

This indicator is a measure of the capacity of native forests to meet the market for wood products. Its purpose is to summarise changes in the area of land available for timber production over time.

The native forest area available for timber production is essential to the calculation of the sustainable yield. This is the best available estimate of the area of native forested land that is likely to be harvested now or at some time in the future.

Maintaining an adequate land-base for timber production is an important component in meeting Tasmania's Regional Forest Agreement (RFA) commitment to sustain a minimum level of high-quality sawlog production. Under the RFA the state is obliged to review the sustainable level of high-quality sawlog production from public land every five years. Prior to the *Tasmanian Forest Agreement Act 2013* the *Forestry Act 1920* s.22AA required that each year from multiple use forest land (otherwise known as State forest) Forestry Tasmania must make available for the veneer and sawmilling industries a minimum aggregate quantity of eucalypt veneer logs and eucalypt sawlogs that met prescribed specifications. The minimum aggregate quantity was set at 300 000 cubic metres. The RFA also stipulated yields of special species timbers to be made available to industry, including up to 10 000 cubic metres of blackwood. The *Forest Management Act 2013* s.16 has re-set a minimum aggregate quantity of eucalypt veneer logs and eucalypt sawlogs, from permanent timber production zone land to be made available to industry at 137 000 cubic metres per year.

The source of information on the area potentially available for timber production on public land is Forestry Tasmania's mapped provisional coupes. Provisional coupes define potential harvest operation boundaries by removing areas where logging is not allowed or is highly unlikely. In the first category are formal and informal reserves. In the second are areas restricted by, for example, *Forest Practices Code* provisions, inaccessibility, uneconomic forest, silvicultural limitations, and logging constraints.

The area of private forest land potentially available for timber production is not mapped and therefore is not able to be reported (Table 2.1.a.1). Because the discounting process used to adjust the private forest resource availability estimates is not specifically area-based, it is not possible to provide a meaningful net area estimate. For private forests, in addition to area discounts, applied due to *Forest Practices Code* or other constraints, the most significant discount to be applied results from 'owner intent', which varies from year to year and must be determined by periodic survey. Hence predicting the potential forest estate available for timber production in a reliable way is problematic.

As shown in Table 2.1.a.1 the area of native forest potentially available for timber production on public land at 30 June 2016 is 376 000 ha, down from 563 000 ha in June 2011. Public native forest land potentially available for timber production has decreased by about 33% over the last five years. While changes to *Forest Practices Code* requirements and assessments that some forest cannot be physically or economically harvested explain a small component, most of this change arises from the enactment of the 2013 legislation. The gross forest area on both private and public lands has changed very little from the previous reporting period.

Table 2.1.a.1 Gross native forest area and net native forest area available for wood production by tenure as at 30 June 2016 (hectares, in '000s)

Tenure	Gross native forest area	Net native forest area
Public	2213	376
Private	840	Not available

The area of native forest harvested on public land varies from year to year (Table 2.1.a.2). This activity is driven by sustainable sawlog supply, market conditions and silvicultural prescription. This area includes clearfell, selective harvesting and thinning operations. The area of public land harvested was at an historic low at the start of the reporting period but had doubled by the end of the reporting period. By 2015–16 the harvest area was still just under half the yearly average recorded over the previous reporting period (11 200 ha per year from 2006–11).

Table 2.1.a.2 Native forest area harvested by tenure (hectares, in '000s)

	Area harvested					
Tenure	**2011–12**	**2012–13**	**2013–14**	**2014–15**	**2015–16**	**Average**
Public	2.4	3.8	3.1	4.6	4.9	**3.8**
Private			NA			

A surrogate for native forest area harvested is the area of native forest approved for harvesting each year, as indicated in certified forest practices plans (Table 2.1.a.3). This dataset is held by the Forest Practices Authority and includes both public and private land tenure. However, it is important to note that actual native forest area harvested is likely to be less than the planned area, and may occur in subsequent years. The area approved for harvest each year on public land varied little from year to year and the average area approved for harvest each year was less than half the average reported over the previous reporting period (12 400 ha per year from 2006–11).

Across all tenures, the average number of ha of native forest approved for harvesting under forest practices plans annually during 2011–16 (7800 ha) was less than one third of that reported in the previous reporting period (26 300 ha).

Table 2.1.a.3 Native forest area approved for harvesting by tenure (hectares)

	Area approved (ha)				
Tenure	**2011–12**	**2012–13**	**2013–14**	**2014–15**	**2015–16**
Public	5379	4234	5783	4309	4516
Private	1888	2265	3557	4839	2230
Total	**7267**	**6499**	**9340**	**9148**	**6746**

INDICATOR 2.1.b AGE CLASS OF PLANTATIONS

This indicator provides a statewide summary of the progress of plantation establishment of native and exotic species over time. An increase in the size and quality of the plantation estate is a significant element in the longer-term sustainability and growth of the forest industry in Tasmania. The Tasmanian Regional Forest Agreement (RFA) lists a number of plantation expansion actions under clauses 14, 15, and 16 of Attachment 12. The expected contribution of plantations to sustainable high quality eucalypt sawlog supply from State forest is addressed independently in the review required by Clause 98 of the RFA.

Table 2.1.b.1 reports plantations in five-year age-classes at an aggregated state level.

This area information is a compilation of GIS data layers contributed by the large forest growers, and independently collected data for the smaller private growers.

A range of species, particularly eucalypts, is planted in Tasmania. However, as the industry has developed, plantations are growing a narrower range of species: the softwood resource is dominated by *Pinus radiata*, while *Eucalyptus nitens* and *E. globulus* dominate the hardwood resource. *E. globulus* is the favoured pulping species, but it grows only in relatively frost free sites. *E. nitens* is the preferred alternative in exposed, frosty or high-altitude sites and is the more widely planted species.

Table 2.1.b.1 Area of Tasmanian plantations in five-year age classes as at 31 December 2015 (hectares)

Age Classes	Hardwood plantations (ha)	Softwood plantations (ha)
Unknown	1 800	100
Pre–1976	1 400	1 700
1976–80	300	1 300
1981–85	700	1 600
1986–90	2 400	5 500
1991–95	10 000	10 100
1996–00	38 300	16 200
2001–05	63 100	14 600
2006–10	99 000	16 700
2011–15	7 000	7 200
Total	224 000	75 000

Table 2.1.b.2 indicates the change in area of plantation since 2001. In line with Australia-wide trends, until the most recent reporting period the area of hardwood plantations increased at a rapid rate. However, the extent of this hardwood plantation estate in Tasmania peaked in about 2008, at the height of Managed Investment Schemes (MIS) and thereafter new plantings have been very small.

In contrast, the area of softwood plantations in Tasmania has remained fairly static to date.

Table 2.1.b.2 Plantation Area Trends 2001–16 (hectares)

Reporting Year	Hardwood plantations	Softwood plantations
2001	117 600	80 400
2006	158 900	71 500
2011	233 200	75 600
2016	224 000	75 000

The main trends evident are:

- The expansion in hardwood plantation establishment continued during the 2006–11 period, increasing in area by 47% or about 74 300 ha, but then decreased by 4% or about 9200 ha during 2011–16.
- The area of softwood plantation, increased slightly in area during 2006–11 by 6% or 4100 ha, and then marginally decreased by less than 1% during 2011–16.

INDICATOR 2.1.c ANNUAL REMOVAL OF WOOD PRODUCTS COMPARED TO THE VOLUME DETERMINED TO BE SUSTAINABLE FOR NATIVE FORESTS AND FUTURE YIELDS FOR PLANTATIONS

This indicator summarises the outcomes of timber harvesting activities for the fourth Tasmanian Regional Forest Agreement (RFA) five-year review period. Strategies for managing public and private timber resources were either in place during the RFA or amended subsequently. These harvesting outcomes are compared with sustainable cut levels to indicate progress of the strategies. Data for the period 2011–16 are presented in Table 2.1.c.1 . Clause 98 of the RFA commits the state to five-yearly reviews of the sustainable supply of high quality sawlogs from public land. This review is reported independently of this report.

Public land

The sustainable cut from public land is based on making available a minimum legislated high quality eucalypt sawlog supply. Prior to enactment of the *Tasmanian Forest Agreement Act 2013* the minimum volume made available to industry was set at 300 000 cubic metres per year. After enactment of the 2013 legislation the minimum volume to be made available to industry was set at 137 000 cubic metres per year. Pulpwood supply arises from meeting these sawlog commitments.

Over the period 2011–16, the sustainable eucalypt sawlog cut for public land was initially based on the revised strategy developed to satisfy Clause 98 of the RFA (Forestry Tasmania 2007). The strategy was to continue an accelerated sawlog cut in the short term, up to 320 000 cubic metres per year, to support the aims of the Forestry Growth Plan, including new downstream processing and intensive forest management. After enactment of the 2013 legislation the strategy was to limit the sawlog cut to a sustainable yield that had been revised to the new lower figure that reflected the reduced resource available for wood production. On public land, the cut of all native forest wood has decreased markedly since 2010-11. As a result, the total cut of eucalypt sawlogs for the period was below the legislated minimum volumes to be made available. Factors affecting the total cut included lack of market demand and the collapse of the export woodchip market in the south of the state with the closure of the Triabunna woodchip export facility that led to reduced harvesting activity in this area.

The cut of special species sawlogs (blackwood, celery top pine, myrtle, Huon pine and sassafras) is relatively small and averaged 10 000 cubic metres each year during the reporting period. This represents a drop of 5 000 cubic metres from the previous reporting period and reflects the reduction in resource availability due to the enactment of the *Tasmanian Forest Agreement Act 2013*. The timber was obtained from selective harvesting of Special Timber Management Units, harvesting blackwood swamps and salvaging individual trees in eucalypt sawlog harvesting coupes.

Wood production from eucalypt plantations has been a small proportion of the public land cut, although in the last two years of the reporting period the pulpwood volumes rose markedly as thinning activity increased.

Softwood plantation wood production has remained relatively static over the period. The age-class structure of the softwood plantations limits the opportunity to increase the cut in the medium term.

Private land

The 1 029 000 ha of forest on private land consist of native forests and plantations. Native forests are largely owned and managed by individual private landowners whereas plantations are largely owned and managed by industrial forestry companies. The total private-forest resource, in both spatial and product terms, will vary as forest is harvested and reforested or converted to agricultural uses, and as agricultural land is converted to plantations. Because of these variations, most of the production from private land in the medium to long-term is likely to be based on planted forests.

The last wood resource review for private forests was published by Private Forests Tasmania in 2005. From a native forest perspective these resource estimates are now considered to be unreliable as significant areas of private native forest have been withdrawn from wood production for conservation reserves and carbon sequestration projects. In addition, considerable areas of private native forest have been converted to plantation during the active MIS era further reducing the estate. The total annual harvest levels have continued to fall considerably over the last few years due to lack of market demand and the collapse of the export woodchip market in the south of the state with the closure of the Triabunna woodchip export facility. Prior to this time the opposite trend was evident and it is expected that the historical trend of increasing private cut will be re-established as the private hardwood plantation estate becomes fully productive.

Private Forests Tasmania collates annual private forest removals of wood products through a comprehensive survey of the processors in Tasmania.

Individual private forest owners' intentions vary and are not able to be detailed over time to develop a similar sustainable sawlog yield as for public land. However, wood flow estimates based on the results of owner surveys and modelling work have provided a continuing yield estimate for the past five years that has indicated an ongoing supply of sawlog from private native forests. Current harvest returns indicate potential total annual wood flows of the order of 1 500 000 cubic metres for plantations and native forest.

The annual average level of softwood plantation harvest has been 272 000 cubic metres for the period (Private Forests Tasmania 2016).

Table 2.1.c.1 Annual removal of wood on public and private land (pulpwood in '000 tonnes and all other products in '000m^3)

	Public Land						Private Land					
SALES CATEGORY	**2012**	**2013**	**2014**	**2015**	**2016**	**Avg.**	**2012**	**2013**	**2014**	**2015**	**2016**	**Avg.**
NATIVE FOREST												
Estimated sustainable cut eucalypt sawlog and veneer log	320	320	137	137	137	**NA**	NA	NA	NA	NA	NA	
Actual cut eucalypt sawlog and veneer log	110	121	128	120	127	**121**	29	21	12	11	62	**27**
Actual cut Pulpwood	796	633	643	635	725	**686**	105	57	76	80	107	**85**
Actual cut Special species timbers sawlog	12	11	9	11	8	**10**	NA	NA	NA	NA	NA	
EUCALYPT PLANTATION												
Sawlogs and veneer	0	0	0	0	0	**0**	0	1	0	37	72	**23**
Pulpwood	61	144	262	342	223	**206**	253	221	820	910	1720	**785**
SOFTWOOD PLANTATION												
Sawlogs and veneer	341	416	426	465	468	**423**	25	19	33	21	28	**25**
Pulpwood	359	288	304	284	279	**303**	226	311	228	211	257	**247**

Notes: *NA – not available. Excludes minor log products. Figures for sawlogs and veneer from private land reflect conversion from reported tonnes to cubic metres using a 1:1 conversion factor.*

The key points to note are:

- On public land the actual average eucalypt sawlog harvest from native forest for the period is below the determined sustainable yield each year. In the first two years of the reporting period the cut was less than half that sustainable yield. The average cut of pulpwood over the period was less than a third of the 2 156 000 tonnes cut in the previous reporting period. The cut of both sawlog and pulpwood was relatively stable over the reporting period.
- On private land there is no sustainable sawlog cut determined; predicted sawlog yields are based on historical actual production. The cut over the first 4 years of the reporting period was very low. The average cut from private native forest in the previous reporting period of 49 000 cubic metres was only exceeded in 2015-16. The cut of pulpwood was more consistent, but very low in comparison to the previous reporting period. The average pulpwood cut dropped to less than 11% of the average cut reported in the previous reporting period (789 000 tonnes)
- On public land there was no sawlog or veneer cut from eucalypt plantation. Pulpwood yields rose over the period. The average yield exceeded that of 158 000 tonnes recorded in the previous reporting period.
- For eucalypt plantations on private land the sawlog and veneer yield rose rapidly in the last two years to reach an average that exceeded the 9 000 cubic metres recorded in the previous reporting period, presumably due to the export of small peeler logs rather than sawlogs processed domestically. The pulpwood yield was very low except for the final year. On average the pulpwood yield was lower than the 914 000 tonnes reported in the previous period.
- On private land softwood sawlog and veneer yield was consistent, except for a slight drop in the first year.

Previous reports include projected long term woodflow from plantations. They are not reported here. Rapid changes to the resource ownership structure and management objectives over the five year period make long term projections highly speculative and potentially misleading.

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INDICATOR 2.1.d ANNUAL REMOVAL OF NON-WOOD FOREST PRODUCTS COMPARED TO THE LEVEL DETERMINED TO BE SUSTAINABLE

This indicator recognises that forests are sources of non-wood products, including for use by Tasmanian Aboriginal people, and that it is important to monitor the level of use and, where practical, assess whether that level is sustainable. The values, quantities and use of non-wood forest products are reported on in

INDICATOR 6.1.b .

While there are some statewide data for this indicator available on removal of non-wood products, the data on sustainable yields of these products are very limited. The different levels of available data reflect market driven responses where demand for particular non-wood products determines what, if any, monitoring systems are developed.

There are no data available on resources collected or used for Tasmanian Aboriginal cultural activities. One example of such collection occurred in 2014, when the bark of 3 paperbark trees was harvested in the Circular Head region by an Tasmanian Aboriginal organisation for the construction of a bark canoe. The group liaised with Forestry Tasmania and the Forest Practices Authority prior to harvesting the bark. The canoe was then used as part of the Dark Mofo winter celebration of the arts in Hobart.

The Aboriginal Access to Traditional Materials Policy (Forestry Tasmania) provides the principles by which Forestry Tasmania manages access to materials which may be of important significant traditional value to Tasmanian Aboriginal people. Under this policy, and in collaboration with the Aboriginal community, Forestry Tasmania aims to:

- Proactively respond to requests from Aboriginal people for access to land and traditional materials (which may include but are not limited to: bark, basket weaving material, wood for spears and clap sticks, ochre, and stones)
- Work with Aboriginal people to identify areas within the permanent timber production zone land that are suitable for collection of traditional materials or use
- Collaborate with Aboriginal people in the collection of materials to educate Forestry Tasmania staff about traditional materials and to ensure a safe environment for all on permanent timber production zone land by compliance with visitor safety and environmental procedures
- Provide key contact points within Forestry Tasmania to facilitate these processes.

Honey

Honey production is dependent on seasonal conditions which determine flowering productivity. The sustainable yield of honey production from forests has not been determined.

Tasmania's honey industry encompassed 215 registered beekeepers in 2015-2016, of which 7 were considered commercial operators. (See also

INDICATOR 6.1.b). The majority of honey produced is sourced from leatherwood forests in north-west, south-west and south-east Tasmania. Most highly productive sites are located in public forests, including the Tasmanian Wilderness World Heritage Area.

Table 2.1.d.1 reports data relating to beekeepers operating on State forest (through 2013) and permanent timber production zone land (2014 onwards) managed by Forestry Tasmania. Table 2.1.d.2 reports data relating to beekeepers operating on land managed by PWS. The total number of hives reported by PWS and Forestry Tasmania is 21 782, almost two thousand more than the total number of registered beehives in Tasmania (DPIPWE: see Table 6.1.b.1). This is due to hive registration not being compulsory, although this may change with imminent changes to biosecurity legislation.

Table 2.1.d.1 Apiary sites, hives and honey production on State forest (through 2013) and permanent timber production zone land (2014 onwards)

Year	Number of sites	Number of hives	Honey production (kg)
1996–97	343	12 607	na
1997–98	334	12 311	na
1998–99	337	12 332	na
1999–00	334	12 317	na
2000–01	322	11 212	na
2001–02	319	12 092	na
2002–03	323	12 013	698 054
2003–04	323	11 880	395 256
2004–05	325	12 534	406 121
2005–06	304	12 376	369 180
2006–07	289	12 300	670 539
2007–08	268	12 186	671 207
2008–09	303	9 583	210 061
2009–10	389	11 262	548 736
2010–11	422	10 662	214 942
2011–12	384	13 573	482 006
2012–13	421	16 477	na
2013–14	373	13 767	na
2014–15	213	7 144	na
2015–16	231	7 616	na

Source: Forestry Tasmania

na = data not available

Table 2.1.d.2 Apiary sites and hives on land managed by PWS in 2015–16

Land category	Sites	Hives
Reserved land	178	8270
FPPF & other Crown land	110	5896

Source: Parks and Wildlife Service, DPIPWE

Treeferns

The harvesting of treeferns (or manferns) (*Dicksonia antarctica*) is strictly regulated in Tasmania under the provisions of the *Forest Practices Act 1985*.

Tasmanian Treefern Tags are issued by the Forest Practices Authority. These tags must remain on the stems at all times to ensure that the origin of treeferns can be tracked to approved harvesting areas.

Harvesting of treeferns must be conducted in accordance with a management plan for the sustainable harvesting of treeferns that has been endorsed by the Australian and Tasmanian governments. Under the current management plan (Forest Practices Authority 2012) harvesting of treeferns must be covered by a certified FPP that includes a suitable prescription for treefern harvesting. Treeferns may be harvested from native forest to be converted to another land use, native forest to be intensively logged and regenerated, existing softwood and hardwood plantations, and treefern plantations or nursery sites.

It is estimated that there are over 130 million individual trunked *Dicksonia antarctica* occurring in Tasmania's forests. Table 2.1.d.3 identifies the estimated numbers of treeferns by land tenure. This figure has been derived from tree fern abundance data collected from a number of studies around Tasmania (Chuter 2003, Kilpatrick and Moscal 1987, Neyland 1991, Pannell 1992, Turner 2003). Abundance data collected in quadrats or transect samples was used to generate density estimates per hectare by wet forest type. Density estimates varied greatly and a conservative approach was taken, where the lower values of range data were used.

Table 2.1.d.3 Estimated treefern numbers by land tenure, 2016 (in '000s)

TENURE	Wet eucalypt forest	Other forest	Estimated total number of stems
Conservation and public reserves	24 950	40 673	65 623
Other publicly managed land	10 052	6 521	16 573
Permanent Timber Production Zone land	25 546	7 275	32 821
Private freehold land	12 932	3 250	16 182
Totals	**73 480**	**57 719**	**131 199**

Source: Forest Practices Authority

During the five years 2011–16, harvesting of treeferns averaged around 13 000 stems per year, a very low proportion of the estimated stems occurring in Tasmania (based on number of tree fern tags issued) (Table 2.1.d.4). The annual harvest varied over this period, but over the last four years there appears to be relatively steady demand for tree fern tags. These treeferns were salvaged from native forest converted to another land use such as forest plantations or agriculture, or intensively logged and regenerated native forest.

Table 2.1.d.4 Number of Treefern tags issued annually between 2002 and 2016

Financial year	Number treefern tags issued
2002–03	64 182
2003–04	54 886
2004–05	61 368
2005–06	45 131
2006–07	43 843
2007–08	35 361
2008–09	17 529
2009–10	19 905
2010–11	10 729
2011–12	22 177
2012–13	8 572
2013–14	8 982
2014–15	11 014
2015–16	13 086

Source: Forest Practices Authority

Treeferns rapidly recolonise coupes disturbed by harvesting. Spores are dispersed from mature treeferns retained in streamside reserves or wildlife corridors. Regenerating treeferns have a height growth rate of 3.5–5.0 cm per year indicating that treeferns can reach maturity (able to produce spores) and also a harvestable size if required in less than 30 years (Forest Practices Authority 2012). The available treefern resource combined with treefern recolonisation and growth rate knowledge indicates that current harvest levels are well within sustainable yields.

Native Seed and Flora Collection

Seeds are collected by private collectors and Forestry Tasmania principally for their own use in native forest regeneration, propagating nursery stock and the establishment of plantations.

Seed collection continues to focus on commercially important species, predominantly trees for forest plantations on public and private land and to a lesser extent to service tree planting activities of organizations such as Landcare and Greening Australia.

Seed collected on private land for commercial horticultural use is not regulated and is likely to be limited in extent. Commercial seed collectors harvesting from public land are small in number and are regulated by permits administered by the relevant public land management agency.

Data are available for seed collection from Forestry Tasmania which provides information on seed weight, origins, site details and germination capacity as standard practice. The annual quantity of seed collected by Forestry Tasmania is shown in Table 2.1.d.5.

Table 2.1.d.5 Annual collection of native tree seed by Forestry Tasmania

Year	Raw seed (kg)
1996–97	2012
1997–98	1370
1998–99	564
1999–00	1278
2000–01	1712
2001–02	2320
2002–03	4765
2003–04	3301
2004–05	3408
2005–06	3367
2006–07	4018
2007–08	3299
2008–09	5787
2009–10	7897
2010–11	4089
2011–12	1406
2012–13	402
2013–14	352
2014–15	710
2015–16	1066

Source: Forestry Tasmania

One emerging issue for forest managers is the harvesting of pepper berry (*Tasmannia lanceolata*) for commercial purposes. Such harvesting is regulated on Crown Land. Anecdotally, such collection occurs mainly on permanent timber production zone land and private land, and there is believed to have been illegal harvesting of pepper berry on former Crown land areas (M. Visoiu, DPIPWE, pers comm.).

Wildlife Harvesting

Brushtail possums, and to a lesser extent wallabies and pademelons, are primarily forest and woodland species whose densities are highest where this habitat is adjacent to agricultural land or disturbed forest.

No estimate has been made of the sustainable yield for wallabies specifically from forested areas, although a sustainable yield formula under a commercial harvest plan is calculated annually based on spotlight surveys.

There have been fluctuating markets for skins and meat over the last 20 years. The fluctuations in annual commercial harvest are shown in Table 2.1.d.6 and Table 2.1.d.7.

In addition to targeted markets, there has been control of these species where browsing of eucalypt seedlings and agricultural crops has been a problem.

Since 1985, the DPIPWE has been monitoring population levels of the brushtail possum, Bennetts wallaby and the Tasmanian pademelon. These results are reported in INDICATOR 1.2.c and Figure 1.2.c.1 . Hunting or control has not impacted on populations levels of

wallabies, pademelons or brushtail possums across Tasmania indicating that current harvesting of these species is within sustainable levels.

Table 2.1.d.6 Annual harvest of brushtail possums

Year	Commercial permits	Est. commercial harvest
1996	59	13 917
1997	35	12 364
1998	176	10 596
1999	38	11 635
2000	42	55 200
2001	22	4900
2002	40	1100
2003	17	1700
2004	47	120
2005	45	5672
2005–06	13	14 497
2006–07	14	4832
2007–08	4	1558
2008–09	7	4680
2009–10	6	1375
2010–11	12	4379
2011–12	11	4596
2012–13	10	5978
2013–14	31	13 387
2014–15	35	33 867
2015–16	75	32 945

Source: Department of Primary Industries, Parks, Water and Environment

Table 2.1.d.7 Annual harvest of wallaby meat.

Year	Commercial licences sold	Game meat produced (kg)	Non-commercial shooting*
1996	113	69 617	4956
1997	80	58 055	5926
1998	61	50 974	4989
1999	50	67 999	4646
2000	44	61 642	4392
2001	45	NA	4492
2002	49	NA	4769
2003	46	8784	4391
2004	60	2630	4518
2005	52	19 045	4531
2006	27	20 920	5840
2007	33	23 696	6499
2008	28	20 746	6534
2009	29	22 148	6705
2010	32	27 670	6835
2011	31	19 452	6685
2012	33	NA	7236
2013	38	NA	7196
2014	35	NA	7429
2015	45	NA	7480
2016	38	NA	7583

** Number of non-commercial game licences sold*

^Data no longer collected

Source: Department of Primary Industries, Parks, Water and Environment

Dry eucalypt forests and woodlands are important to fallow deer for shelter, fawning and resting, though wet forests and rainforests are too dense to be utilised by them. The number of game licences sold during the period continues to increase, while the number of male deer taken has plateaued. This is likely to reflect the availability of hunting opportunity for trophy males rather than any population limitations. Take of male and female fallow deer for crop protection purposes has risen significantly in recent years.

The annual harvest of deer (from game licenses only) is given below in Table 2.1.d.8.

Table 2.1.d.8 Annual harvest of deer from game licences only

Year	Deer licences	Estimated male deer taken under game licence (not Crop Protection permits)
1996	2672	580
1997	2832	600
1998	2862	592
1999	2774	544
2000	2737	760
2001	2800	877
2002	2845	946
2003	2937	1000
2004	3135	1153
2005	3228	1261
2006	3599	1631
2007	3869	1591
2008	3849	1479
2009	4088	1286
2010	4151	1307
2011	4163	1317
2012	4325	1652
2013	4452	1444
2014	4607	1559
2015	4792	1996
2016	5165	1945

Source: Department of Primary Industries, Parks, Water and Environment

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INDICATOR 2.1.e THE AREA OF NATIVE FOREST HARVESTED AND THE PROPORTION OF THAT EFFECTIVELY REGENERATED, AND THE AREA OF PLANTATION CLEARFELLED AND THE PROPORTION OF THAT EFFECTIVELY RE- ESTABLISHED

This indicator reports on the extent of native forest harvested and the success of re-establishing regeneration. It also compares the area of plantations clearfelled with the area effectively replanted, and gives an indication of the success of the planting effort.

Effective regeneration of harvested native forest is required for all forest unless permanent conversion to another land use is approved. In native forests, the *Forest Practices Code 2015* (the Code) prescribes that sowing and planting mixtures must approximate the natural composition of the canopy trees of the harvested forest. The Code requires regeneration surveys to be conducted one year after clearfelling or two years after partial harvesting. Where surveys show survival is less than the required stocking standard, remedial treatments must be considered.

Plantations are not necessarily re-established following clearfelling. Environmental (eg inappropriately located on steep slopes or unstable soils), cultural (eg urban expansion) or economic (eg distance to mills, market) factors may influence whether a plantation is re-established or an alternative land use and/or tree crop is established. The reason for conversion is not reported. In Tasmania, all of the major plantation growers have internal management systems that provide for assessment of regeneration/re-establishment stocking levels and the likelihood of success of remedial treatment.

All forestry operations on public and private land are undertaken under a forest practices plan. Under the *Forest Practices Act 1985*, a compliance report must be lodged upon completion of the operations under the plan indicating whether regeneration or re-establishment has occurred in accordance with the *Forest Practices Code* and forest practices plan.

The Forest Practices Authority reports annually on the extent of planned forest operations across all tenures. The figures provided, however do not reflect actual completed ha as there is often a reduction in area due to operational reasons. Table 2.1.e.1 shows the area (ha) of native forest planned and approved for clearfell harvesting and planned for reforestation, conversion or non-forest land use since 1999–2000. Harvesting of native forest for conversion to plantation on State forest ceased on 1 June 2007.

Table 2.1.e.1 Total area of native forest (public and private) planned for clearfell harvesting and proposed for regeneration, conversion to plantations or non-forest land use 1999–2000 to 2015–16 (hectares)

	Native Forests		
Reporting Year	**Clearfelled followed by regeneration by seeding**	**Clearfelled followed by plantation**	**Clearfelled followed by non-forest land use***
1999–2000	4 500	13 400	1 910
2000–01	4 650	11 810	1 620
2001–02	3 750	7 660	1 620
2002–03	6 180	5 720	2 700
2003–04	5 080	7 300	1 970
2004–05	4 590	6 460	1 540
2005–06	3 100	12 510	850

2006–07	3 770	11 950	1 730
2007–08	5 030	5 660	2 300
2008–09	4 910	7 770	1 920
2009–10	4 610	5 220	1 350
2010–11	4 630	230	2 130
2011–12	3076	107	545
2012–13	2325	0	729
2013–14	3541	8	2281
2014–15	2637	74	2078
2015–16	1905	40	480

**Non-forest land use is minor on State forest and restricted to infrastructure requirements such as roads, power lines and dams.*

Plantations clearfelled and followed by native forest re-establishment reflects the reforestation of streamside reserves with native species in plantations originally established prior to the introduction of the *Forest Practices Code* in 1987.

Table 2.1.e.2 provides information on plantations planned for re-establishment, reforestation with natives, or conversion to non-forest land use since 1999–2000.

The area of plantation planned for harvesting declined from a high in 2007–08, as a result of tightening market conditions and collapse of Gunns Ltd including closure of its woodchip facilities at Triabunna, Hampshire, Burnie and Bell Bay. Increased harvesting was again reported in 2013–14 as the industry recovered with new Timber Industry Management Organisations (TIMOs) purchasing assets of previously collapsed MIS companies. For example New Forests purchased forests previously owned by Gunns Ltd and set up Forico Pty Ltd to manage these assets, including the woodchip export facilities at Hampshire and Bell Bay, Resources Management Services LLC (RMS) purchased plantation assets previously owned by Forest Enterprises Australia, and Neville Smith Timbers purchased Smartfibre which owns an export woodchip facility at Bell Bay.

Table 2.1.e.2 Total planned area of plantation forest (public and private) harvested and proposed for re-establishment or converted to non-forest land use 1999–2000 to 2015–16 (hectares)

Reporting Year	Plantation clearfelled followed by plantation re-establishment	Plantation clearfelled followed by conversion to non-forest use*	Plantation clearfelled followed by native forest re-establishment**
1999–00	3 600	50	
2000–01	5 230	90	
2001–02	5 350	360	
2002–03	7 740	130	
2003–04	8 250	420	
2004–05	6 550	220	
2005–06	7 590	510	
2006–07	9 450	260	
2007–08	9 760	610	
2008–09	7 360	400	110
2009–10	7 940	280	240

2010–11	6 370	340	120
2011–12	3691	350	162
2012–13	3827	550	24
2013–14	7515	1496	209
2014–15	6847	2313	41
2015–16	11879	3394	64

**Non-forest land use is minor on State forest/permanent timber production zone land and restricted to infrastructure requirements such as roads, power lines and dams – area not reported.*

***Largely from native streamside reserves re-established in pine plantations which were established prior to the* Forest Practices Code*.*

Forestry Tasmania reports annually on the level of regeneration achieved for all harvested native forest operations on permanent timber production zone land. Regeneration success of eucalypt coupes is reported three years after harvesting operations. Regeneration of rainforest, blackwood swamp and Huon pine coupes is reported at five years after harvesting. Table 2.1.e.3 shows that Forestry Tasmania has consistently exceeded its regeneration success target of 85% of the regenerated area meeting prescribed stocking standards. Stocking standards specify the minimum levels of growing stock to be retained or regenerated in order to maintain productive native forest after harvesting operations. The required stocking standard is determined by the forest type being regenerated and is based on the number and spatial distribution of acceptable seedlings, saplings or trees that occur within the forest area being assessed. Areas that don't meet the stocking standard are assessed to determine if they are ecologically stocked, meaning that that the stocking is sufficient to maintain the forest community even though its wood productivity may be low. Very few areas fail to meet ecological stocking, especially after remedial treatments are applied.

Table 2.1.e.3 Percentage of regenerated native forest meeting the stocking standard on State forest (1998–2013) and Permanent Timber Production Zone (2014–2016) lands

Reporting year	Regeneration year eucalypt clearfell and partial logging	Regeneration year rainforest/blackwood swamp	Total area treated (ha)	Total area which achieved standard (ha)	% Area meeting standard
1998–99	1995–96	1993–94	4006	3815	**95**
1999–00	1996–97	1994–95	5466	5184	**95**
2000–01	1997–98	1995–96	4145	4011	**97**
2001–02	1998–99	1996–97	4808	4568	**95**
2002–03	1999–00	1997–98	4148	3837	**93**
2003–04	2000–01	1998–99	5526	5141	**93**
2004–05	2001–02	1999–00	6569	6526	**99**
2005–06	2002–03	2000–01	7226	6942	**96**
2006–07	2003–04	2001–02	9445	9244	**98**
2007–08	2004–05	2002–03	10 207	10 010	**98**
2008–09	2005–06	2003–04	7522	7002	**93**
2009–10	2006–07	2004–05	6882	6220	**90**
2010–11	2007–08	2005–06	7820	6888	**88**

2011–12	2008–09	2006–07	9377	9002	**96**
2012–13	2009–10	2007–08	9190	8639	**94**
2013–14	2010–11	2008–09	7414	7192	**97**
2014–15	2011–12	2009–10	4580	3985	**87**
2015–16	2012–13	2010–11	2994	2994	**100**

In previous reporting periods, Forestry Tasmania had reported annually on the level of establishment success achieved for all plantation establishment operations on State forest. Establishment success of eucalypt plantations was reported two years after planting operations. On private land data relating to effective stocking of plantations one year after planting were not available.

For the reporting period 2011-16 establishment success data is not available for private land or for public forests. On permanent timber production zone land, the areas being established are extremely small, and environmental management processes are in place to ensure that stocking standards are met. Similarly, the majority of plantations on private land are established and managed by forest management companies, either on their own freehold land or under a joint venture or leasing arrangement. Such private property is therefore subject to the high standards of forest management consistent with the companies' internal procedures and systems.

An assessment of re-establishment success is undertaken through the Forest Practices Authority's compliance reporting and the independent assessment process **(**as described in INDICATOR 7.1.b).

Certificates of compliance do not specify regeneration or re-establishment rates achieved but do indicate the level of compliance with the objective specified within a forest practices plan.

The FPA's annual independent assessment process assesses whether an effective stocking standard is likely to be achieved following clearfelling in plantations and native forests which are to be re-established or regenerated.

Table 2.1.e.4 Forest Practices Authority's annual assessment performance rating for regeneration in native forest operations 2003–04 to 2015–16

	Total for all tenures	Private industrial	Private independent	State forest
2003–04	3.4	3.3	4.0	3.5
2004–05	3.0	2.6	2.9	3.4
2005–06	3.6	3.3	3.5	3.8
2006–07	3.4	3.4	2.4	3.7
2007–08	3.5	3.4	3.0	3.8
2008–09	3.5	3.5	3.1	3.7
2009–10	3.3	3.4	3.0	3.5
2010–11	3.6	3.6	3.5	3.6
2011–12	3.5	3.7	3.0	4.0
2012–13	3.3	4.0	2.5	3.8
2013–14	3.2	4.0	2.8	3.4
Average	**3.4**	**3.5**	**3.0**	**3.6**

New rating system: acceptable & maximum rating is '3'				
2014–15	2.7	3.0	1.7	3.0
2015–16	2.8	-	3.0	2.3

From 2003–04 the performance rating system stipulated that a minimal compliance rating of 'three' was considered acceptable, with a maximum possible rating of 'four'). In 2014–15 the performance rating system was changed so that the acceptable rating of 'three' was also the maximum rating. Table 2.1.e.4 and

Table 2.1.e.5 show the results all tenures from 2003–04 to 2015–16 for regeneration success of native forest and establishment success of plantations.

Table 2.1.e.5 Forest Practices Authority's annual assessment performance rating for re-establishment in plantation operations 2003–04 to 2015–16

	Total for all tenures	Private industrial	Private independent	State forest
2003–04	4.0	4.0	4.0	3.9
2004–05	3.3	3.3	3.6	3.1
2005–06	3.8	3.9	4.0	3.6
2006–07	3.7	3.8	2.5	3.8
2007–08	3.7	3.6	4.0	3.8
2008–09	3.4	3.3	3.3	4.0
2009–10	3.4	3.4	3.0	3.9
2010–11	3.4	3.5	2.3	4.0
2011–12	**3.3**	**3.3**	**3.5**	**3.0**
2012–13	3.8	3.7	4.0	4.0
2013–14	4.0	4.0	4.0	NA
Average	**3.6**	**3.6**	**3.5**	**3.7**
New rating system: acceptable & maximum rating is '3'				
2014–15	3.0	3.0	3.0	-
2015–16	2.9	2.7	2.8	3.0

References

Forest Practices Board (1996–2004) annual reports, Forest Practices Board, Hobart.

Forest Practices Authority (2004–2016) annual reports, Forest Practices Authority, Hobart.

CRITERION 3: MAINTENANCE OF ECOSYSTEM HEALTH AND VITALITY

This criterion focuses on the impacts of pests and diseases on plantations and native forest and on the impact of both planned and unplanned fire on the forest.

Understanding the impact of pests and diseases and developing improved and more ecosystem "friendly" control measures is an ongoing process. The current control measures are reported here, including changes in approach from those in previous reporting periods.

Trends in areas affected by both planned fires and wildfires by forest type are reported.

INDICATOR 3.1.a AREA AND PERCENTAGE OF FOREST AFFECTED BY PROCESSES OR AGENTS THAT MAY CHANGE ECOSYSTEM HEALTH AND VITALITY

Native and exotic pests (vertebrate and invertebrate), pathogens and weeds can adversely affect the health and vitality of plantations and native forests; as can abiotic stresses such as extreme weather events, fire and nutrient imbalances. Damage to forests from most native insect pests and pathogens is usually widespread at low severity, having little effect on the health of trees. However, occasional outbreaks/epidemics do occur and the resultant damage can adversely affect commercial values, particularly in plantations. It is generally considered that occasional outbreaks/epidemics by native pests and pathogens form part of normal ecosystem processes and have minimal effect on the conservation values of native forests. However, when coupled with significant stresses such as drought, these occasional outbreaks/epidemics can cause widespread mortality and may result in long-term change to affected native forests. Exotic pests, pathogens and weeds on the other hand, pose significant threats to conservation values and many also impact adversely on amenity and commercial values.

In Tasmanian commercial forests, active management of established pests and pathogens, both native and exotic, is directed heavily towards protecting commercial values. Most plantation owners routinely manage key pests (browsing mammals, leaf beetles, weeds) and formal surveillance methods are used to detect health problems in high-value plantations on permanent timber production zone land.

In reserved forests, the intensity of pest and disease management is low, there is no formal surveillance and most pests and pathogens are not managed. The exceptions are some exotic pests, pathogens and weeds that have become established in Tasmania and threaten the conservation values of reserves. The *'Keeping it Clean'* hygiene guidelines have been developed and introduced to manage the spread of aquatic pests and pathogens that threaten the conservation values of forest ecosystems. While there is no surveillance done in reserves, several focused monitoring programs have been established, including: myrtle wilt rate of spread plots (established in the 1980s), montane conifer climate change monitoring plots (established in 2010–11), and environmental monitoring of waterways for *Phytophthora* susceptible species (pilot project done in 2009–10).

Limiting the establishment of additional exotic pests and pathogens through effective biosecurity and quarantine measures is an ongoing priority. Plant Health Australia (2013) has recently updated the Plantation Forest Biosecurity Plan, which integrates with the national plant biosecurity system, particularly PlantPlan, the generic incursion management plan for exotic plant pests and pathogens. Furthermore, the recently-released *Biosecurity Manual for the Plantation Timber Industry* (Plant Health Australia, 2015) provides detailed descriptions of the high priority exotic pests and diseases that threaten the forest industry. The *Tasmanian*

Biosecurity Strategy 2013–2017 (DPIPWE 2012) provides the system and structures for formulating biosecurity policy and delivering it operationally: it is particularly important for capturing the additional biosecurity benefit provided by Bass Strait. In recent years screening for exotic bark beetles has been incorporated in to the *Sirex* static trapping program in softwood plantations on permanent timber production zone land. Additionally spot checks are now performed for a limited number of target exotics with distinctive symptoms as part of routine pine health surveillance.

Where chemicals are used to control pests and diseases the manufacturer's guidelines for use are strictly followed, as well as any additional requirements imposed by the Australian Pesticides and Veterinary Medicines Authority (APVMA). Chemicals are applied both on the ground and by aerial spraying. The implementation of aerial spraying guidelines determines when spraying can be carried out and minimises the chance of spray drift into streams or onto neighbours properties. Aerial spray buffers are currently being reviewed in light of changes to APVMA pesticide labelling.

Main health problems affecting *Eucalyptus* plantations

A detailed summary of the factors affecting the health of plantations on State forest/permanent timber production zone land each year from 2011–12 to 2015–16 is provided in APPENDIX 3.1.a: . Expansion of the *Eucalyptus* plantation estate in Tasmania (predominantly *E. nitens*) continued until 2011. Planting rates have slowed down markedly since that time with only 1456 ha being planted between 2012 and 2016. Browsing, predominantly by native mammalian herbivores (brushtail possum, Tasmanian pademelon and Bennetts wallaby) remains the major threat during the establishment phase. All the plantations established for solid wood production received protection from browsing management.

The use of the poison 1080 on permanent timber production zone land was phased out over 10 years ago and management now relies on shooting and trapping, often in combination with seedling stockings. Results from forest health surveillance of eucalypt plantations on permanent timber production zone land over the last five years detected only very small, localised areas of stunting or reduced stocking due to mammal browsing and some widespread defoliation of recently planted seedlings in a single coupe.

The chrysomelids, *Paropsisterna bimaculata* and *P. agricola*, remained the major insect defoliators affecting plantations post-establishment. They are the only insect pests that are routinely managed. This involves an integrated pest management (IPM) strategy based on regular monitoring during summer to detect damaging (above threshold) populations that may need controlling. There has been ongoing adaptive adjustment to the IPM which has moved to a much more targeted and risk-based approach. Monitoring was greatly reduced or excluded from low-risk areas of the estate while the threshold was adjusted to help protect areas of chronic damage.

The insecticide alpha-cypermethrin is routinely used in aerial spray operations to control above-threshold populations. Substitution of alpha-cypermethrin with spinosad, a more environmentally-friendly insecticide, has been largely unsuccessful because of operational difficulties and lower cost-effectiveness. The summer of 2012–2013 saw an extremely high level of beetle activity and the appearance of *Paropsisterna selmani* as a major defoliating pest. Subsequent research has shown that *P. selmani* develops more quickly than *P. bimaculata* and commences egg laying earlier. The full consequences of these differences are still to be understood. These large populations saw a substantial increase in the area across which control operations needed to be conducted (Table 3.1.a.1). The following year saw more normal leaf beetle populations while 2014–2015 saw a crash in numbers, particularly across the north of the

state, with a consequent reduction in the area of plantation over threshold and the necessity for chemical control. Low populations were maintained during 2015–2016 with the only control operations being conducted in the south of the state.

Table 3.1.a.1 Summary of the annual chrysomelid leaf beetle integrated pest management (IPM) program on State forest for the five years between 2011–12 to 2015–16 (numbers in parentheses are areas as a percentage of the total area (in hectares) that was monitored)

	2011–12	2012–13	2013–14	2014–15	2015–16
Area monitored	19 333	14 530	13 454	11 288	9291
Area of plantations over-threshold[1]	3 525	6 137	1 543	695	779
(%)	(18)	(42)	(12)	(6)	(8)
Area of plantations over-threshold that were sprayed	2 361	4 741	887	409	558
(%)	(12)	(33)	(10)	(4)	(8)

1. Monitored populations of leaf beetle eggs and larvae that exceed economic injury levels.

No other insect pest of eucalypt plantations requires routine management. The eucalypt weevil, *Gonipterus scutellatus*, caused localised damage in some southern plantations but this was never extensive or severe enough to warrant control operations. Populations of autumn gum moth (*Mnesampela privata*), were restricted to the north-west of the state and generally only caused moderate damage; the exception being 18 ha of severe damage in a pulp plantation. Gum leaf skeletoniser (*Uraba lugens*) was widespread but damage remained limited to edge trees, usually adjacent to native forest.

Drought stresses have manifested in patchy and ongoing mortality in a number of mid-rotation plantations in the north of the state. Such environmental stresses render trees susceptible to a range of insects and pathogens for a considerable period of time. Between 2012 and 2016 some 430 ha were affected by this syndrome which involved borer attack (buprestids and cerambycids) as well as bark infection by *Holocryphia eucalypti* (*Endothia gyrosa*) and root/collar rot from *Armillaria*.

With the aging of the plantation estate, the soil-borne pathogen, *Phytophthora cinnamomi*, has not been recorded as the primary causal agent for any significant mortality over the last five years.

The fungal leaf pathogens *Teratosphaeria* spp. (formerly *Mycosphaerella*) and *Kirramyces eucalypti* can occasionally cause severe defoliation and shoot death in eucalypt plantations as the result of epidemics that develop when moist, humid conditions coincide with periods of active growth. Conditions for epidemic leaf disease were widespread across northern and eastern Tasmania during the 2009–10 and 2010–11 seasons.

The 2010–11 season was particularly favourable for fungal leaf disease. 2000 ha of predominantly *E. nitens* plantations on permanent timber production zone land suffered defoliation at levels likely to cause significant growth reductions. The combination of fungal defoliation, leaf beetle damage, cold, exposure and wind damage lead to large areas of chronic poor crown density in the north-east highlands with a consequent severe impact on wood production. In response adaptive management was implemented using data collected during forest health surveillance to continually improve and strategically deploy the IPM program. Adjusted monitoring techniques and thresholds were aimed at protecting these vulnerable crowns from any further leaf beetle damage and giving them the best chance of recovery. This

proved to be successful and was assisted by the general decrease in overall leaf beetle populations.

In 2012 over 2700 ha of the north-east highlands were mapped as having chronically thin crowns largely due to MLD (*Mycosphaerella* leaf disease); by 2015 this had fallen to only 164 ha. A similar syndrome developed in a localised region further to the east following a very wet summer and an outbreak of defoliating fungal pathogens in 2014–15, which currently affects about 226 ha.

Myrtle rust (*Puccinia psidii*) became established in northern New South Wales in autumn 2010. It was identified as being present in Tasmania in February 2015. Both *E. globulus* and *E. nitens* are known to be susceptible to the rust and it is likely that some members of the Myrtaceae in Tasmania's native forests will also be susceptible. While climatic conditions in Tasmania are not as suitable for epidemic disease as the more northerly states, the pathogen is still considered to pose a threat in lowland forests along northern Tasmania, particularly during years with wet summers like that experienced in 2010–11. In response the original incursion Forestry Tasmania incorporated myrtle rust monitoring in to browsing damage surveys in both plantations and native forest regeneration as well as including surveys in young eucalypt plantations as part of the forest health program. Symptoms of the disease have not been detected in either plantations or native forest regeneration (see also INDICATOR 1.3.a).

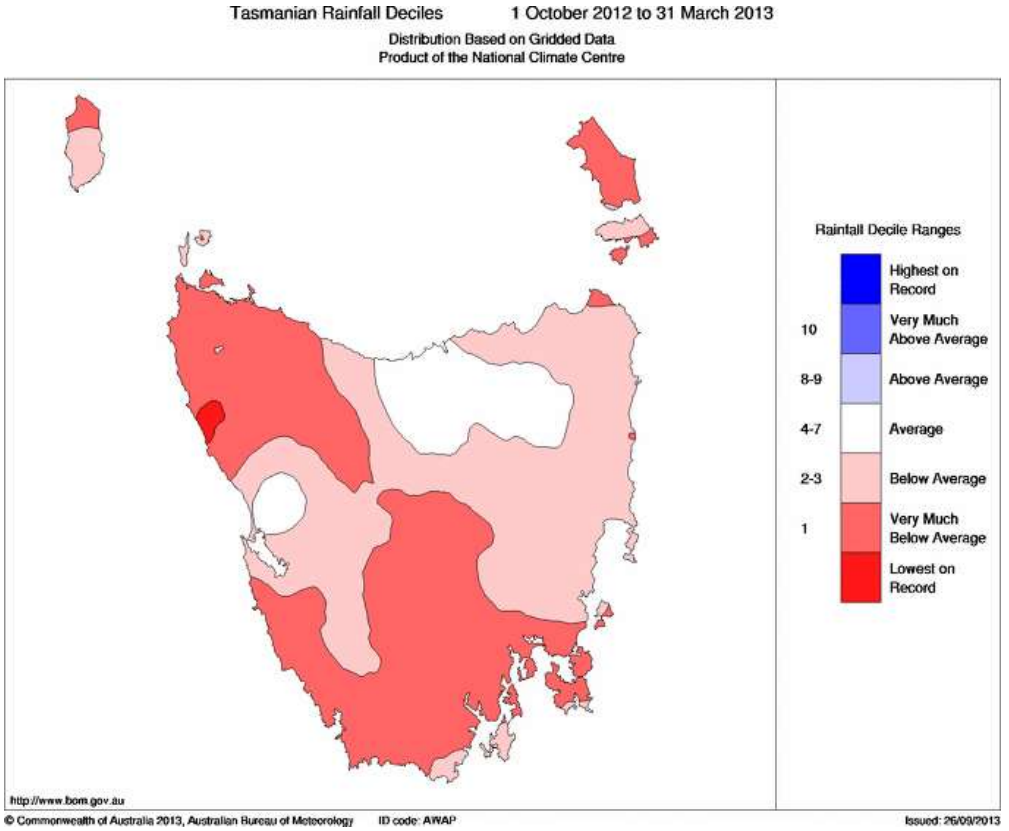
In early 2014 a suite of symptoms started appearing in mid-rotation *E. globulus* plantations in the north-west of the state. Affected trees had a distinct dark-reddish discolouration, extensive kino bleeding and commonly had swellings and cracks in the bark (Figure 3.1.a.1). Routine health surveillance showed this syndrome was widespread in the north-west but was also observed in the north-east where *E. globulus* is generally planted on poorer sites. The colouring of affected trees lead to this being termed "ginger tree syndrome". Investigation showed large kino filled pockets which were contained inside the annulus of a single new growth ring (Figure 3.1.a.2). The rupture of these pockets is what caused the copious resin bleeding and ginger colouration of affected stems. There were no insect pests or diseases associated with these defects.

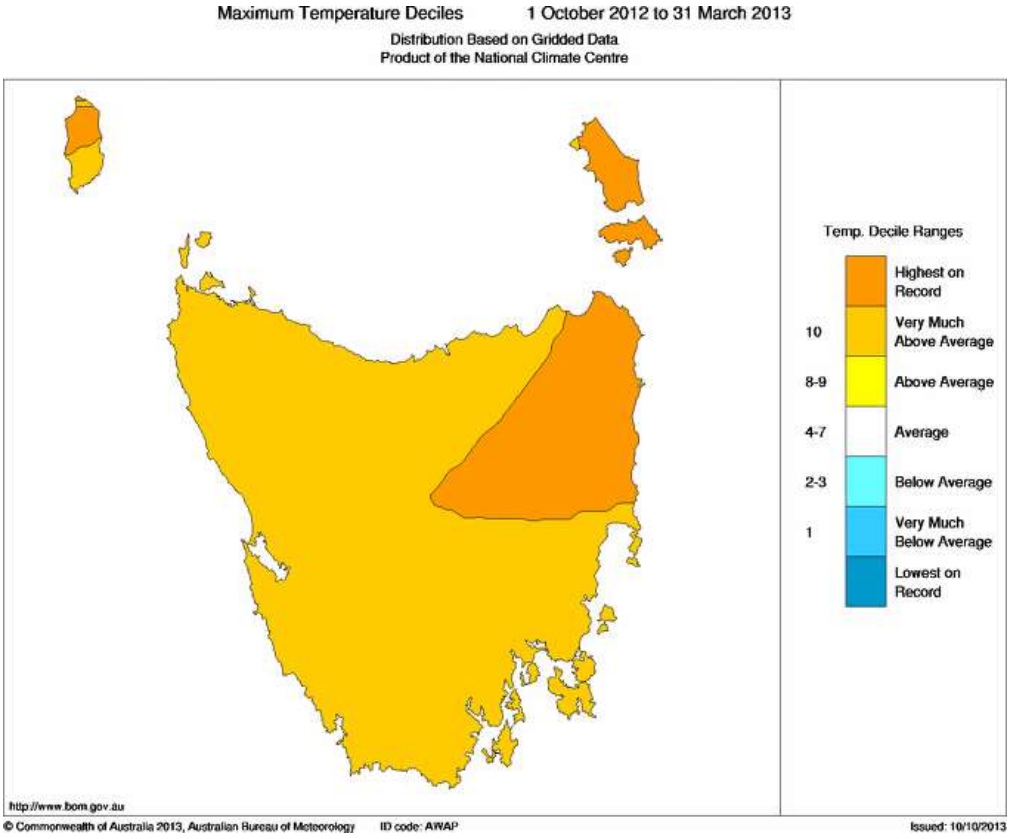
Kino pockets coincided with the 2012–13 growing season, which was characterised by unusually dry and hot weather across the north of the state (Figure 3.1.a.3). Such severe physiological stresses are known to be capable of causing trauma to the cambium and triggering the formation of kino veins and pockets (Eyles and Mohammed 2003). Furthermore, affected trees that were examined had evidence of similar, though less severe, damage in older wood. Such trees are unsuitable for saw or veneer logs. Follow-up surveys in 2015 showed only a small percentage of affected trees died (8% of affected trees with external symptoms but this only represented 1.3% of all assessed plantation trees) and that external symptoms disappeared as bark was sloughed off (Forestry Tasmania, internal data). This syndrome is also suspected to be responsible for similar symptoms occurring in native eucalypts on farmland and in private native forest, although little damage has been observed in native forests on permanent timber production zone land. *Eucalyptus viminalis* appears to have been particularly adversely affected and significant mortality has been observed around the state.

Figure 3.1.a.1 Symptoms associated with "ginger tree syndrome" including general stem discolouration, swellings, cracks and extensive kino bleeding.

Figure 3.1.a.2 Large kino-filled pocket contained inside the annulus of a single new growth ring (left) and kino veins in older wood indicating a general predisposition to kino vein formation in some E. globulus trees (right).

Figure 3.1.a.3 Rainfall (top) and temperature (bottom) conditions experienced in Tasmania during the 2012–13 growing season which coincided with the formation of kino filled pockets in susceptible E. globulus mid-rotation plantation trees.





The extensive wildfires across the north-west of the state in the summer of 2015–16 had a large impact on the eucalypt plantation estate. Around 3286 ha were affected to some extent. Of this area 1095 ha were assessed as minimally burnt (<10%), 921 ha as burnt in patches (10–75%) and 1270 ha as completely burnt (>75%) (Forestry Tasmania, internal data).

Main health problems affecting *Pinus* plantations

Needle cast diseases, such as spring needle cast (SNC) and *Dothistroma,* and bark stripping by wallabies remains the major problem affecting the pine plantation estate.

Defoliation and needle discolouration from SNC and *Dothistroma* have been fairly limited over the last three years. However, in 2012 and 2013 these diseases caused significant foliar discolouration, defoliation and poor crown density across 1143 and 627 ha respectively.

Culling by shooting or trapping is the only means of management currently available to manage bark stripping. Research has shown bark stripping is associated with an annual peak of bark sugar levels in pines during a time of the year when preferred herbage is scarce. The area affected by reportable levels of wallaby damage remains fairly consistent from year to year at between 1000 and 1500 ha. This primarily consists of sub-lethal bark stripping, but also includes some shoot browsing and ring-barking mortality that leads to reduced stocking in very young plantations. Top death in mid-rotation plantations caused by possum ringbarking has generally been restricted in distribution over the last five years.

Sirex wood wasp is the main insect threat to pine plantations in Tasmania and an annual static trapping program is conducted in at-risk plantations on permanent timber production zone land in northern Tasmania. Low populations were generally maintained over the last five years and no significant mortality was reported. The *Sirex* parasitoid, *Ibalia leucospoides*, was usually present, although none were detected in 2015–16. Despite overall low populations, the level of *Sirex* activity warranted the inoculation of a number of plantations with the nematode *Beddingia siricidicola*, which is a very effective biological control agent..

The Monterey pine aphid (*Essigella californica*) remains restricted to plantations in southern Tasmania; no activity has been observed on permanent timber production zone land in the north of the state. The black pine bark beetle *Hylastes ater* was detected, causing scattered mortality in a single young plantation in the central north of the state in 2016. There were no other insect problems of note reported. Tasmania continues to remain free of the five-spined bark beetle (*Ips grandicollis*). Modelling suggests that Tasmania's climate is sub-optimal for this pest.

Top death due to *Diplodia pini* infection tends to be closely associated with dry conditions. Peaks in infection levels were observed in 2013 and 2016, primarily in the drier areas in the central north and north-east of the state, which coincided with severe rainfall deficiencies over the preceding summers.

Extensive, copious resin bleeding was observed across more than 350 ha in an east coast plantation in 2015 (Figure 3.1.a.4). Bleeding was more prominent in trees older than 10 years, although it could be seen on larger trees as young as 8 years. Extensive resin bleeding in *P. radiata* can be a sign of the formation of resin pockets due to damage to the developing xylem in the cambial region. The formation of such defects has been consistently associated with environmental conditions such as water stress and drought (Dave et al. 2011, Ottenschlaeger et al. 2012) and may be similar to the ginger tree syndrome in eucalypts. The previous 18 months on the north-east had seen the lowest rainfall on record. Symptoms had largely abated by 2016 and no tree mortality was observed (Fig. 3.1.a.5).

Dry conditions were also responsible for substantial areas of transplant failure in 2013 (269 ha) and 2014 (331 ha).

Significant windthrow and stem breakage due to storm events tended to be patchy and localised with around 165 ha being affected over the five years to 2016.

Figure 3.1.a.4 Copious resin bleeding of P. radiata in a north-eastern coastal plantation and rainfall conditions across Tasmania for the preceding 18 months.

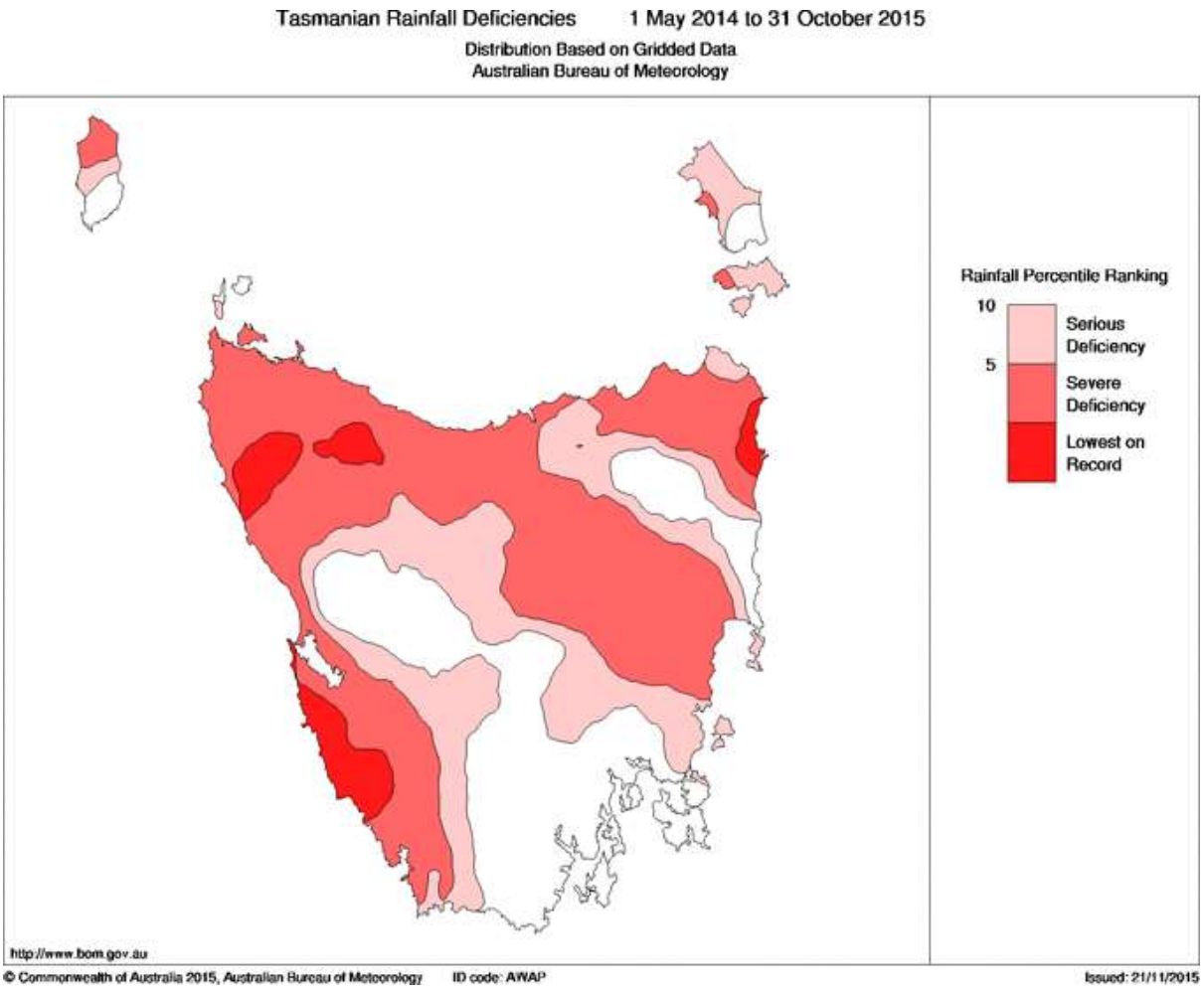


Fig. 3.1.a.5 Tasmanian Rainfall Deficiencies 01/05/14 – 31/10/15

Native forests

Browsing of young regeneration by browsing mammals remains a major factor affecting successful reafforestation of eucalypts in native forests. Browsing is a particular risk in coupes harvested and regenerated using variable retention silviculture and coupes that are being managed primarily for blackwood (*Acacia melanoxylon*). For variable retention harvesting areas browsing management relies on regular monitoring and culling to protect regeneration from the cotyledon stage through until the seedlings have reached a safe height (about 1 metre tall). For the blackwood coupes, fencing is the primary method of protection from browsing and is used on all coupes (in the Circular Head area).

Myrtle wilt caused by the native pathogen *Chalara australis* is the most significant factor affecting the health and vitality of *Nothofagus cunninghamii*-dominated rainforest. Long-term monitoring of the activity of myrtle wilt is done in a set of five permanent plots established across Tasmania. These were last assessed in 2000–01.

There are two fungal pathogens of note that affect native forests more generally. A particularly active Armillaria root rot disease continues to develop in the forest surrounding the Tahune Airwalk in southern Tasmania, most notably causing significant mortality in mature celery top pine (*Phyllocladus asplenifolius*). The root-rot pathogen, *Phytophthora cinnamomi*, remains the most significant biotic threat to the health of native forests in Tasmania with the potential to affect broad areas. The movement of gravel for road and other civil construction is a major

vector for the spread of *P. cinnamomi*. Quarries used for roading in forests on permanent timber production zone land are routinely monitored to determine their *Phytophthora* status, to ensure that *P. cinnamomi* is not spread into areas of susceptible vegetation. Other land managers are adopting the quarry monitoring system used for permanent timber production zone land and require that material used for roading and civil construction are sourced from quarries that have been determined to be *Phytophthora*-free. Washdown of all roading, harvesting, and site preparation equipment is required before it is moved from one area to another, to reduce the spread of soil borne weeds and diseases. In recreational forests, management of foot traffic has been introduced to curtail spread of this pathogen.

E. coccifera forests along the western edge of the Central Plateau have suffered severe dieback: a continuation of the syndrome than commenced in the late 1990s during a period of sustained drought. The epicentre of these drought events has been the area east of Great Lake. Local populations of *E. gunnii* and *E. gunnii* subsp. *divaricata* suffered severe dieback and mortality following heavy possum browsing and drought episodes during the early 2000s. Remedial treatment involving caging and fencing of sites with sufficient regeneration has generally given good results although there is an issue with deer browsing once seedlings have grown beyond the protection offered by cages.

Drought has also caused locally severe dieback of trees and understorey species in eastern, north-eastern and midlands Tasmanian forests: in some areas (eg. Waterhouse Conservation Area) forests have almost been eliminated. Forest trees affected include *E. obliqua* and *E. amygdalina* on ridges, *E. risdonii*, *E. pauciflora* on sands, *E. viminalis* on dry sites, *Allocasuarina verticillata* and some understorey species such as the Tasmanian threatened species *Mirbelia oxylobioides*. In some eastern montane locations Gondwanan pine species including pencil pine and King Billy pine appear to be suffering dieback through gradual canopy thinning. The King Billy pine stand at Lake Fenton is the most severely affected stand.

Wet forests are highly resistant to weed invasion beyond the post-fire/harvesting disturbances, although bird dispersed species such as holly are capable of invading undisturbed wet forests. Riparian areas are most at risk from weeds such as Elisha's tears and blackberry. Dry forests are threatened by a greater range of invasive species, however they still retain a high proportion of their native species diversity away from access. Grassy, dry forests tend to have a greater diversity of weeds than those with shrubby or heathy understories. Some significant woody invasive weeds capable of spreading away from disturbed sites in dry forest are: *Erica lusitanica, Genista monspessulana* and *Pinus radiata*.

Forestry Tasmania has developed a weed mapping system for permanent timber production zone land forests which will feed weed location data into the Natural Values Atlas (NVA). Natural Resource Management organisations are deploying NVA-compliant portable data assistants with local government weed officers, which will greatly assist in documenting the extent of weed infestations.

On permanent timber production zone land, weed infestations detected during routine forest operations or formal forest health surveillance guide the development of work programs for weed management. This has been formalised through the development of a weed strategy for permanent timber production zone land. Of the most threatening invasive species, gorse and pampas grass are being contained through direct action. This is keeping infestations to low levels, but falls short of eradication. Wildling pines are still a significant invasive threat in dry forests adjoining pine plantations. Infestations are impacting several forest reserves but to date remedial treatments have not been done. Rehabilitation of non-commercial areas of pine plantations back to native forest has been done in two plantation areas on State forest, in the Scamander and Branches Creek forest blocks. In national parks and reserves priorities for weed

management are determined using both weed-based and site-based criteria with an aim for local area eradication, for example there has been a focus on removal of broom and *Erica lusitanica* from Maria Island.

Many forest-dwelling vertebrate species would be at risk from an introduced fox population, from either predation or potential competition for resources. These include the Tasmanian bettong, eastern quoll, southern brown bandicoot, long-nosed potoroo, Tasmanian pademelon, brushtail possum, and Tasmanian devil. Forests, forested fringes of agricultural areas, and even plantations in rural areas have significant potential as refugia for foxes.

A range of physical items were collected since 1998 that indicated fox activity in Tasmania. The increasing accumulation of this evidence, along with a volume of credible fox sighting reports from members of the public, led the Tasmanian Government to initiate a fox eradication program from 2006 to 2014. Encouragingly, no physical evidence of fox activity has been collected in Tasmania since July 2011 and it is hoped that fox eradication has been successful. However, detecting foxes when they are in low numbers is very difficult and it is important that all members of the Tasmanian community remain vigilant for foxes and signs of their activity.

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INDICATOR 3.1.b AREA OF FOREST BURNT BY PLANNED AND UNPLANNED FIRE

This indicator reports the area and percent of forest types and tenures burnt by both planned and unplanned fires. Fire is a natural and important part of forest ecosystems in Australia. It may have either a positive or negative impact on forest health and vitality depending on how it occurs and the characteristics of the area. In any forest type the total area burnt, and the proportions of that area burnt by planned and unplanned fires are good measures of management success.

Fire is managed co-operatively by land managers, including the Parks and Wildlife Service (PWS), Forestry Tasmania (FT) and the Tasmania Fire Service (TFS), under the Inter-Agency Fire Management Protocol. This operates seamlessly across land tenures and provides a best practice model for such activity in Australia.

Planned fires

Planned fires are defined as those started in accordance with a fire management plan or some other type of planned burning program. Reasons for such fires include: fulfilling the ecological requirements of flora and fauna; the protection of life and property; maintaining and promoting sustainable production values; maintaining cultural resources and practices.

FT maintains records of areas burnt by planned and unplanned fires, as does the PWS. Table 3.1.b.1 summarises area burnt by planned burns conducted by FT and PWS, including multiple-tenure fuel reduction burning completed in cooperation with other land managers. Burns conducted by land managers other than FT or PWS have not been recorded. The TFS issues permits for the lighting of fires during the fire permit period and records the action of lighting permit fires, but not details of the vegetation type or area burnt by the fire. Outside of the fire permit period there is no requirement that land owners notify the TFS of planned burning operations, or the results of a planned burn. However land management agencies register all burning with the TFS all year round recording details of vegetation type and area burnt.

Total softwood and hardwood plantation areas treated by planned burning do not include areas where non-forest communities have been converted to plantation (as these will be grass and paddocks), nor the establishment of second rotation plantations where it is assumed that burning does not occur and nutrient cycling is more important than removing debris.

Table 3.1.b.1 Area in hectares [a] of forest types burnt [b] by planned fires

TENURE[c]	VEGETATION TYPE[d]	YEAR				
		2011-12	2012-13	2013-14	2014-15	2015-16
Permanent timber production zone land	Dry eucalypt forest	3000	1000	1000	3000	200
	Wet eucalypt forest	3000	2000	3000	3000	1000
	Other native forest	200	200	200	200	100
	Plantation	500	300	200	60	50
Conservation & Public Reserves	Dry eucalypt forest	800	4000	3000	10 000	600
	Wet eucalypt forest	200	700	300	2000	100
	Other native forest	10	100	100	300	50
	Plantation					
Other publicly managed land	Dry eucalypt forest	3000	4000	900	2000	200
	Wet eucalypt forest	1000	600	600	200	10
	Other native forest	20	10	40		
	Plantation					
Private freehold land	Dry eucalypt forest	10	500	80	1000	1000
	Wet eucalypt forest	10	100	30	400	10
	Other native forest				20	
	Plantation					
TOTAL [e]	**ALL**	**11 000**	**14 000**	**10 000**	**22 000**	**3320**

a) Figures rounded to nearest 10/100/1000 hectares.
b) Fire extent is for forested (as mapped in vegetation communities) land only.
c) Tenure for all fire seasons as at 30th June 2016.
d) Vegetation mapping for all seasons as at first quarter of 2015.
e) Totals are rounded sums of actual totals.

The majority of the planned burns on permanent timber production zone land in the above table reduced post-logging fuel loads and created a suitable seed bed for the regeneration of native forest. The remainder of the planned burns were conducted for strategic fuel management purposes.

Pre-plantation establishment burning on permanent timber production zone land is no longer undertaken due to FT's decision in 2006 to cease the conversion of native forest to plantation.

A coordinated smoke management strategy (CSMS) was established in 2008 to minimise the risk of high concentrations of smoke within individual airsheds. Under the CSMS, restrictions may be imposed upon the forest industry, PWS, TFS or other participating members of the CSMS in order to limit or ban burning on days when weather forecasts predict poor smoke dispersal.

Unplanned fires

Unplanned fires are defined as those started naturally or accidentally that are not in accordance with planned fire management prescriptions. Usual causes of such fires include: lightning strike; escaped campfires or BBQs; fires accidentally started as a result of sparks from equipment or machinery; fires which are deliberately lit without the necessary permits or authority (and those lit with malicious intent); and escaped planned burns.

Table 3.1.b.2 Area in hectares [a] of forest types by tenure burnt [b] by unplanned fires

TENURE [b]	VEGETATION TYPE [c]	YEAR				
		2011-12	2012-13	2013-14	2014-15	2015-16
Permanent timber production zone land	Dry eucalypt forest	100	3000	200	500	11 000
	Wet eucalypt forest	100	2000	200	90	20 000
	Other native forest	30	30	400		5000
	Plantation	90	700	50	10	3000
Conservation & Public Reserves	Dry eucalypt forest	50	9000	1000	90	11 000
	Wet eucalypt forest		800	400	10	3000
	Other native forest		2000	200		2000
	Plantation					
Other publicly managed land	Dry eucalypt forest	60	7000	400	1000	6000
	Wet eucalypt forest		800	200	80	7000
	Other native forest	30	900	200		3000
	Plantation					
Private freehold land	Dry eucalypt forest	2000	19 000	2000	4000	4000
	Wet eucalypt forest		900	200	20	500
	Other native forest	60	70	20	10	100
	Plantation	100	2000	70	30	500
TOTAL [d]	**ALL**	**3 000**	**49 000**	**5 000**	**6 000**	**78 000**

a) Figures rounded to nearest 10/100/1000 hectares.
b) Fire extent is for forested (as mapped in vegetation communities) land only.
c) Tenure for all fire seasons as at 30th June 2016.
d) Vegetation mapping for all seasons as at first quarter of 2015.
e) Totals are rounded sums of actual totals.

The total land area for each of the tenure classifications used in Table 3.1.b.1 and Table 3.1.b.2 has changed during the reporting period. Year to year comparisons of the percentage area burnt by tenure reflect both changes in tenure and fire activity.

FT records of the areas of permanent timber production zone land burnt by unplanned fire and the PWS records of the area of reserved land burnt by unplanned fire are more comprehensive than the TFS records of the areas of private land burnt by unplanned fire. In addition to the unplanned fires recorded as occurring on private land, it is likely that there are additional unplanned fires that are not reported to the TFS and so are not included in the records. Consequently the recorded area burnt by unplanned fire on private land is certainly understated but to what extent is unknown.

The episodic nature of Tasmania's fire seasons can be seen in the following chart of area burnt per season by fires attended by Forestry Tasmania personnel. Because not all of these fires were confined to permanent timber production zone land the 'area burnt' depicted for each year in this chart is greater than the area of permanent timber production zone land burnt in that year.

FT records dating back to 1941 indicate that three of the past five fire seasons were well below average. There were two severe bushfires (large-scale wildfires); the Dunalley bushfire in 2012–13 and the north-west bushfires in 2015–16. About 120 000 ha were burnt by bushfires in 2015–1, 78 000 ha of which were forested. This the greatest area burnt since the 1971/72 fire season (44 years ago) when over 140 000 ha were burnt.

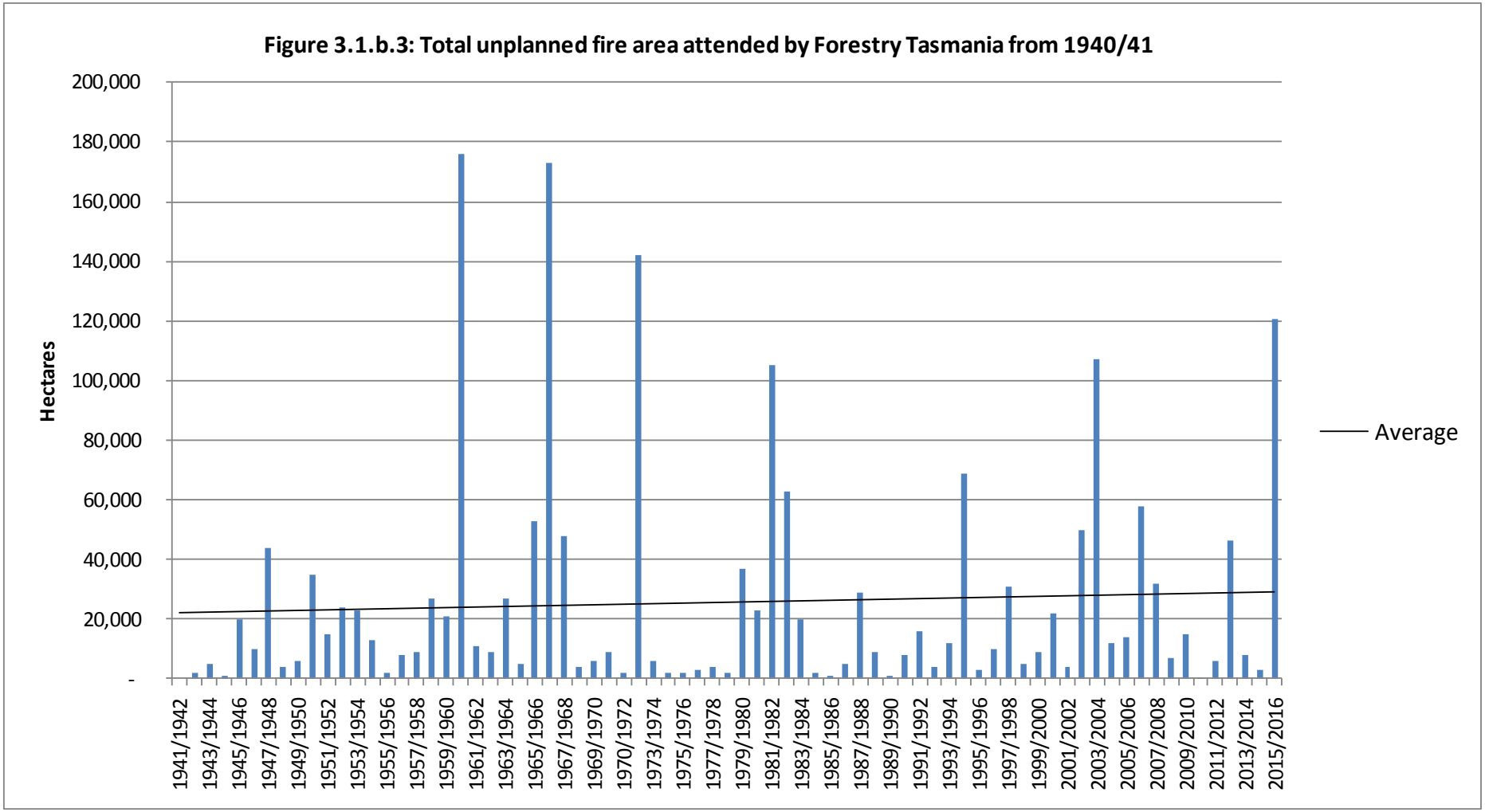

Figure 3.1.b.3: Total unplanned fire area attended by Forestry Tasmania from 1940/41

Note: Includes unplanned fires in non-forested areas and on all tenures

CRITERION 4: CONSERVATION AND MAINTENANCE OF SOIL AND WATER RESOURCES

This criterion monitors the area of forest across Tasmania managed primarily for catchment protection values. Management procedures put in place, including their implementation, to mitigate against the risk of soil erosion and minimise the risk to soil physical properties, water quality and water quantity are also reported.

INDICATOR 4.1.a AREA OF FOREST MANAGED PRIMARILY FOR PROTECTIVE FUNCTIONS

This indicator reports the area of forest land managed for the protection of soil and water values.

Soil and water values are protected on forest land in Tasmania through a range of measures, with two key mechanisms being the *Forest Practices Code 2015* and the *Tasmanian Reserve Management Code of Practice 2003*.

The *Forest Practices Code 2015* provides specific management prescriptions to be applied to forest practices as defined by the *Forest Practices Act 1985* on any forest lands, particularly roading, harvesting or reforestation. The objectives of the *Forest Practices Code* provisions in relation to soil and water are to minimise soil erosion, compaction, nutrient loss and landslides and to maintain acceptable water quality and flow. This code applies over all tenures.

Soil and water values are also protected in nature conservation reserves in Tasmania. The *Tasmanian Reserve Management Code of Practice 2003* applies to all terrestrial reserves managed under the *National Parks and Reserves Management Act 2002*, the *Forestry Act 1920* (repealed in December 2013) and the *Crown Lands Act 1976*. The reserve management code aims to maintain or restore the natural quality of water and to maintain or restore natural soil processes and avoid soil degradation, within reserved lands.

Area of forest where disturbance activities which impact on soil and water values are excluded

Activities that can directly affect soil and water values in forested areas are roading, timber harvesting, burning and recreation activities. The only one of these activities that is broadly excluded from substantive areas of protected land in Tasmania is timber harvesting. The other three activity types listed are rarely fully excluded. However, the potential impacts of these activities are managed through codes of practice, such as those described above. Asset planning for recreation facilities on reserves managed under the *National Parks and Reserves Management Act 2002* shows that most land in reserves is not actively used for recreation by way of roads, tracks etc. Hence although recreation activities are not excluded from most reserved land, by virtue of the small area of land occupied by access and other visitor infrastructure, the vast majority of the area of nature conservation reserves is not subject to disturbance which might impact on soil and water values.

Table 4.1.a provides the area of forest land, within each of the four main land tenure categories, where timber harvesting is excluded. The total area of land excluded from timber harvesting across all categories of land in 2016 is 2 037 000 ha.

Table 4.1.a **Area (hectares) of native forest where timber harvesting is excluded, by tenure (in '000s)**

REPORTING DATE	Land Classification (Tenure)				
	Multiple use forest or PTPZ land[(a)]	Nature conservation reserve[(b)]	Other publicly managed land[(c)]	Private freehold land[(d)]	Total area excluded
June 2001	368	1104	80	3	1556
June 2006	419	1121	85	48	1673
June 2011	582	1172	73	83	1910
June 2016	327	1255	358	96	2037

Notes:

(a) The figures provided in this column include only those areas of native forest on Multiple Use Forest land from 2001 to 2011, and on permanent timber production zone (PTPZ) land in 2016, that are not available for timber harvesting, including areas in informal reserves and areas that are too steep or inaccessible or otherwise excluded by the provisions of the Forest Practices Code.

(b) The nature conservation reserve category includes all formal reserve categories within the CAR reserve system.

(c) This category of tenure broadly includes native forest on Commonwealth land, unallocated Crown land and FPPF land

(d) The figures provided in this column include only those areas of native forest on private land that are within the CAR reserve system (eg conservation covenants, private nature reserves).

During the reporting period 2011 to 2016 the main trends evident from the data provided in Table 4.1.a are:

- There has been a net decrease of 255 000 ha (44%), in the total area of native forest excluded from timber harvesting within what was Multiple Use Forest land and is now permanent timber production zone land. This is primarily due to the gazettal of future potential production forest land.
- There has been a net increase of 83 000 ha, or 7%, in the total area of native forest in nature conservation reserves.
- There has been a net increase of 285 000 ha, or 390%, in the total area of forest on other publicly managed land, primarily because of the gazettal of future potential production forest land.
- There has been a net increase of 13 000 ha in the total area of native forest excluded from timber harvesting on private land. This increase on the 83 000 ha in 2011 reported in *State of the forests Tasmania 2012* is a continuation of a trend identified in the previous report. The ongoing increase is due to the increase in area of forest protected within conservation covenants or other private reserves over the last five years through a range of private land conservation programs.
- In total there has been a net increase of 126 500 ha or 7% of forest across all tenures where timber harvesting has been excluded reducing potential disturbance to water supply catchments.

Area of forest in catchments managed primarily to provide water for human or industrial use

Tasmania has large areas of forested catchments within the CAR reserve system. Many of these catchments are used for water harvest for domestic or industrial use, although the majority of these are not explicitly reserved as water catchment areas. However, under the *National Parks and Reserves Management Act 2002*, all reserve classes have as one of the statutory management objectives the requirement 'to preserve the quality of water and protect catchments'. Two reserves where the role as drinking water catchments is explicitly recognised are Wellington Park and Mt Field National Park. The slopes of Mount Wellington are specifically set aside and managed for town water supply to Hobart and adjacent localities. The *Wellington Park Management Plan 2005*, developed under the *Wellington Park Act 1993*, includes the requirement to manage water catchments in the park as sources of clean water. The Lake Fenton/Lady Barron Creek drinking water catchment covers 1530 ha of the Mt Field National Park and supplies 20% of drinking water for Hobart and environs. The *Mt Field National Park Management Plan 2002* identifies the importance of the catchment for drinking water and provides controls on use and works in the catchment to protect water quality.

There is no statewide area figure available for forest in catchments explicitly managed for water harvest. The total area of forested catchment (ie forest land) in the CAR reserve system is provided in INDICATOR 1.1.c.

Area of environmental plantings of trees on previously degraded or cleared sites, to improve the protective function for soil and water values

The *2007 Sustainability indicators report* included information on plantings undertaken through government funded programs such as the Australian Government's Natural Heritage Trust and the National Action Plan for Salinity and Water Quality. Information on the status of these plantings, and similar initiatives during this reporting period are not available.

During the reporting period there have been plantings initiated by a number of forest companies, including Timberlands Pacific, Norske Skog and Gunns. The plantings are being made in second rotation sites, in areas which are now subject to the *Forest Practices Code* and on pasture sites where there are constraints on establishing plantations adjoining streams. These areas are increasingly being established with native species. For the reporting period 2011–16 approximately 500 ha have been reforested in this way (see Table 2.1.e.2).

INDICATOR 4.1.b MANAGEMENT OF THE RISKS OF SOIL EROSION AND THE RISKS TO SOIL PHYSICAL PROPERTIES, WATER QUANTITY AND WATER QUALITY IN FORESTS

INDICATOR 4.1.b reports the extent to which the risks to the physical properties and distribution of soils, and the risks to water quality and quantity in Tasmanian forests have been explicitly assessed and addressed in forest management.

Maintaining soil and water values in forests is critical to sustainable forest management because:

- soil erosion reduces soil depth, results in loss of nutrient- and carbon-rich topsoil and affects stream water quality and sediment load
- physical degradation of soils, including compaction, mixing and loss of soils structure, can affect seed germination, growth and survival of trees and can lead to increased water runoff and erosion
- downstream users (including the natural ecosystem and commercial and domestic users) depend on natural flows being maintained in streams, although it must be recognised that stream flow and groundwater recharge are affected by wildfires as well as forest age.

Developing a baseline for reporting is difficult, particularly for water quality. For example, turbidity and suspended solids in Australian drinking water in catchments largely free of human intervention can exceed recommended standards due to high levels of natural tannins or organic matter, or movement of organic matter and sediments in floods (Roberts 2008).

Changes in water quality can affect aquatic biodiversity – see CRITERION 1.

The use of chemicals in forest management may affect water quality – see CRITERION 3.

Water quality

Catchment research within Tasmania and in similar temperate forests on the mainland has shown that commercial forestry influences both the hydrological and ecological characteristics of catchments (e.g. Davies and Nelson 1993; Lane and Mackay 2001; Vertessy 1999; Vertessy et al. 2001; Bunce et al. 2001; Davies et al. 2005). A paper by Davies et al. (2016) related stream ecosystem condition to upstream forest management but the study was retrospective and historical: none of the coupes studied were harvested in the reporting period and the average harvest age was pre–1991; in addition, no direct links between stream condition and harvest operations were noted. The percentage of land under grazing in a catchment can be used to predict stream health; when the total exceeds 40% of the catchment area a marked decline of sensitive aquatic invertebrates (a key measure of river ecological health) results. As commercial forests tend to be concentrated in contiguous areas, most forested catchments have healthy rivers (Lefroy 2010) and in commercial eucalypt forests there has been ‘no visible impact of logging on the water flow’ in Launceston water supply catchments (O’Shaughnessy and Bren 2001).

The Department of Primary Industries, Parks, Water and Environment (DPIPWE) maintains an extensive stream gauging and river health monitoring network in Tasmania’s major rural catchments. Water quality is routinely monitored at 86 stream gauging sites, spot sampling turbidity, dissolved oxygen, pH, electrical conductivity and water temperature.

River health is currently monitored at 60 sites across the state in autumn and spring every 2 years.

The monitoring undertaken by the DPIPWE indicate that streams within catchments with a history of forestry operations showed no significant impacts in terms of river health and possessed similar macroinvertebrate communities to those without such operations.

Although use of triazines in plantation forestry resulted in contamination of stream water before 2009 (McIntosh and Hawkins 2005; McIntosh 2007, 2008), the use of these long half-life chemicals has now been drastically curtailed and no records of triazine contamination of streams in forested catchments has been reported to the FPA in the reporting period.

Assessment of risk

As noted previously, the effects of forest practices on soil and stream condition are not routinely monitored at the coupe or catchment level because of the difficulty of obtaining meaningful results and the practical difficulties that arise when trying to establish long-term monitoring: for example monitoring stations may be damaged or destroyed by floods or animals, or vandalised. However, small research-scale studies have produced useful results (e.g. Harwood and Jackson 1975; Bren et al. 1997; Croke et al. 1999; Laffan et al. 2001; Pennington et al. 2001). Studies have shown that the forestry operations that most increase the risk to soil and water values include: the timing of road building; road position in the landscape; road drainage; drainage of temporary tracks and firebreaks; lack of dispersion of timber harvesting operations in catchments; long-term change of land use; operations in or near streams or riparian areas; diversion of water courses; soil compaction; and short periods of high-intensity rainfall, such as 24-hour rainfall exceeding 100 mm, which occur regularly in north-east Tasmania. Depending on its severity and location, fire can lead to erosion and affect water quantity and flow.

An effective alternative to long-term monitoring of soil and water quality is to check whether management provisions for limiting deleterious effects are included in plans and applied during operations. Meaningful indicators of soil erosion risk management are (1) whether preventative measures designed to limit soil and water damage are included in harvest proposals (forest practices plans); (2) whether management guidelines are implemented during harvest operations, rehabilitation and reforestation; and (3) whether operations comply with codes of practices, other regulatory instruments and associated guidelines.

The *Forest Practices Code 2015* and supporting manuals (listed below), other regulatory instruments (listed in Indicator 7.1.a and applying to public and private lands at different scales), environmental certification schemes (such as the Australian Forestry Standard and ISO 14001) and internal agency or company operational guidelines provide benchmarks against which the management of soil and water values can be assessed.

The *Forest Practices Code 2015* manuals which apply to management of soil and water values include:

- Soil
    - Forest Soil Fact Sheets
    - Forest Soils of Tasmania
    - Quarry Code of Practice
    - A method for assessing the erodibility of Tasmanian forest soils
    - Basalt Talus Guidelines
    - Dolerite talus Guidelines

- Guidelines for cut road batters in high erodibility soils
- Sinkhole guidelines
- The Strahan guidelines: Prescriptions and guidelines for sustainable harvest of plantations on high and very high erodibility west coast dune sands

- Water
  - Estimation of Peak Flows for Small to Medium Sized Rural Catchments
  - A Guide to Riparian Vegetation and its Management
  - Riparian Land Management Technical Guidelines
  - Guidelines for the Protection of Class 4 streams.

Irrespective of land tenure or forest type, assessments for soil and water risks are made for all forest activities covered by *Forest Practices Act 1985*. Assessments are also commonly undertaken on public (including conservation) forests and large industrially managed private forests in relation to road and other site developments (e.g. major recreation facilities, ongoing maintenance or infrastructure) not specified under the *Forest Practices Act 1985*. Forest activities not specified under the *Forest Practices Act 1985* (e.g. small-scale firewood harvesting) are not reported.

Table 4.1.b.1and Table 4.1.b.2 indicate the extent to which legally and non-legally binding instruments in Tasmania address risks to soil and water values, using the subjective four-level scale as indicated below, for specified forest management and operations. There has been no change in the way both legally and non-legally binding instruments address the risks to soil and water values during the reporting period 2011–2016 compared to previous reporting periods.

Subjective level scale used to determine the extent to which instruments address the risk to soil and water values for the management disturbance activities in Tables 4.1.b.1 and 2

1	The instruments require the following components to be taken into account in addressing the risk to soil and water values from disturbance: 1) slope 2) erosion processes (wind, sheet, rill, gully, tunnel, stream bank, wave and mass movement) 3) soil characteristics (erodibility, compactability, mixing, soil moisture) 4) rainfall intensity 5) water yields; age structure and proportion of forest in catchments 6) streams and drainage depressions: size, location and number 7) management practices (such as cording of snig tracks, road drainage, stream crossings).
2	The instruments address most of the components listed at one but do not specify all subjects or are limited in their application.
3	The instruments mention the need for addressing risks when conducting disturbance activities but do not specify the components listed above.
4	The instruments do not mention the need for addressing risks to soil or water values.

Table 4.1.b.1 Extent to which legally binding instruments address the risk of soil and water values for the disturbance activities listed

DISTURBANCE TYPE	Multiple-use forest		Nature conservation reserves		Other Crown land		Private	
Mineral exploration/ mining/ quarries	1	1	1	1	2	2	2	2
Native forest harvesting & silviculture, including related road/trail construction and/or maintenance	1	1	NA	NA	1	1	1	1
Plantation operations	1	1	NA	NA	1	1	1	1
Road/trail construction or maintenance (not related to forestry operations)	1	1	2	2	3	3	4	4
Walking trail construction or maintenance	1	1	2	2	3	3	4	4
Utility corridors including pipelines	1	1	2	2	1	1	1	1
Fire management	1	1	2	2	3	3	4	4
Tourism/recreation developments and management	1	1	2	2	3	3	3	3

Table 4.1.b.2 Extent to which non-legally binding instruments address the risk of soil and water values for the management disturbance activities listed

DISTURBANCE TYPE	Multiple-use forest		Nature conservation reserves		Other Crown land		Private	
Mineral exploration/ mining/ quarries	1	1	1	1	–	-	2	2
Native forest harvesting & silviculture, including related road/trail construction and/or maintenance	1	1	NA	NA	-	-	2	2
Plantation operations	1	1	NA	NA	-	-	2	2
Road/trail construction or maintenance (not related to forestry operations)	1	1	2	2	-	-	2	2
Walking trail construction or maintenance	1	1	2	2	-	-	3	3
Utility corridors	1	1	2	2	-	-	3	3
Fire management	1	1	2	2	-	-	3	3
Tourism/recreation developments and management	1	1	2	2	-	-	3	3

Knowledge base

The *Forest Practices Act 1985* requires that 'all forests practices are conducted in accordance with the *Forest Practices Code*'. The Code underpins Tasmania's forest practices system whose objective is 'to achieve sustainable management of Crown and private forests with due care for the environment.' In accordance with the Act's objective, the Code provides a set of practical guidelines and standards for the protection of environmental values (including soil, and water quality and flow) during forest planning and operation:

- Soils
    - *Section D1: Soils*, details prescriptions and principles which underpin operations in order to protect soil values. This includes a guide for identifying a soil's erodibility class (Appendix 6 of the code). Erodibility class then influences operational prescriptions and limitations (as specified in Tables 2, 3, 5, 6 and 10, and Appendices 3, 4, 5 and 6 of the Code) designed to ameliorate the impact of forest activities on soil values.
- Water
    - *Section C4: Water Quality and Watercourse Protection* and *Section D2: Water Quality and Flow* focuses on prescriptions and principles which protect all water catchments and watercourses identified during planning and operational activities within forests. Specific guidelines include culvert spacing along roads (Table 2 of the Code), wet weather harvesting criteria (Table 3 and 5 of the

Code) and wet weather limitations (Section C2) and the establishment of streamside reserves and machinery exclusion zones (Table 8 of the Code).

The Forest Practices Authority website (www.fpa.gov.au) also enables Forest Practices Officers and any member of the public including landowners and managers to access keys to soils and information on soil and water issues that supports the *Forest Practices Code 2015.* These include:

- Soils
    - Soils in Cambrian sediments and volcanics (13 soils)
    - Soils in dolerite and sediments derived from dolerite (14 soils)
    - Soils in granite and sediments derived from granite (24 soils)
    - Soils in granodiorite (6 soils)
    - Soils in Permian sediments (12 soils)
    - Soils in Triassic sandstone and sandstone-dolerite mixtures (10 soils)
    - Soils in Mathinna Beds (16 soils)
- Water
    - Guidelines for the Protection of Class 4 streams
    - Forest Sinkhole Manual.

Soil and water identification, management and support documents, combined with ongoing research and training, and the experience of forest managers ensure that sufficient knowledge is available for the identification and mapping of soil types and water courses, and recording their characteristics and distribution. This knowledge base enables risks arising from the interactions between slope, climate, soil type, rainfall, stream management, and vegetation cover to be assessed and managed.

The Parks and Wildlife Service maintains an ongoing recreation impact monitoring program, mainly in the Tasmanian Wilderness World Heritage Area, until 2015. Soil data were regularly recorded as part of this program.

Using the following qualitative ratings as a guide, an assessment of the comprehensiveness and appropriateness of the knowledge base within Tasmania for managing the risk of soil erosion on each tenure is detailed in Table 4.1.b.3.

Soil and water Knowledge Base Interpretation
1. Knowledge well developed, including: published research, GIS tools, decision support tools, codes of practice, local knowledge and training, site specific research/models
2. Reasonable knowledge of impacts of activity on listed value, includes local knowledge and training, codes of practice
3. Some local knowledge of impacts of activity on listed value, not in codes, research publications
4. Minimal knowledge – general principles but untested in this landscape
5. No knowledge, not in a position to assess and manage the risk.

Table 4.1.b.3 Comprehensiveness and appropriateness of the knowledge base for the management of the risk of soil erosion

TENURE	Scale of knowledge	Narrative on the knowledge base of soil and water values
PTPZ* land and some public land previously known as State forest	1	Major areas of public forest in northern Tasmania have been mapped at 1:250 000 scale; 95 soil types with differing properties and erosion risks have been identified throughout the state, mostly in PTPZ land; areas at risk from erosion are identified in plans and protected or managed appropriately following the *Forest Practices Code*; advice is given through the FPA; notification to the FPA is obligatory for high and very high erodibility soils and for moderate to high erodibility soils on steep slopes; landslides are recorded on a joint FPA/MRT database; research is being conducted on erosion by headwater streams; several papers have been published on erosion by headwater streams; regular training given to foresters and forest managers
Nature conservation reserves	2 and 3	Limited knowledge, generally site specific in areas of management interest e.g. WHA walking tracks, campsites; some publications; managed by the Parks and Wildlife Service.
Other Crown land	3, 4 and 5	Few publications; limited knowledge, generally site specific; managed by Parks and Wildlife Service; remote areas have very limited knowledge (‘5’ classification)
Private	2	One private company (Norske Skog) has mapped the soils of its forest estate; other companies conduct soil surveys on an *ad hoc* basis, generally pre-purchase or before operations begin; soil database is less complete than for multiple-use forest (see above) but procedures to identify and manage risks are similar, viz.: areas at risk from erosion are identified in plans and protected or managed appropriately following the *Forest Practices Code* as for multiple-use forest above.

Assessment of practices

All of the major professional forest management organisations in Tasmania participate in one or more independently assessed environmental management and/or forest certification schemes tied to standards such as ISO14001, The Australian Forestry Standard, and the Forest Stewardship Council (see INDICATOR 7.1.b: Independent assessment of forest activities).

Assessment of forest practices which have been carried out under a forest practices plan (FPP) certified under the *Forest Practices Act 1985* are also undertaken by the Forest Practices Authority on all tenure classes. This assessment takes two forms: compliance reporting on discrete operational phases performed on every certified FPP, and the FPA's annual compliance assessment program performed on a random sample of plans certified in the previous three years (see Table 4.1.b.5 below.) Conservation forest, other Crown lands and private forests are not externally audited unless subject to a forest practices plan or forest certification audit.

Using the following qualitative ratings as a guide, an assessment of the level of processes in place to manage the risk to soil and water values on each tenure is detailed in Table 4.1.b.4.

Qualitative ratings applied to determine Table 4.1.b.4

1	Legal/ non-legal mechanisms exist for managing the risk of soil and water values comprehensively and are subjected to regular external audit
2	Legal/ non-legal mechanisms exist for managing the risk to soil and water values comprehensively but are not subjected to regular external audit
3	There are no legal/ non-legal mechanisms exist for managing the risk to soil and water values and there is no auditing to assess the extent of impacts.

Table 4.1.b.4 The level (1–3) of processes applied to manage the risk to soil and water values

	Permanent Timber Production Zone land		Nature conservation reserves		Other Crown land		Private	
Mineral exploration/ mining/ quarries	1	1	2	2	2	2	2	2
Native forest harvesting & silviculture, including related road construction and/or maintenance	1	1	1	1	1	1	1	1
Plantation operations	1	1	1	1	1	1	1	1
Road/trail construction or maintenance (not related to forestry operations)	1	1	2	2	2	2	2	2
Walking trail construction or maintenance	1	1	2	2	2	2	2	2
Utility corridors	1	1	2	2	2	2	2	2
Fire management	1	1	2	2	2	2	2	2
Tourism/ recreation development/ management	1	1	2	2	2	2	2	2

The FPA's independent assessment process assesses specific aspects of selected operations to determine a performance rating against identified standards. Note the number of operations assessed varies from year to year, but averages about 10–15% of FPPs certified.

Within each tenure group, coupes are randomly selected for compliance assessment. Full details of assessments and methods, including questions addressed, are given in FPA annual

reports, available on the FPA website. 87 questions are considered, using a scoring system ranging from 1 (unacceptable) to 3 (fully compliant) to rate performance. 53 of these questions relate to soil and water issues.

The results in Table 4.1.b.5 indicate that consistently high scores are achieved for compliance inspections concerning soil and water issues on all tenures, demonstrating that operations are generally carried out to a very high standard and that only locally and sporadically do issues require attention. (Note that only summaries for 2014–15 and 2015–16 are given as in previous years a four-point system was used for scoring and results would not be comparable.)

Table 4.1.b.5 Summary of compliance assessments (mean scores out of a maximum score of 3) of soil and water issues on recently-active forestry operations.

YEAR	Independent private	Industrial freehold	Permanent Timber Production Zone land	Total for all tenures
Roading (15 questions)				
2014–15	3.0	3.0	2.9	**2.9**
2015–16	2.9	2.9	2.9	**2.9**
Harvesting (18 questions)				
2014–15	2.9	2.9	2.9	**2.9**
2015–16	2.9	2.9	2.9	**2.9**
Reforestation (13 questions)				
2014–15	2.9	3.0	2.5	**2.9**
2015–16	2.8	2.8	2.8	**2.8**
Soil erosion and watercourse classification (7 questions)				
2014–15	3.0	3.0	3.0	**3.0**
2015–16	3.0	3.0	3.0	**3.0**

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CRITERION 5: MAINTENANCE OF FOREST CONTRIBUTIONS TO GLOBAL CARBON CYCLES

Estimates of total forest biomass allow temporal changes in the total carbon pool to be identified. Categorising forest into types helps pinpoint where changes are occurring. The data provided below for Tasmania has been supplied by the Commonwealth Department of Environment and Energy utilising systems underpinning the National Greenhouse Gas Inventory.

INDICATOR 5.1.a TOTAL FOREST ECOSYSTEM BIOMASS AND CARBON POOL

Forests are large natural pools of carbon; estimates of their biomass are a measure of their contribution to global carbon cycles.

Australia's National Inventory System provides annual national estimates of greenhouse gas emissions, including emissions and sinks in the land sector, which is largely made up of forest and agricultural activities.

Data presented in this *State of the forests Tasmania 2017* focusses on total biomass carbon and living biomass carbon, which are units the Federal Carbon Accounting System is designed to produce, rather than above-ground biomass as reported in previous *State of the forests Tasmania* reports. As a general rule above-ground biomass carbon can be doubled to provide an estimate of total above-ground biomass. Comparisons to previous *State of the forests Tasmania* Reports should be made with caution, as significant improvements to sources and methods have been applied to the series by the Department of Environment and Energy.

Estimates of carbon in forest biomass for 2006, 2010 and 2015 are presented in Table 5.1.a. These estimates have been produced using spatial simulations of land use changes detected by satellite imagery, in conjunction with the Full Carbon Accounting Model (FullCAM). The National Inventory System operates in time-series and all methodological changes are reflected in retrospective updates to the entire time-series. Therefore there is comparability in estimates over time, and change can be assessed. Further information on the sources and methods used in these simulations are available in volume 2 of the Department of Environment and Energy's National Inventory Report (2015) and for the recent updates to the model, the Federal Department of Environment and Energy.

With a lack of large landscape level disturbances the carbon content of major vegetation groups and their sum has remained relatively constant over the three reporting periods. This, and Tasmania's forest management system that promotes and enforces sustainable forest management practices, indicates that the contribution of Tasmanian forests to global carbon cycles has been maintained.

Table 5.1.a Estimated biomass carbon in Tasmania by vegetation type

Major vegetation group	Mean biomass carbon[1] 2015	Area (kha)			Total above-ground living biomass carbon (millions of tonnes)			Total biomass carbon[1] (millions of tonnes)		
	(t C/ha)	2006	2010	2015	2006	2010	2015	2006	2010	2015
Acacia forest and woodland	396	14	14	14	2	2	2	6	6	5
Acacia shrubland	244	1	1	1	0	0	0	0	0	0
Callitris forest and woodland	355	0	0	0	0	0	0	0	0	0
Casuarina forest and woodland	186	14	14	14	1	1	1	3	3	3
Eucalyptus low open forest	212	17	17	17	1	1	1	4	4	4
Eucalyptus open forest	380	1962	1954	1964	292	291	298	747	741	746
Eucalyptus open woodland	201	74	72	73	4	4	4	15	15	15
Eucalyptus tall open forest	432	733	732	735	129	129	133	316	314	317
Eucalyptus woodland	256	535	534	537	45	44	44	137	137	137
Heath	236	163	161	164	12	12	12	39	38	39
Low closed forest and closed shrubland	468	252	252	253	51	51	51	118	118	118
Other forest and woodland	636	35	34	35	11	11	11	22	22	22
Other shrublands	273	67	67	68	6	6	6	18	18	18
Rainforest and vine thickets	571	834	834	836	227	228	229	476	476	477
Total		**4700**	**4686**	**4710**	**781**	**780**	**792**	**1900**	**1892**	**1901**

[1] biomass carbon is the sum of living and dead organic matter, including soil organic matter.

Source: Federal Department of Environment and Energy.

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CRITERION 6: MAINTENANCE AND ENHANCEMENT OF LONG-TERM MULTIPLE SOCIO-ECONOMIC BENEFITS TO MEET THE NEEDS OF SOCIETY

This criterion, and associated indicators, are intended to show the extent to which forests contribute to national and regional economies, benefit personal and community wellbeing, and support cultural values. Socio-economic data are important measures of the monetary and non-monetary value and benefits of forests to society. In addition, Tasmanian communities have strong social and cultural connections to the forests, including for provision of wood and non-wood forest products, direct and indirect employment and nature-based recreation.

The past five years has seen significant changes to Tasmanian forestry legislation, a changing forestry business environment, and a renewed interest in the Tasmanian forestry sector. The impact of these changes are reflected in the socio-economic data reported.

The indicators in this criterion are considered in five sub-criteria.

6.1: Production and consumption

This sub-criterion provides data and analysis on the socio-economic benefits to the Tasmanian economy of both value and quantities of both timber and non-wood products.

INDICATOR 6.1.a. VALUE AND VOLUME OF WOOD AND WOOD PRODUCTS

This indicator enables socio-economic benefits to be monitored by ascertaining trends in value and volume of wood production.

Volume

The wood production and volume data for this report has been sourced from the annual reports of Forestry Tasmania and Private Forests Tasmania. These reports provide comprehensive data on the harvest of wood from both plantations and native forests. Private Forests Tasmania reports data from all companies sourcing significant volumes of wood from private forests. Table 6.1.a.1 shows the reported volumes of wood harvested for the previous five financial years.

Table 6.1.a.1 Quantity of wood produced from public and private forests in Tasmania

ANNUAL PRODUCTION	2011–12	2012–13	2013–14	2014–15	2015–16
Hardwood – native forest: high quality sawlog, high quality veneer (m^3)	109 946	120 932	128 259	119 855	127 057
Hardwood – native forest: other sawlog, veneer, peeler, special timbers (tonnes)	613 262	421 914	237 547	189 161	266 769
Hardwood - native forest pulpwood (tonnes)	420 101	420 611	719 807	714 810	831 803
Hardwood - plantation sawlogs (m^3)	1 864	1 264	0	37 466	71 611
Hardwood - plantation pulpwood (tonnes)	313 960	364 896	1 082 102	1 252 864	1 942 166
Softwood - sawlog (m^3)	423 765	577 919	551 606	580 784	582 800
Softwood - pulpwood (tonnes)	583 867	684 716	576 703	501 534	553 229
Total Production*	**2 466 765**	**2 592 252**	**3 296 024**	**3 396 474**	**4 375 435**

Source: Forestry Tasmania Annual Reports (2011–12 to 2015–16) and Private Forests Tasmania Annual Reports (2011–12 to 2015–16). * Assumes 1 m^3 = 1 tonne

The data illustrates the difficult period the Tasmanian forest industry has experienced since 2011–12, notably the:

- collapse of the largest private forestry business, Gunns Limited
- collapse of hardwood plantations management entities; and
- the comparatively high value of the Australian dollar against the US dollar, in which international wood exports are traded.

The data further indicates the more positive levels of activity in the industry since 2013–14. In 2015–16, volumes increased by 28% from the previous financial year. The biggest growth has occurred in the hardwood plantation pulpwood sector, with an increase of 55 percent in 2015–16 compared to the previous financial year.

Figure 6.1.a.1 Trends in total wood production on public and private forests in Tasmania 2006–16 (tonnes)

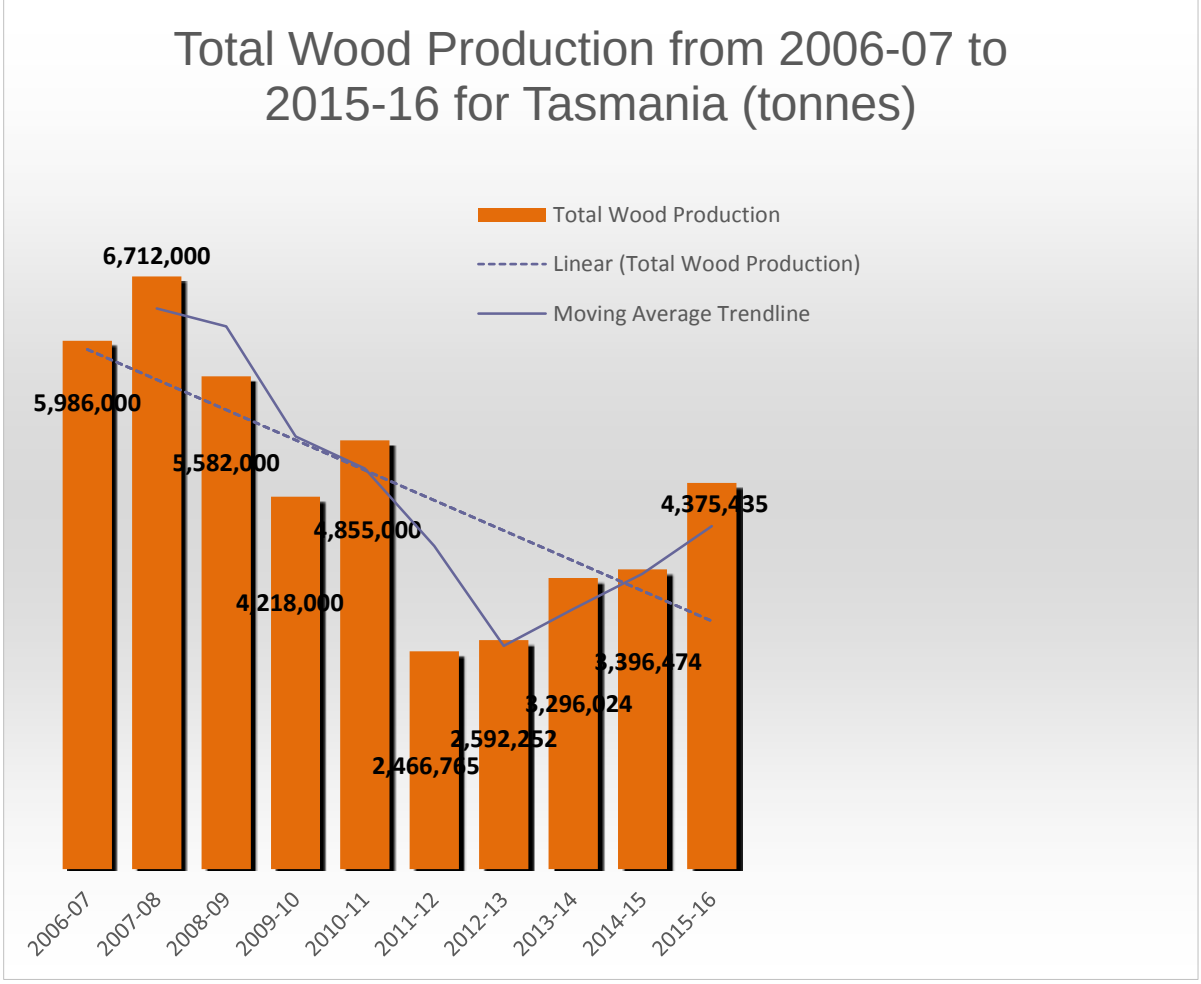


Figure 6.1.a.1 shows that from 2006 to 2011 there was a downward trend in production. Lowest production levels were in 2011–12, with a total wood volume of 2.4 million tonnes.

Since 2011–12, there has been a significant recovery, with gains in annual output experienced for the following four financial years.

2015–16 total wood production figures were still 34% below the peak output achieved in 2007–08. Looking forward, it is expected that the hardwood plantation pulpwood sector will remain the highest yield sector by volume.

In the five years since *State of the forests Tasmania 2012*, new private plantation enterprises have been established in Tasmania. New Forests (an investment manager in forestry, land management, and conservation) purchased the hardwood plantations previously owned by Gunns Ltd. Since acquiring the former assets of Gunns, New Forests has embarked on an investment program, through its forest manager, Forico, to rapidly build productive capacity. Forico has since gained Forest Stewardship Council (FSC) certification. As Tasmania's largest private owner of hardwood plantations, the increase in production by Forico has strongly influenced the overall production figures for Tasmania, with the company forecasting even greater volumes over the short to medium term.

The remaining timber sectors have been fairly stable over the previous five years. Native forests are starting to see an increase in production, mainly confined to the native forest pulpwood sector.

Figure 6.1.b.1 Native Forest Pulpwood Production Volumes and the AU-US Exchange Rate

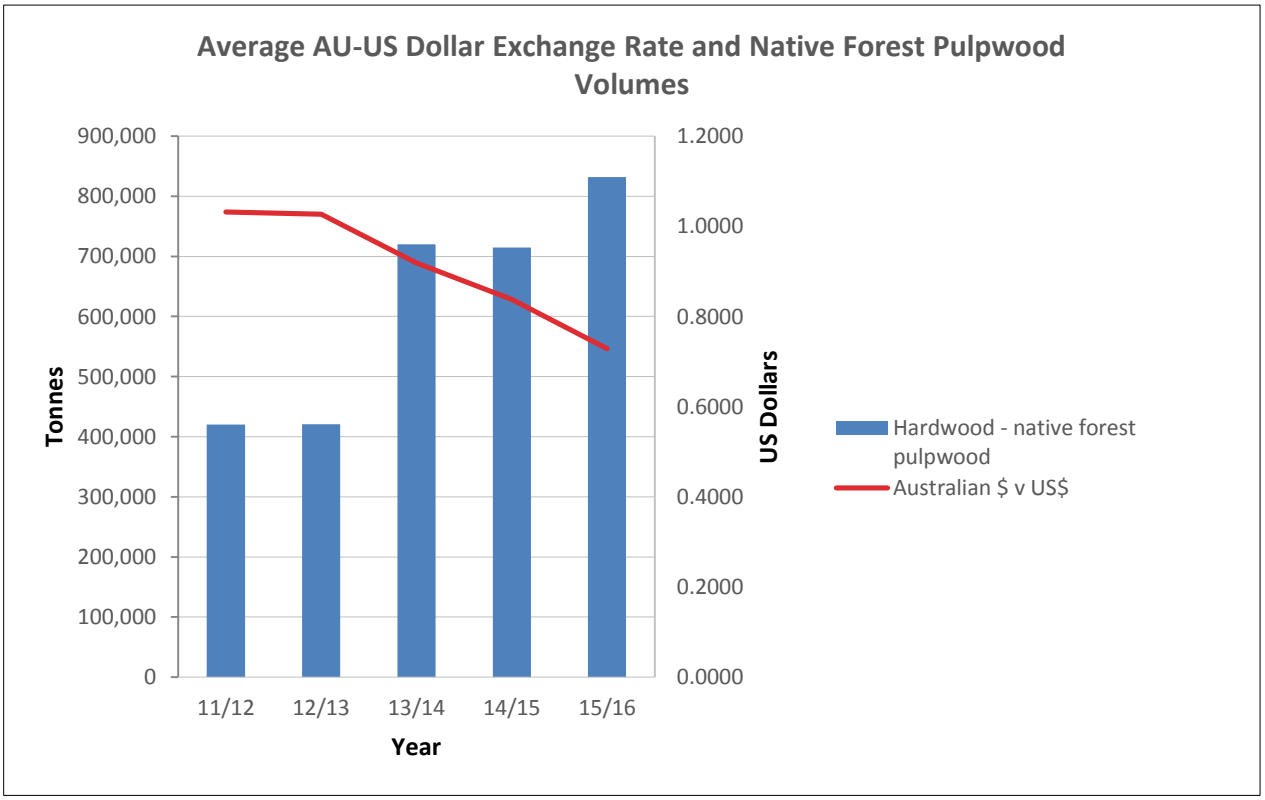


Figure 6.1.b.1 highlights the negative correlation between the Australian dollar-US dollar exchange rate and native forest pulpwood production. Between 2011–12 and 2015–16, the Australian dollar depreciated by 30 percent against the US dollar. In that five year period, the volume of native forest pulpwood produced increased by 98 percent.

There are a number of other factors that have affected the annual volumes of native forest hardwood produced over the preceding five years. However, the declining value of the Australian dollar (against the US dollar) has made Australian woodchips more competitive in

Asian pulpwood markets. Native forest pulpwood is a bulk commodity that competes for market share with pulpwood sourced from hardwood plantations and native forests from Australian and international sources.

Forest management certification has also emerged as an important element of market access. Forest Stewardship Council (FSC) certification has become increasingly prominent, particularly with respect to access to Japanese pulp markets.

Value

The forest industry in Tasmania is comprised of many different components. Deriving a complete and accurate picture of the forest industry in Tasmania is a complex task. However, there are various sources of information, included below, that will help to assist in providing a guide to the size and scale of the Tasmanian industry in monetary terms.

ABARES publishes an annual *Australian Forests and Wood Products Statistics (AFWPS)* report that contains data relevant to Tasmania's forestry industry and the economic value this generates in regional communities.

Table 6.1.a.2 Value of Logs Harvested in Tasmania (millions of dollars)

	2011–12	2012–13	2013–14	2014–15	2015-16
Hardwood native	81	58	71	73	78
Harwood plantation	14	23	71	95	149
Softwood	79	77	72	63	66
Total	**174**	**158**	**214**	**231**	**293**

Source: ABARES AFWPS

Table 6.1.a.2 gives an indication of the transition that has taken place in Tasmanian forestry, where the value of logs harvested from plantations now exceeds the value harvested from native forests by a significant margin.

The value of the native forest hardwood harvest in 2015–16 was 54% less than the 2010–11 value ($170 m). The value of native forest hardwood logs harvested has stabilised over the last three years of the reporting period.

The value of hardwood plantation logs harvested has increased ten-fold over the reporting period, although the volume of logs harvested increased six-fold. This reflects increasing value in the market of these products. Hardwood plantation production is expected to increase over the short to medium term, with a maturing plantation estate and a simultaneous increased investment in processing technologies to increase processing capacity.

The following table provides data on the value of certain components on the wood manufacturing industry in Tasmania over a five year period.

Table 6.1.a.3 Wood Manufacturing Data for Tasmania – ABS Manufacturing industry by States and territories by ANZSIC subdivision (millions of dollars).

	2011–12	2012–13	2013–14	2014–15	2015-16
Wood product manufacturing	350	256	335	381	389
Furniture and other manufacturing	74	77	78	81	NA*
Pulp, paper and converted paper product manufacturing	356	336	NA	NA	NA

Source: ABS NA* means data not available

The data in Table 6.1.a.3 is for the Sales and Service Incomes of these sectors within the timber industry. Again, the table demonstrates the volatility faced by the forest industry in Tasmania over the past 5 years.

Sales values of furniture and from other manufacturing has been consistent over the previous five years, although the figures suggest a reduction in value in real terms.

The value of wood product manufacturing, after a severe decline in 2012-13, has steadily increased to $389m. Furniture and other manufacturing, and pulp and paper manufacturing have remained relatively stable for the years for which data are available.

INDICATOR 6.1.b VALUES, QUANTITIES AND USE OF NON-WOOD FOREST PRODUCTS

This indicator enabled socio-economic benefits to be monitored by ascertaining trends in quantities, values and usage of non-wood products against management objectives.

State of the forests Tasmania 2012 provided some data and analysis on various other non-wood forest products produced from the forests. Changes in the types of data collected, and the levels of monitoring by Government and industry bodies, means that some data relied upon in 2012 is no longer available. This report has relied on those data sources that remain available, together with other research and industry observations.

Honey and Beeswax

The apiary industry is regulated by the Department of Primary Industries, Parks, Water and Environment (DPIPWE).

Honey is the major commercial output of the honey bee industry. There are a number of other products which also add to the income of honey bee businesses, and include paid pollination services, beeswax production, queen bee and packaged bee sales.

Leatherwood honey is the most distinctive Tasmanian honey, and accounts for a significant proportion of sales, particularly outside of the State.

Leatherwood (*Eucryphia lucida*) trees predominantly occur in mature wet eucalypt forest and rainforest. Approximately one million ha of forest in Tasmania has been identified as likely to contain leatherwood. Of this, 230 000 ha (21%) occurs on permanent timber production zone land, with about 98 000 ha of this area zoned for wood production.

The majority of beekeepers in Tasmania depend on land managed by Forestry Tasmania for access to leatherwood nectar.

Beekeeping is identified as a management objective for areas with a high leatherwood component under Forestry Tasmania's Management Decision Classification zoning system. Harvesting in these special management zones takes particular account of maintaining and enhancing leatherwood sources.

In 2014, the Australian Bureau of Agriculture and Resource Economics and Sciences (ABARES) determined the gross value of production (GVP) of the beekeeping industry in 2012–13 in Australia was $88 million, with a forecasted GVP of $92 million in 2013–14 (ABARES, 2014). The relatively small beekeeping industry GVP understates the industry's value to agriculture, and the economy in general, particularly through pollination services, which provide a vital service which generates significant revenue for the agriculture industry in Tasmania. Economic studies of this industry in the past have shown its annual contribution to our economy to be about $100 million of which at least 90% is through crop pollination (DPIPWE, 2010).

Table 6.1.b.1 Registered Beekeepers and Bee Hives in Tasmania

	2011–12	2012–13	2013–14	2014–15	2015–16
No. Reg. beekeepers	169	173	181	186	215
No. Reg. hives	17 243	16 084	16 490	19 660	19 930

Source: Department of Primary Industries, Parks, Water and Environment

Beekeeping, and the industries dependent on it, remains a relatively small-scale industry in Tasmania. There are seven commercial honey operations registered in the state (Tasmanian Beekeepers).

The registration numbers provided by DPIPWE indicate a continuing increase in the number of registered beekeepers, although the number of hives per registered bee keeper has fallen, suggesting that the bulk of the increase has been in small-scale bee keeping operations. As noted in relation to Table 2.1.d.1, the number of hives known to be located on public forest exceeds the number of registered hives reported in Table 6.1.b.1 , due to hive registration being non-compulsory at the present time.

Seed

Forestry Tasmania collected 1066 kilograms of native tree seed for the 2015–16 financial year. This is an increase on the previous three financial years, yet still less than the 2011–12 financial year when 1406 kilograms of seed were collected.

Table 6.1.b.2 Annual Collection of Native Tree Seed

Year	Raw seed (Kg)
2011–12	1406
2012–13	402
2013–14	352
2014–15	710
2015–16	1066

Source: Forestry Tasmania

Wildlife Harvesting

Since the data for 2010 were published in *State of the forests Tasmania 2012*, no further data or statistics have been collected by DPIPWE on the amounts of wallaby and possum meat processed every year. Data is compiled by DPIPWE each year on the number of recreational and crop protection licences issued for some species of game in Tasmania. The business of controlling and protecting crops from economic losses incurred from animal incursions helps support regional businesses and employment.

The table below provides some data on the number of fallow deer licence sales and the number reported to have been taken.

Table 6.1.b.3 Fallow Deer Licence Sales and Reported Take 2011–2015

	2011	2012	2013	2014	2015
Licences sold	4 163	4 325	4 452	4 607	4 792
Reported take	3 816	4 383	4 061	4 016	4 975

Source: DPIPWE Game Tracks Publication

Table 6.1.b.4 Fallow Deer Crop Protection Tags Issued 2011 – 2015

	2011	2012	2013	2014	2015
Tags issued	3 983	6 263	7 670	10 981	16 708

Source: DPIPWE Game Tracks Publication

Treeferns

There are five species of treefern that occur naturally within Tasmania, *Dicksonia antarctica, Cyathea australis, C. cunninghamii, C. marcescens* and *Todea barbara*. *Cyathea cunninghamii* and *C marcescens* are listed as threatened species on the Tasmanian *Threatened Species Protection Act 1995*. *Dicksonia antarctica* (manfern or soft treefern) is the only species of treefern that can be harvested or traded.

The harvesting of treeferns in Tasmania is regulated under the *Forest Practices Act 1985*. In 2001 a treefern management plan was developed by the Tasmanian Government in consultation with the Australian Government to meet the requirements of the Tasmanian *Forest Practices Act 1985* and the Wildlife Trade Guidelines, under the provisions of the *Environment Protection and Biodiversity Conservation Act 1999*. The objective of the Treefern Management plan is to facilitate the legal and sustainable harvest and export of treeferns.

The Treefern Management Plan remains in force for a maximum period of five years. It has been revised in 2005, 2007 and 2012. The next revision is currently underway and due in November 2017. Revisions made in 2007 enabled tree fern harvesting to occur in areas subject to clearfall, burn and sow silviculture, in addition to areas being converted from native forest to another land use such as plantations or agriculture. In either scenario treefern harvesting allows for utilisation of treeferns without compromising the maintenance of the species in the landscape. The Treefern Management Plan 2012 provides guidelines for the harvesting of trunked treeferns from native forest operations, including the salvage harvesting of treeferns from areas where they would otherwise be destroyed, as well as harvesting within existing plantations, treefern plantations or nursery sites.

All harvested treeferns must have a Tasmanian treefern tag issued by the Forest Practices Authority securely attached at the point of harvest. Treeferns cannot be sold on a wholesale or retail basis without a tag. The Forest Practices Authority is responsible for regulating treefern harvesting to ensure that such harvesting meets the objectives of the Tasmanian Treefern Management Plan. Failure to comply can result in substantial penalties.

In July 2011 the Forest Practices Regulations 2007 were amended to allow for two categories of treefern stem lengths: below 30cm (small) and above 30 cm (large). The tag cost of a large fern was set at one fee unit, and the tag cost of a small fern set at 0.5 of a fee unit in a given financial year. Table *6.1.b.5* shows the number of treefern tags issued annually by the Forest Practices Authority for the most recent reporting period, and at the end of each previous reporting period, and at the introduction of the tree fern tag system.

Table 6.1.b.5 Number and Value of Treefern tags issued by year 2013–2016

Year	Tree fern size	Number of tags issued	Tag cost ($)	Value of treefern tags issued ($)
2002–03	all	**64 182**	2.16	**138 633**
2005–06	all	**45 131**	2.34	**105 607**
2010–11	all	**10 729**	2.72	**29 182**
2011–12	large	13 457	1.40	18 840
	small	8720	0.70	6104
Total		**22 177**		**24 944**
2012–13	large	5891	1.44	8483
	small	2681	0.72	1930
Total		**8572**		**10 413**
2013–14	large	5652	1.46	8252
	small	3330	0.73	2431
Total		**8982**		**10 683**
2014–15	large	6864	1.48	10 159
	small	4150	0.74	3071
Total		**11 014**		**13 230**
2015–16	large	8896	1.51	13 433
	small	4190	0.75	3142
Total		**13 086**		**16 575**

Source: Forest Practices Authority annual reports (2012–16)

The data in Table 6.1.b.5 reflects the general pattern of production from the forest industry over the last five years, with a steep decline in 2012–13 and 2013–14 as the industry restructured, and the subsequent improvement in output. This trend can be attributed to the loss of export markets, a reduction in conversion and clearfell operations, and fewer treefern harvesters in operation. There is also possibly a need for more efficient systems to identify suitable areas and enable treefern harvesters to access them prior to timber harvesting.

References

Forest Practices Authority (2012) Treefern Management Plan for the Harvesting, Transporting, or Trading of *Dicksonia antarctica* in Tasmania. Forest Practices Authority, Hobart.

Tasmanian Beekeepers Association: www.tasmanianbeekeepers.org.au

http:--www.rirdc.gov.au-research-programs-animal-industries-honeybee

INDICATOR 6.1.c VALUE OF FOREST BASED SERVICES

Marketing of forest-based services such as ecotourism and credit schemes for carbon, salinity, and ecosystem services provide economic value. Although their contribution to the national economy can be relatively small compared with the value of wood products, public awareness of such services is increasing and they are growing in economic importance.

Forest-based recreation and tourism services are included in this indicator. There are numerous forest-based tourism experiences marketed in Tasmania, but data regarding visitor numbers and revenues are generally not available for the forest-based tourism sector alone.

One exciting example of successful forest-based tourism, the internationally recognised Blue Derby Mountain Bike Trails, has been developed in the north-east of Tasmania during the period covered by this report (2012–2016).

Blue Derby Mountain Bike Trails are a joint project of Dorset and Break O'Day Councils. 80 kilometres of trails have been constructed through forested areas managed by Forestry Tasmania and the Parks and Wildlife Service. Statistics collected by the Councils indicate that the trails have been attracting approximately 2000 riders per month over the summer period 2015–2016, which is expected to increase to 3000-4000 per month. To date, over 50% of these riders are visitors from interstate, and spend on average 3 nights in the Derby area and 7 nights overall in Tasmania (Tim Watson, General Manager Dorset Council, pers. comm.).

A report was prepared by TRC Tourism Pty Ltd in April 2016 estimating the impact on the local economy of the trails developed to date in the Derby area (Stage 1), and the potential impacts of 112 kilometres of proposed trail extensions to Blue Tier and St Helens (Stage 2). The figures quoted below are taken from this report, although the Council data suggest that this report may underestimate the benefits to the region. This report analysed visitor data and estimated 14 476 mountain bike visitors to the existing trail network for 2015 (actual trail counts were 22 000 for the first 14 months of operation) . This number was projected to grow to at least 40 574 by 2019 if the additional 112 km of trails were constructed, with a best-case scenario of 59 707 visitors.

During the construction phase in 2017 and 2018, the report estimated that 3.7 million would be spent on trail development, with an additional $800 000 spent on related infrastructure and activities. This would generate an average of 8.0 continuous FTE jobs over the 2-year construction period. The current number of jobs in the Break O'Day and Dorset local government areas supported by the existing trail network (Stage 1) is estimated at 29.1 FTEs in 2015, projected to grow to 114.7 with the completion of the full trail network.

Once the operational phase of the project begins in 2019, based on the projected visitor numbers, length of stay and average spending per day, mountain bike (MTB) spending in the region would total at least $24.3 million with the completion of the trails network.

The Australian Cross Country Marathon Mountain Bike Championships were held in Derby in 2015 and 2016, attracting over 250 competitors. In July 2016 it was announced that the second round of the Enduro World Series would be held in Derby in April 2017. The event will attract 450 international and Australian riders, 60 visiting journalists and will be the first time the event has been held in Australia.

The tourism associated with MTB trail development has also had significant positive impacts on local businesses, accommodation providers, and real estate sales. Businesses directly related to mountain biking, such as hire and shuttle services, have also reported significant increases in trade.

The economic impact is particularly significant as the north-east is a forested region which has traditionally benefitted from the forest industry, but has suffered severely from recent mill closures and the general downturn in forest harvesting. The success of the trails can be attributed in large part to cooperation between Forestry Tasmania and the Dorset and Break O'Day Councils.

Forest services which may not provide direct economic benefits can still be given a value. In September 2015 the State Treasurer and the Minister for Resources directed Forestry Tasmania to provide numerous community services, with funding provided by the State Government. Among these were Public Recreation Sites ($0.18 million), Forest Education Activities ($0.2 million) and Non-commercial Tourism ($0.11 million).

The reporting period 2011–16 has seen the development of a community awareness of carbon related issues and emergence of schemes that seek to sell carbon capture services through planting or retaining trees. For example, Greening Australia has planted native species to revegetate a total area of approximately 1200 ha during this reporting period (Neil Davidson, pers.comm).

References

TRC Tourism (2016) Review of Economic Potential of Stage 2 Development of Blue Derby MTB Trails – Extension to the East Coast. Prepared for the Break O'Day Council.

INDICATOR 6.1.d PRODUCTION AND CONSUMPTION AND IMPORT/EXPORT OF WOOD, WOOD PRODUCTS AND NON-WOOD PRODUCTS

This indicator provides a measure of the trends in the production and consumption of wood and wood related products in Tasmania, and the export of those products from Tasmania. Ongoing access to interstate and international markets is fundamental in ensuring the viability of the forestry sector, as witnessed over the last three to four years.

Limited data are available at the State level for this indicator, with the dollar value of the goods imported and exported not recorded. However, the volumes of forestry products exported from, and imported into, Tasmania are recorded.

Wood products exported from Tasmania

Table 6.1.d.1 provides data on the export of wood products from Tasmania obtained from TasPorts. This data records all the wood and wood related products that leave Tasmanian shores. However, it does not record the final destination, with some of the goods consumed in international markets, and some consumed in domestic markets.

Table 6.1.d.1 Wood and Wood Products Exported from Tasmania (tonnes)

PRODUCT	2011–12	2012–13	2013–14	2014–15	2015–16
Roundwood logs	312 525	226 682	256 407	250 755	412 629
Woodchips	788 918	904 066	1 877 256	2 145 233	2 615 655
Veneer	165 474	81 048	100 843	95 352	72 469
Paper-newsprint	233 206	228 356	189 461	235 619	245 114
Other wood products	110 591	104 279	92 106	90 450	88 631

Source: TasPorts

Woodchips are the dominant product exported from Tasmania (in terms of tonnage), with the bulk of this commodity destined for markets in Asia.

Export woodchips have gradually recovered since 2011–12, primarily reflecting the successful restructuring of private hardwood plantation estates, as well as improved terms of trade through the depreciation of the Australian dollar. From 2011–12 to 2015–16, the volume of woodchip exports has increased by over 230%.

Also notable in Table 6.1.d.1 is the declining trend for exports of veneer products since 2011–12. This is primarily as a result of reduced supply of peeler logs from public native forests, as a result of the reduced native forest estate available for wood production.

The volumes of roundwood logs exported have increased. This reflects a general increase in whole log exports across Australia, in response to increased Asian demand. Small diameter logs can be cost-effectively peeled in Asia, utilising small–scale, low technology processing techniques to produce veneers for a range of applications.

The volume of paper and newsprint exported has been fairly consistent over the previous five years, a notable exception was 2013–14 which recorded a significant decline. This sector is highly dependent on the fortunes of print media, where there is a continuing trend away from newspapers and magazines, to electronic media. This trend is expected to continue for at least the short to medium term.

Wood products imported to Tasmania

There is minimal data available from TasPorts on the volumes of wood and wood related products imported to Tasmania. Tasmania is a net exporter of forest and forest related products.

Table 6.1.d.2 Wood and Wood Products Imported to Tasmania (tonnes)

Product	2011–12	2012–13	2013–14	2014–15	2015–16
Paper-newsprint	72	109	55	49	359
Other wood products	15 454	13 550	12 908	15 631	18 721

Source: TasPorts

Table 6.1.d.2 shows the low volumes of wood and wood related products imported to Tasmania over the last five years. Products in the category of 'Other Wood Products' are primarily associated with manufactured furniture products.

Non-wood products

Data and statistics on the volumes and values of non-wood forest products exported from Tasmania are not available. In *State of the forest Tasmania 2012*, there were data on treefern destination countries for all of Australia and some limited data on the destination of possum meat. This data is no longer collected by the relevant agencies.

INDICATOR 6.1.e DEGREE OF RECYCLING OF FOREST PRODUCTS

This indicator provides information on the extent to which recycling and reuse of forest products occurs in Tasmania. Recycling of forest products can, in the broad sense, be linked to the conservation of forest resources by reducing the overall demand for new raw materials direct from the forest.

Data on recycled and/or consumed forest products are available only in a generalised form and is limited in extent. It is known that white office paper, newsprint, cardboard and liquid paperboard are all recycled within Tasmania although data on actual quantities consumed could not be sourced. The data provided in Table 6.1.e below regarding recycling of packaging materials were provided to the Commonwealth National Environment Protection Council (NEPC) by the State of Tasmania, and are sourced from the annual reports of NEPC. They relate to the National Environment Protection Measure (NEPM) entitled 'Used Packaging and Materials'.

Table 6.1.e Recycling of Packaging Materials in Tasmania by year (tonnes)

YEAR	Total packaging paper i.e. Cardboard, liquid paper board	Total non-packaging paper, i.e. Mixed, white office, newspaper, magazines
2011–12	23 250	18 599
2012–13	24 698	18 583
2013–14	17 643	12 579
2014–15	24 250	13 484
2015–16	NA	NA

Source: National Environment Protection Council (NEPC) Annual Reports

The same NEPC annual reports indicate that for the period 2011–2013, 94% of Tasmanian households had access to a recycling service, and 73% participated in recycling. In 2013–15 these figures were 82% and 82% respectively. However, these figures relate to all materials recycled, not just forest-based materials such as paper and cardboard.

Data in previous *State of the forests Tasmania* reports relied largely on data from the Publishers National Environment Bureau, which is now under the umbrella of NewsMediaWorks. Their website cites a report done in 2013 entitled the 'Old Newsprint Recovery Figures Report' which cites a national recycling rate for this product as 78%.

Resource recovery of timber products occurs as well, with tip shops and salvage shops offering old timber furniture and construction timber for reuse (including items recovered from demolitions or renovations).

References

National Environment Protection Council (NEPC) Annual Reports 2011–2012, 2012–13, 2013–14, 2014–15, 2015–16.

NewsMediaWorks report : http://www.newsmediaworks.com.au/australian-newsprint-the-most-recycled.

6.2: Investment in the forest sector

INDICATOR 6.2.a INVESTMENT AND EXPENDITURE IN FOREST MANAGEMENT

This sub-criterion reports on investment and expenditure in forest management, and the development and implementation of new technologies.

This indicator aims to monitor the investment in managing all forests and plantations, and expenditure on developing, maintaining, and obtaining goods and services from them.

Investment in active forest management is undertaken by a wide range of government agencies, private companies, community groups and associations, and individuals. The level of management ranges from specific projects to integrated approaches that are funded by grants, budgetary appropriation, commercial operations and private donations. The complexity of organisations and funding models means that comprehensive data on the level of this investment in forest management are not readily available.

Forest management investments include, but are not necessarily restricted to:

- establishing, maintaining, conserving and re-establishing native and plantations for commercial and non-commercial uses, including wood and non-wood products
- identification, maintenance and management of biodiversity values
- monitoring, maintaining and enhancing water quality and production capacity
- establishing, maintaining and enhancing recreational and tourism facilities and opportunities, including access
- constructing, maintaining and decommissioning infrastructure such as roads, bridges, walking tracks and fire breaks
- identifying, developing and providing contemporary education, information and training, and opportunities for individuals, groups and organisations involved in forest management
- establishing processing facilities for both wood and non-wood forest products.

Business reporting requirements adhere to accounting standards and, as such, do not clearly identify investment and expenditure solely attributable to forest management. There are currently no Australian publicly-traded businesses operating in the forest sector in Tasmania.

Between 2005–06 and 2012–13, it was estimated that expenditure by the Tasmanian forest industry fell by approximately 70%. In 2005–06 expenditure was estimated at $1.4 to $1.6 billion, and had fallen to around $452 to $395 million by 2012–13 (J. Schirmer et al, 2014*)*.

Table 6.2.a.1 lists alphabetically the major public and private forest organisations that undertake investment in and expend monies in forest management in Tasmania.

Table 6.2.a.1 Major organisations investing in forest management in Tasmania

Organisation	Function
Department of Primary Industries, Parks, Water And Environment	Tasmanian government agency – monitoring and research into natural forest values including land, biodiversity and water.
Forest Practices Authority	Tasmanian statutory authority – forest practices regulator.
Forestry Tasmania	Tasmanian government business enterprise – manages native and plantation forests, recreation and tourism facilities, roads and infrastructure, and carries out forest research and analysis either directly or in collaboration.
Forico Pty Ltd	Tasmania's largest private forest company – responsible for New Forests' hardwood plantation assets. Business concentrates on the management and harvesting of hardwood plantations
IFARM (Independent Forest And Resource Management)	A management services business to private forest owners, that seeks to optimise the assets by providing sustainable, environmental, social, economic and cultural outcomes.
Hydro Tasmania	Tasmanian government owned business – responsible for use and management of water resources to produce power and manages forested land that surrounds dam infrastructure.
Natural Resource Management (NRM) Groups	A government funded network of three regional bodies working with local communities to co-ordinate improved management of natural resources, including forests.
New Forests	International funds management business – owns Taswood pine estate and Timberlink sawmill, and the former Gunns hardwood plantation assets.
Norske Skog	International company which owns and manages native and plantation forests, and wood processing plants.
Private Forests Tasmania	Tasmanian statutory authority – supports private forest sector.
Private Forest Owners	There are approximately 5 000 private land owners in Tasmania whose property incorporates native and-or plantation forest.
Private Forest Reserve Owners	A wide range of owners and organisations, with over 600 conservation covenants in place. Funding is typically through governments, donations and the sale of covenanted lands for the purchase, management, and conservation of lands that include forests.
Resource Management Services LLC (RMS)	A United-States based forestry investment manager. Purchased the forest assets of Forest Enterprises Australia.

Organisation	Function
SFM Forest Products	A forest management and wood broking company operating in the private and public forest sectors in Tasmania
Tasmania Parks and Wildlife Service	Part of DPIPWE, which is responsible for the management of large areas of forested reserved lands for conservation and recreation.
Timberlands Pacific	Provides expertise to manage large plantation forests in Australia, and market forest products both domestically and internationally.
AKS Forest Solutions	A forest management and wood broking company operating in the private and public forest sectors in Tasmania.
Tasmanian Land Conservancy	A private fund which aims to protect areas with high conservation values for species which are not adequately protected on private land.
Pentarch	Directly involved in the procurement, development and sale of timber products to export markets in Asia and the Middle East.
Tourism Tasmania	Tasmanian statutory authority – promotes tourism within Tasmania including in forested areas.
Wildcare Inc	Tasmania's largest environmental volunteer group supporting heritage conservation and reserve management, including many forested areas.

In addition to those listed in Table 6.2.a.1 there are other organisations involved in the promotion of improved approaches to the management of forests. These include the ARC Centre for Forest Value (UTas), the Forest Industries Association of Tasmania, the Tasmanian Timber Promotion Board, the National Forest Learning Centre, Timber Communities Australia, the Australian Forest Growers, local governments and volunteer organisations including Landcare.

Ongoing commitment to the Tasmanian RFA supports a culture of continuous improvement and adaptive management which is embraced and driven by forest managers. Forestry Tasmania employs stringent forestry management systems that underpin their compliance with various forest standards, and the majority of industrial forest areas are accredited under the *Australian Forestry Standard* (AFS) and other independently audited environmental management systems such as ISO 14001. A large area of Tasmania's production forest is now also Forest Stewardship Council (FSC) certified (see INDICATOR 7.1.b). Forestry Tasmania has recently achieved FSC Controlled Wood certification for its plantation operations. This allows Forestry Tasmania, and other organisations who hold FSC Controlled Wood certification, to sell FSC Controlled Wood to customers who hold FSC Chain of Custody certification. This product can then be combined with fully certified products to create an "FSC mix" product e.g. for paper production.

The Tasmanian Government, as the largest forest resource owner, remains the major investor in forest management, through the Parks and Wildlife Service and Forestry Tasmania.

Hydro Tasmania manages water in forested catchments to create power, and TasWater manages the supply of water for domestic and other uses from forested catchments. These entities have made minor investments in forest management.

The Parks and Wildlife Service has made a considerable investment in infrastructure in reserves to facilitate recreation and tourism, including roads, bridges, walking tracks, viewing platforms, picnic facilities, toilets, camping areas, some overnight accommodation, information and interpretation signs as well as management infrastructure including fire trails, water supplies, staff housing, workshops and communications facilities. A conservative estimate of the current value of this infrastructure is over $300 million (2015–16), up from $280 million in 2011. The increase in the estimated value of the infrastructure is due to two main factors: improved recording of assets (i.e. there are now more assets recorded on the asset inventory than previously) and the replacement-upgrading of existing infrastructure, leading to increased value.

The annual operating budget for 2015–16 for the Parks and Wildlife Service was approximately $60 million. These funds are spent on administering and managing forests in Tasmania's parks and reserve system. These areas provide significant environmental, social, cultural and economic benefits and experiences. The Parks and Wildlife Service budget also contains a $4 million provision for managing and maintaining high priority infrastructure, enabling necessary replacement and upgrading of old infrastructure.

Forestry Tasmania has been adjusting its business model over the last few years to help it to achieve profitability from its forest management business. This had inevitably resulted in Forestry Tasmania reducing its cost structure in managing Tasmania's native production forest estate. In 2015–16, total operational expenditure for wood production and conservation activities on Tasmania's permanent timber production zone land totalled $148 million. This included: expenditure on the establishment, protection, tending and harvesting of native forests and plantations; inventory, mapping, and planning of forest; servicing and maintenance of recreational and tourism facilities and conservation reserves; maintenance and development of roads; and maintenance of corporate services and facilities.

Forestry Tasmania continues to invest in forest infrastructure, with millions of dollars each year deployed annually. Investments include:

- Maintaining more than 2111 km of roads, bridges and other infrastructure that in addition to industrial processors, provide access, and support, for:
    - Fire protection, firefighting, training and response capacity
    - Tourism, fishing, hunting, walking, and cycling
    - The honey industry; and
    - The local Tasmanian firewood industry.

- Recreation and tourist facilities including camping sites, parks, barbecues, boating facilities, and 'adventure hubs'.

There is no estimate of the value of private investment for tourism in reserves. In the last two years, the Tasmanian Government has sought to provide greater opportunities for businesses to operate in the reserved land network.

The Parks and Wildlife Service's volunteer partner is Wildcare Inc, the largest and fastest growing incorporated environmental volunteer group in Tasmania, with a membership of around 6000. It undertakes volunteer work supporting natural and cultural heritage conservation and reserve management throughout the state. Work is undertaken in reserves

and on private land in close partnership with a number of government agencies as well as with local government and private landowners. It is estimated that around 200 000 hours are volunteered per year, to the value of almost $5 million (DPIPWE, Budget Papers 2015–16).

References

Schirmer J, Dunn C, Loxton E (2014) Socio-economic impacts of forest industry change Tasmanian Forest industry employment and production, 2012–13, Tasmanian Government, Hobart.

INDICATOR 6.2.b INVESTMENT IN RESEARCH, DEVELOPMENT, EXTENSION AND USE OF NEW AND IMPROVED TECHNOLOGIES

This indicator reports the level of investment and investment trends in research, development, extension and use of technologies to improve forest management for economic, social or environmental purposes.

Research and development is a driver of innovation and is vital to ongoing industry competitiveness, sustainability and investment for economic, social and environmental values.

Innovation is considered to be an adaptation to change resulting from applying known and/or original technology/management approaches or processes in ways which provide real advantages across the supply chain. The innovation process can also result from observation and operational experience or experimentation, adopting strategic approaches to challenges, or a combination of trial and error, intuition and luck.

Tasmania's forest and wood product industry has a long history of adapting to change through innovation. Early forest utilisation concentrated on the production of shingles, split posts, rails, palings and pit sawn logs. These processes were labour intensive, required low skill levels and involved low capital investments. Industrialisation led to the development of water and steam powered light rail and automated sawmilling technology which supported an expansion of forestry at a scale which supported the development of new markets. For example, the development of 'steaming' or reconditioning technology (from the early 1930s) resulted in an expanded use of native hardwoods in house construction.

Research and development has been a historical driver of innovation in Tasmania and is viewed as an integral strength which is vital to the sustainability and competitiveness of current and future forest-based industries.

Importantly Tasmania has developed strong expertise in forest sector research. In partnership with private forest industry organisations and companies, significant research has been undertaken during the reporting period 2011–2016 by a wide range of public organisations including:

- Cooperative Research Centre (CRC) for Forestry
- Commonwealth Scientific and Industrial Research Organisation (CSIRO)
- Forestry Tasmania
- Forest Practices Authority
- University of Tasmania (and other universities)
- National Centre for Future Forest Industries (NCFFI)
- Private Forests Tasmania
- ARC Centre for Forest Value
- National Institute for Forest Products Innovation

Many of these research institutions also provide valuable training opportunities and their continued funding is essential if the forest industry is to realise its potential.

Tasmanian companies' strong links with research institutions have led to the development of innovative sawmilling methods, improved recovery in harvesting practices and improved tree productivity. In the forest management sector, the last five years have seen significant increases in the adoption of a range of new technologies. Notable developments include:

- **Restoration technologies linked to enhanced biodiversity management and genetic selection for tree plantings in the face of climate change, in degraded farmlands of the Central and Southern Midlands, Tasmania (S. Prober, CSIRO and N. Davidson, Greening Australia, 2016)**:

  Current and projected climate change has significant implications for the long term success of environmental plantings in highly modified rural landscapes. The choice of tree species and where to collect seed within a species range will be critical decisions in building climate resilience into long-term environmental plantings.

  A number of seed sourcing (provenancing) strategies have recently been proposed that capitalize on inherent genetic diversity and adaptive capacity within native species and these are currently being tested through pedigreed eucalypt provenance trials embedded within large scale restoration plantings in the Midlands of Tasmania. Over the past six years Greening Australia has established 850 ha of restoration plantings across 10 sites using multiple local species and various establishment techniques. The provenancing trials consists of range-wide collections for five eucalypt species to test the local vs. non-local superiority in fitness (i.e. survival, growth, reproduction), in combination with glasshouse studies investigating provenance differentiation in functional traits. Glasshouse results are providing evidence for adaptive syndromes in key functional traits, which are correlated with increasing home-site aridity. Further, early field trial results suggest that local adaptation may be context dependent and related to the population structure of the species, suggesting that local sources can be best but not always. These early findings are refining the assumptions of our species and provenance choice models and helping to guide future restoration projects.

- **Hydrowood – Taking underwater harvesting from an idea to commercialisation (D Crook, SFM Forest Management 2016):**

  There is estimated to be around 300 million trees worldwide submerged in dams constructed during the 1950s through to the 1970s for the creation of hydroelectric schemes and water storage. The Hydro dams in Tasmania fit into this global pattern. There remain large areas of untapped forest resource submerged within the Hydro dams of Tasmania. The success of this project can be brought down to several key aspects of creating and delivering new technologies: (a) Always be willing to ask questions, we were often told it is not possible but we always asked "Why?"; (b) Utilising great people within the company (SFM Environmental Solutions Pty Ltd), allowing us to use the skills and systems already found within SFM that were transferable to the project; (c) Recruiting people to the Hydrowood team that fitted the culture of the company and filled in the knowledge and skill set gaps; (d) Developing key working relationships with suppliers and manufacturers in Tasmania, and where possible, giving them ownership of their part of the project and therefore the drive to make it successful. After a 15 month build time, the operation started in November 2015 and now runs on a 7 day/week roster recovering approximately one load of timber per day, of varying products. The wood is sold to customers as a certified product and chain of custody will enable the story to be passed along with each log. The salvaged timber has unique properties that drive high end timber sales. Particular defects celebrate the story that each one of these logs has to tell.

- **Existing and potential uses of eucalypt plantation wood (G Nolan, University of Tasmania, 2016):**

  New research is aimed at developing and testing technologies to support development of the timber industry through the sustainable use of wood and timber products, especially in

the built environment. The research focuses on the potential use of Tasmania's (and Australia's) plantation hardwood resource for a range of timber and other solid wood products. Sustainable development requires increased reliance on *renewable* resources and economic withdrawal from *non-renewable* ones. *Renewable* resources are those that return to their previous stock levels after exploitation, by natural processes of growth or replenishment. Organisms, such as trees, are *renewable* resources that regenerate and regrow to provide valuable materials such as wood.

Buildings consume significant resources in their construction and operation. One strategy for supporting sustainable development is to optimise the use of *renewable* resources in making and operating buildings. Using wood is one answer. Trees absorb CO_2 during photosynthesis, store carbon in woody tissue and give off oxygen. Carbon stored in the tree is retained in lasting wood products. Also, using timber or wood products instead of other materials can also reduce environmental impacts eg. through reduced energy usage.

Tasmania has three major wood resources: native forests, and softwood plantations, and hardwood plantations. Most of this hardwood resource is Shining Gum (*E. nitens*) grown in unthinned and unprunned stands for fibre and likely to produce little conventional sawlog. Most is exported either as chips or as peeler logs. With the viability of fibre markets for this plantation hardwood resource being re-evaluated, the research is focussed on attempting to recover sawn or veneered solid wood products in support of alternative, sustainable markets of the future. University of Tasmania's School of Architecture and Design has recently been involved in modular timber construction and the use of cross-laminated timber (CLT) in multistorey residential building in Tasmania.

- **Engineered wood products from plantations and regrowth forests (E Rolley, Ta Ann Tasmania, 2016):**

  Much has been spoken of the 'Sleeping Forest Giant' which is the production potential of Tasmania's privately owned forests. The private forest estate in Tasmania is dominated by the large, mostly foreign owned hardwood and softwood plantation assets. Most of these hardwood plantations have been established and managed for short rotation pulpwood production. The larger industrial plantings are supplemented with smaller private plantation holdings, some of which are pruned, and extensive areas of private regrowth native forests. As the average log diameters from Tasmanian wood production forests have come down in recent years, the commercial priority to 'think thin' and to peel rather than saw smaller diameter logs for high value recovery has been realised. With the publicly owned forests increasingly committed to conservation priorities, stronger opportunities have emerged for private forests to become important competitive suppliers to local processers.

  Ta Ann Tasmania has taken a leading role in peeling younger regrowth and plantation logs to produce veneers and panel products for a variety of national and international markets. The investment in modern peeling and plywood manufacture offers opportunities for private forest growers to become suppliers to modern processing facilities with final products focused on emerging engineered wood product markets.

The active and targeted research within permanent timber production zone land has delivered improved methods of forest management and led to a transfer of knowledge and adoption of new approaches within private forests. These practices have supported ongoing investment in innovative systems, technology and skill enhancement along the logistic, processing and market supply and management chains. A carbon flux tower in the Warra Long Term Ecological Research Site has enabled the monitoring of changes in the exchange of greenhouse

gases between the forest and atmosphere over time (http://www.ozflux.org.au/monitoringsites/warra/warra_description.html).

Today, research in Tasmania's forest and wood processing industry is supported by a wide range of organisations and companies which collectively and co-operatively are working to improve systems and provide solutions to challenges facing the industry. Organisations undertaking research include co-operative research centres (see examples below), universities, CSIRO, private forestry companies such as Norske Skog and Forico, the Forest Practices Authority, the Tasmania Fire Service, the Department of Primary Industries, Parks, Water and Environment, Private Forests Tasmania, and other government and private agencies.

Private Forests Tasmania (PFT) expenditure on research and business development, and extension and education is focused on supporting private forest owners and managers. For the period 1 July 2011 to 30 June 2016 PFT expenditure was $1 220 670.

To achieve a coordinated outcome, the government, industry and educational institutes established active partnerships, such as the CRC for Forestry which is an Australia-wide research venture established to operate from July 2005 until June 2012. The CRC for Forestry focused on new technologies, innovation, value-adding, efficiency and competitive advantage; as well as landscape issues and community engagement. The CRC had its headquarters in Tasmania and received $26.6 million cash from the Australian Government and $57 million cash and in kind contributions from partners over the seven years.

Approximately 55% of the overall CRC for Forestry budget was expended in Tasmania, with research being conducted by the University of Tasmania, CSIRO, Forest Practices Authority and Forestry Tasmania. Tasmanian forestry businesses contributing resources to the CRC were Forestry Tasmania, Gunns Ltd., and Norske Skog. The Tasmanian Government also supported the research via its Department of State Growth, the Forests and Forest Industry Council and the Forest Practices Authority.

The closure of the CRC for Forestry was closely followed by the National Centre for Future Forest Industries (NCFFI) which operated from mid-2012 through 2014. The NCFFI came into existence via a Commonwealth funding grant to the University of Tasmania, with the University of the Sunshine Coast, the University of Melbourne, CSIRO, the Queensland Department of Agriculture, Fisheries and Forestry, and the Southern Tree Breeding Association as subcontractors. In the two and a half years of its existence, the NCFFI supported work on 19 projects within the following 4 themes: Future Options, Productivity, Risk Mitigation and Education and Communication. Total investment in the Centre was $12 345 031, with funds associated with other grants totalling $6 194 648 and leverage not associated with other grants totalling $3 650 383[16].

The ARC Centre for Forest Value (http://www.utas.edu.au/arc-forest-value/home) came into being in early 2015 and is situated on the University of Tasmania's Hobart campus. The Centre has as its focus the training of forest scientists to work within the forest industry with a market-driven approach. The Centre has 8 industry partners including Greening Australia, Forestry Tasmania, SFM Environmental Solutions, Forico, Neville-Smith Forest Products, Next 50 Architects, Forest and Wood Products Australia, and the Island Workshop Prefab Lab. The total budget for the first 5 years of the centre, including all in-kind contributions, is $9 million (M. Neyland, pers. comm.).

[16] *National Centre for Future Forest Industries Final Report, 15 December 2014.*

On 4 June 2016 the Australian Government announced the establishment of the National Institute for Forest Products Innovation to be jointly based in Launceston, Tasmania and Mt Gambier, South Australia. Each of these locations received $2 million in Commonwealth funding, matched by $2 million in State Government funding and $2 million in industry funding[17]. This research centre has as its focus timber processing, wood fibre recovery, advanced manufacturing and the bio-economy.

Reference

Prober, S.M., Byrne, M., McLean, E.H., Steane, D.A., Potts, B.M., Vaillancourt, R.E. & Stock, W.D. (2015) Climate adjusted provenancing: a strategy for climate-resilient ecological restoration. *Frontiers in Ecology and Evolution*,**3**

[17] *Media release prepared by Senator Anne Ruston and Mr. Andrew Nikolic, Federal Member for Bass, 31 May 2016.*

6.3 Recreation and tourism

This sub-criterion reports on the area of forest available for recreation and tourism, the range of uses and facilities available and the intensity of usage.

INDICATOR 6.3.a AREA OF FOREST AVAILABLE FOR GENERAL RECREATION AND TOURISM

Indicator 6.3.a reports the extent and proportion of forests available for recreation or tourism. For the purpose of this indicator, an area of forest is considered to be available for recreation and tourism if there is no legal or other form of prohibition on access for recreation and tourism activities. This includes areas where patrons may have to pay for public access to private land, such as a privately run wildlife park.

There has been little change in the availability of public forest for recreation and tourism since that reported in the *State of the forests Tasmania 2012*.

This indicator complements INDICATOR 6.1.a. (Value and volume of wood and wood products) and

INDICATOR 6.1.b (Values, quantities and use of non-wood forest products).

This indicator recognises that forests have diverse non-consumptive uses that are commercially, socially and culturally important. It is therefore important to monitor whether access is provided to forests for recreation or tourism.

The overwhelming majority of forested land managed under the *National Parks and Reserves Management Act 2002* is available for recreation and tourism. Recreation and tourism are statutory management objectives for most reserve classes 'to encourage tourism, recreational use and enjoyment consistent with the conservation of the reserve's natural and cultural values.'

Recreation and tourism activities are not specifically excluded from nature reserves; rather they are not encouraged, as they are not within the management objectives.

In the case of the two private land reserve types – private sanctuaries and private nature reserves – public access is a matter of the owner's discretion.

The total combined area of forest within nature reserves, private sanctuaries and private nature reserves is 14 000 ha, just over one percent of the area of reserved forests.

Public access to a reserve can be restricted by declaring a 'restricted area' in a management plan or by erecting a sign prohibiting access. Access to these areas may be restricted year round or on a seasonal basis. If there are year round restrictions, access may be possible under a permit from the Director of National Parks and Wildlife. No further 'restricted areas' have been declared in the reporting period. From time to time roads and tracks may be closed for safety reasons as well as environmental protection.

Under the *Phytophthora cinnamomi* Strategic Regional Plan for Tasmania (Schahinger, Rudman and Wardlaw 2003), a number of locations in reserves have been identified as 'special management areas' where it is recommended that no further formed access be provided so that the introduction of the root rot fungus can, hopefully, be prevented. Whilst access will not be restricted to these areas, it will not be facilitated through construction of roads and tracks.

Under the *Forestry Act 1920* (repealed in December 2013), forest reserves were available for public recreational use, the preservation or protection of features of the land of aesthetic, scientific or other value, and the preservation or protection of species of flora or fauna. The statutory management objectives included 'to encourage appropriate tourism, recreational use and enjoyment'.

State forest could be accessed for recreational purposes that were not incompatible with the *Forestry Act 1920*. Under the Act public access could be restricted, usually temporarily, for safety reasons associated with active forestry operations or management of identified hazards. In 2013 the majority of Forest Reserves were proclaimed conservation areas under the *Nature Conservation Act 2002* and management responsibility, including for recreational use, was transferred to the Parks and Wildlife Service.

The National Wilderness Inventory in 1996 identified sixteen separate areas of high-quality wilderness in Tasmania. These were used as the basis for reservation analysis under the RFA. APPENDIX 6.3a provides updated reservation levels for these high quality wilderness areas. At June 2016, 99% of high quality wilderness areas were protected within the CAR reserve system. This is an increase of 39 600 (2%) ha since 2011.

On private forest some recreation, such as camping, hunting and fishing does occur at the owner's discretion and there are also some small commercial tourism ventures on forested land.

The area of forested land available for general recreation is shown in Table 6.3.a.1. This represents a decrease of 1 000 ha in forested area available for general recreation.

Table 6.3.a.1 Area and proportion of total forests available for general recreation and tourism as at 30 June 2016 (hectares, in '000s)

YEAR		Conservation reserves	Other State forest/ PTPZ land	Other publicly managed land	Private freehold land*	Total forest in Tasmania
Area	**2002**	975	1140	81	0	**3365**
	2006	1108	1128	85	0	**3353**
	2011	1161	1080	74	0	**3388**
	2016	1244	711	359	0	**3354**
Percentage	**2002**	29	34	2	0	**100**
	2006	33	34	3	0	**100**
	2011	34	32	2	0	**100**
	2016	37	21	11	0	**100**

** Some small areas available, less than one thousand hectares, some commercial ventures.*

References

Schahinger R, Rudman T, Wardlaw TJ (2003) Conservation of Tasmanian Plant Species and Communities Threatened by *Phytophthora cinnamomi* Strategic Regional Plan for Tasmania, *Nature Conservation Branch Technical Report 03/03*, Department of Primary Industries, Water and Environment, Hobart.

INDICATOR 6.3.b RANGE AND USE OF RECREATION/TOURISM ACTIVITIES AVAILABLE

This indicator reports the range of recreation and tourism facilities available in forests and how much the facilities are used. This indicator complements Indicators 6.1.a and 6.1.b and recognises that forests have many non-consumptive uses that are commercially, socially and culturally important.

Some of these facilities are usually provided solely for recreation or tourism. These might include walking or riding tracks, picnic sites and camp grounds. Other facilities, such as roads and vehicular tracks are provided for a range of management purposes and are also available for use for recreation and tourism.

Recreation facilities and activities available

Table 6.3.b.1 lists the recreation facilities and activities available in 2015–16 on State forest and reserves managed by the Parks and Wildlife Service. With the transfer of forest reserves to the PWS in 2013, many facilities previously recorded on State forest are now reported under PWS management.

In addition to the activities listed in Table 6.3.b.1, climbing, abseiling, caving, nature observation, photography and swimming are all further activities that continue in State forest and parks and reserves. Hunting continues to be allowed on State forest and on some reserve classes: game reserves, conservation areas and regional reserves. There have been few significant observed changes in the nature or level of these types of activities over the past five years.

Major investment in walking tracks and cabins and mountain bike facilities in forested environments were a feature of the past five years.

Three Capes Track

The much anticipated Three Capes Track in the Tasman National Park was opened for the first visitors in late 2015. The four day/three night walk has been highly acclaimed and it immediately set a new benchmark for Australian bushwalks, creating a walk combining the raw beauty of the southern hemisphere's highest sea cliffs with comforts and interpretation unsurpassed by any other trail in the country. Work on Stage Three of the project, which will develop the track west of Port Arthur and incorporating Cape Raoul and Shipstern Bluff, has begun.

Blue Derby Mountain Bike Project

Major new mountain bike facilities were developed in temperate rainforest in north-east Tasmania. The Blue Derby Mountain Bike Project was a $3.1 million joint initiative between Dorset and Break O'Day Councils, assisted by a $2.5 million grant from the Federal Government. It involved construction of an 80 km network of trails at Derby and within the adjacent Blue Tier Forest Reserve, in the stunningly beautiful north-east region of Tasmania. The trails have now been completed and are setting new standards for mountain biking in Australia.

In 2015 new boutique accommodation, Pumphouse Point Lodge, opened at Lake St Clair within the Tasmanian Wilderness World Heritage Area, sensitively re-using existing Hydro infrastructure

In 2014 The State Government called for expressions of interest in developing new sensitive and sustainable tourism developments in national parks and reserves. Thirty five EOIs were received, of which 24 progressed to a second stage assessment. The majority of proposals involved forested landscapes. Four proposals have been approved, involving walking, mountain bike accommodation and boat tours. See '*Tourism investment opportunities in the Tasmanian Wilderness World Heritage Area, National Parks and Reserves*'.

The opportunities for recreation on State forest are manifold. Sightseeing, walking, picnicking, fishing and camping remain the more popular recreational activities. Facilities for these, and other activities, are maintained wherever feasible.

Table 6.3.b.1 Facilities available in public forests for recreation and tourism activities –as at 30 June 2016

FACILITY/ACTIVITY	Permanent Timber Production Zone land	National parks and reserves
Disabled Access	3	294[1]
Information/Visitor Centre	2	31
Toilets	34	331
Gas Barbecue	4	29[1a]
Wood Barbecue	20	167
Picnic Shelter	12	101
Picnic Area	9	728
Fireplace	0	NSR
Boat Ramp	42	28
Lookout (Platform)	3	126
Short Walk	7	Included in day walks
Day Walk	2	511[3]
Overnight Walk	0	210[4]
Camping Area (Vehicle Access)	3	130[5]
Camping Area (Foot Access)	40	155
Caravan Site	1	25
Accommodation (Walkers Huts)	0	57[6]
Accommodation Cabins	1	42[7]
Self-Guided Interpretation	0	72
Guided Interpretation	1	nd[7a]
Interpretation Booths	3	72
Wildlife Observation Hides	0	3
Education	1[8]	NSR
Cultural Heritage[9]	1	40
Mountain Bike Riding[10]	8	3[10]
Trail Bike Riding[11]	-	12
Recreational Vehicle Driving[12]	6	25
Horse Riding	7	4
Boating	0	35

FACILITY/ACTIVITY	Permanent Timber Production Zone land	National parks and reserves
Canoeing	1	35
Fishing	0	NSR [15]
Hang Gliding	1	1
Playground Equipment	0	3
Skiing (Ski Fields With Facilities)	0	2
Special Events	NSR	nd
Licensed Tourism Businesses	1	263[16]

nd – no data available NSR – data not separately reported

[1] PWS – number of locations/sites state-wide where there is disabled access

[1a] PWS – includes 11 gas barbecues and 18 electric

[2] PWS – includes Day Use Comfort and Day Use Basic Categorised Sites

[3] PWS – 850 km day walks

[4] PWS – 1040 km overnight walks (includes some duplication with day walks)

[5] PWS – includes formal camping areas and camping areas as small as one site

[6] PWS – includes 'easy access' huts and bush walkers huts

[7] PWS managed

[7a] PWS – commercial guided walks are licenced go wherever public has access. Most licenced guiding companies use W1, W2, T1 and T2 grade tracks.

[8] FT – areas where educational material is available

[9] Sites that showcase cultural heritage, which includes interpretation. For PWS this would include forested Historic Sites and the majority of the 72 interpretation booths since these usually include a cultural heritage component

[10] FT/PWS – all public roads are available, FT figure includes areas where mountain bikes are commonly directed

[11] FT/PWS all public roads are available for licensed riders and registered vehicles – figures represent tracks published in the Ride Around Tasmania booklet.

[12] FT/PWS – all public roads are available for licensed drivers and registered vehicles. PWS figure refers to number of vehicle tracks published in the "Cruisin Without Brusin" booklet.

[13 /14] FT – areas where users are commonly directed. PWS – specifically designated areas, people can use other trails/areas.

[15] PWS – fishing is permitted in all reserves subject to Inland Fisheries regulations and any other management requirement, eg. drinking water catchment protection

[16] Includes leases and licences

In the five years to 2015–16, the following visitor services were undertaken by the Parks and Wildlife Service in forested reserves:

- Cradle Mountain Lake St Clair National Park
    - Master planning for the day use area and park entrance at Cradle Valley.
    - Upgraded and maintained day-walk areas
- Frenchmans Cap – major upgrade of the walking track under a partnership with Dick Smith.

- South Coast Track – completed two years into the four-year $2 million upgrade. Priority erosion control works were done on natural surface track, existing walking track infrastructure was repaired and new track infrastructure built.
- Mount Field National Park – upgraded Russell Falls track to wheel chair standard and developed innovative World Heritage interpretation at the Mount Field Visitor Centre, upgraded and maintained the track network.
- Replacement of access bridges across the Meander River and Mother Cummings Rivulet providing vehicle access to a range of popular walks, including the Meander Falls walking track, one of Tasmania's 60 Great Short Walks.
- A new viewing platform was constructed at Dip Falls in the north-west, which provides an elevated position from which to view the falls and enhance the visitor experience.
- Ongoing development of mountain bike tracks and facilities, including in the Kate Reed Nature Recreation Area and Trevallyn State Reserve (Launceston); in the Wellington Park (Hobart); and in the Meehan Range Nature Recreation Area (Hobart).

Overall, in the past five years there has been an increase in the number of facilities provided by the Parks and Wildlife Service for recreation and tourism, largely due to transfers from Forestry Tasmania, as well as some major new developments. New assets have been provided and others have been decommissioned. Substantial work has gone into upgrading, replacing and maintaining existing assets. Following the massive floods in early 2016, major repairs and replacement of visitor infrastructure commenced and is still in progress, especially in the north of the state, but also on the east coast.

There were two significant sources of funding for PWS visitor infrastructure works:

1. Park Entry fees
2. Australian and Tasmanian Government project funding for the Three Capes Track

Current data for State forest and national parks and reserves are now documented under established asset management systems.

With Federal Government funding, Environment Tasmania undertook a series of short walk upgrades with interpretation in the Tasmanian Wilderness WHA and in forests in north-east Tasmania.

Number of visits to recreational sites

This indicator provides information on the number of visits made to selected reserves (or specific sites within parts of reserves).

The PWS manage over 800 parks and reserves in Tasmania. The PWS cannot monitor visitors to all sites. The PWS maintain counts of visitors at 11 selected parks and reserves (called "reference sites") across the state. Information from the reference sites gives a general idea of visitor trends generally.

Over the long-term, the underlying trend has been for visitor numbers to increase. However, there have been periods of growth and decline:

- Visitor numbers were growing before the first reporting period. Visitor numbers peaked in the period between 2003 and 2005;
- Visitor numbers plateaued throughout 2005–06 to 2008–09;

- Visitor numbers declined to most reference sites from about 2009–10 to 2012 and into 2013;
- Visitor numbers rebounded from 2012 and 2013 onwards – with increases occurring earlier in some places, whilst there was a lag at other sites;
- As at 2015–16, visitor numbers have increased across most reference sites, and – in some cases – visitor numbers are at record levels.

Over the nearly 20-year period since the Tasmania Regional Forest Agreement was signed in November 1997, the tourism industry has grown substantially in Tasmania (Table 6.3.b.2).

- Visitors to Tasmania are often the major source of activity at most of the reference sites monitored by the PWS. Visitor numbers to Tasmania have increased almost two-and-half fold from 485 000 visitors in 1997–98 to over 1.168 million in 2015–16 (up 141%).
- The other source of visitors to parks and reserves are Tasmanian residents. The Tasmanian population has grown far more modestly (up 10% between 1997–98 and 2015–16) compared to visitors coming to Tasmania. In 1997–98, for every one Tasmanian resident, there was approximately one visitor to Tasmania that year – by 2015–16, this ratio had grown to 2.25 visitors for every resident. This is a substantial shift in the source of visitors to parks and reserves.

In summary, visitor numbers to the reference sites have grown during the same period, often reaching new record levels of visitation. Most of the growth of visitor numbers in the reference sites can be attributed to visitors to Tasmania.

Table 6.3.b.2 Visitors to selected parks and reserves (“reference sites”), visitors to Tasmania, and change in Tasmanian resident population, over the life of the Regional Forest Agreement (1997–98 to 2015–16)

VISITORS TO SELECTED PARKS AND RESERVES ("REFERENCE SITES")	1997–98 (‘000s)	2015–16 (‘000s)	% change (19 years)	Change in visitors (19 years) (‘000s)
Freycinet	146	272	86	126
Cradle Mountain	135	228	69	93
Mount Field	134	189	41	55
Tasman Arch (Tasman Peninsula)	n.c.	164	NA	NA
Lake St Clair	83	94	13	11
Mole Creek Karst	52	55	6	3
Narawntapu (Western entrance)	31	46	48	15
Hastings Caves and Thermal Pool	25	46	84	21
Tamar Island Wetlands	n.c.	30	NA	NA
Maria Island	13	23	77	10
Overland Track	7	9	29	2
Visitors to Tasmania (Source: Tasmanian Visitor Survey, Tourism Tasmania)	485	1 168	141	683
Resident Population of Tasmania (Source: Australian Bureau of Statistics)	473	519	10	45

Notes: n.c. - not collected in that year; NA - not available; Cradle Mountain - the estimate of 228 000 is for the 12 months ending March 2016

Visitor numbers to parks and reserves respond to changes in the larger tourism industry – and the larger industry respond to an ever-changing combination of factors. The decline in visitors prior to 2012 and 2013 seems to have been in response to:

- Fewer visitors coming to Tasmania for a holiday. At this time, overall visitor numbers were helped up by an increase in people coming to visit friends and relatives in Tasmania. However, visitors were less likely to go to parks and reserves compared to their holiday counterparts
- Cheap international airfares and a stronger Australian dollar encouraged Australians to travel overseas instead of interstate (to places like Tasmania)
- Many Australians seemed to buy consumer goods items instead of taking holidays. In addition, many Australians were not using all their annual leave, and were taking more trips, but the trips were shorter.

The subsequent increase in visitors from 2012 and 2013 onwards seems to have been in response to:

- Relatively favourable currency exchange rates which encourage travel from overseas and from interstate
- An emerging visitor market from China, on top of the existing Hong Kong and north-east Asia market
- Holiday visitors from interstate have rebounded
- The tourism industry in Tasmania has developed more accommodation and attractions which entice visitors to Tasmania generally (and they will visit parks and reserves while they are here).

References

Tourism Research Australia (2015) State Tourism Satellite Accounts 2013–14, Tourism Research Australia, Canberra.< https://www.tra.gov.au/research/State-tourism-satellite-accounts-2013–14.html>

Tourism Research Australia (2016) State Tourism Satellite Accounts 2014–15, Tourism Research Australia, Canberra. < https://www.tra.gov.au/research/Tourism-Satellite-Account-2014–2015.html>

6.4 Cultural, social and spiritual needs and values

This sub-criterion reports on the area of forest to which Indigenous people have use and rights to protect their special values and the extent to which these values are protected by Indigenous participation in forest management.

The sub-criterion also reports on the protection of non-Indigenous cultural values and the importance of forests to people.

INDICATOR 6.4.a AREA OF FOREST TO WHICH INDIGENOUS PEOPLE HAVE USE AND RIGHTS THAT PROTECT THEIR SPECIAL VALUES AND ARE RECOGNISED THROUGH FORMAL AND INFORMAL MANAGEMENT REGIMES

This indicator reports on the maintenance of an acceptable level of accountability for the protection of Indigenous peoples' cultural, religious, social and spiritual values. This is done by ensuring that adequate land is placed appropriately under the range of tenure classifications and/or dedicated management regimes to protect Indigenous peoples' values associated with forests.

Tasmanian Aboriginal people have formal use and rights by virtue of land title over areas identified under the *Aboriginal Lands Act 1995.* Australia's *State of the Forests Report 2013* reported 8000 ha of forest in Tasmania as under Indigenous ownership and management, with an additional 750 000 ha of forest under Indigenous co-management. Indigenous co-managed land was defined in that report as 'lands that are owned and managed by other parties, but have formal, legally binding agreements in place to include input from Indigenous people in the process of developing and implementing a management plan (e.g. nature conservation reserve memoranda of understanding)' (ABARES, 2013). However, as noted by Smyth (2001), "No formal joint management arrangements are in place for any national parks in Tasmania. However, Aboriginal people do participate on advisory councils for national parks, and have direct involvement in the recording and maintenance of cultural sites within national parks."

Formal and informal management regimes that recognise Aboriginal values have been established under the *Aboriginal Relics Act 1975*, the *National Parks and Reserves Management Act 2002*, the *Forestry Act 1920* (repealed in December 2013) and the *Forest Practices Code 2015*.

Aboriginal Lands Act 1995

The *Aboriginal Lands Act 1995* provides for the transfer of specified areas of Crown land to the Aboriginal community. This Act established the Aboriginal Land Council of Tasmania (ALCT) as a statutory body to hold and manage land on behalf of the Aboriginal community in perpetuity. No areas were transferred between 2011–16.

To date, 15 areas have been returned and title transferred to the Aboriginal Land Council of Tasmania. One of these areas, truwana/Cape Barren Island, contains large areas of forest.

Management of Cape Barren Island is undertaken by the Cape Barren Island Aboriginal Association. The Tasmanian Aboriginal Centre (TAC) continues to run a youth justice program on lungtalanana/Clarke Island.

Aboriginal Relics Act 1975

All forest land on all tenures is subject to the *Aboriginal Relics Act 1975* which is the main piece of state legislation affecting Aboriginal heritage and intended to provide blanket

protection for all Aboriginal relics as defined in the Act. The government consults with the Aboriginal community through the Aboriginal Heritage Council. The Council is an all Aboriginal advisory body established by the Minister. Its primary function is to provide advice on Aboriginal heritage matters directly to the Minister, the Director of National Parks and Wildlife and Aboriginal Heritage Tasmania. The Council supports broad engagement and consultation with the Aboriginal community. Consultation may occur directly with organisations such as the Tasmanian Aboriginal Centre, weetapoona, South East Tasmanian Aboriginal Corporation and Six Rivers Aboriginal Corporation to help it meet contemporary social expectations in determining how to protect Aboriginal heritage. The legislation does not regulate the full range of Aboriginal values identified under this indicator, nor does it include requirements for Aboriginal participation in forest management identified under INDICATOR 6.4.c.

The *Aboriginal Relics Act 1975* is dated, although its purpose is clear: it is an Act to make provision for the protection of Aboriginal heritage. It is intended to ensure that any action that affects Aboriginal cultural heritage (called 'relics' in the Act, and defined as only those created before 1876) is subject to strict investigatory, scientific and administrative controls. Under the legislation, all people have a duty to report finding Aboriginal heritage, and to deal with Aboriginal heritage only through the mechanism of a permit issued by the Minister. A permit is required where a proposed activity would destroy or in any way interfere with an Aboriginal relic. Aboriginal Heritage Tasmania (AHT), within the Department of Primary Industries, Parks, Water and Environment administers the *Aboriginal Relics Act 1975*. This legislation has not been used in relation to forest practices during the report period.

The *Environmental Management and Pollution Control Act 1994*, the *Land Use Planning and Approvals Act 1993*, the *National Parks and Reserves Management Act 2002*, the *Nature Conservation Act 2002*, and the *Forest Practices Act 1985* complement the *Aboriginal Relics Act 1975*. The *Coroners Act 1995* also has specific provisions relevant to Aboriginal heritage, as do a number of other state Acts, including the *Aboriginal Lands Act 1995*, and *Museums (Aboriginal Remains) Act 1984*. The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* also affect how Aboriginal heritage should be dealt with in the state. All legislation relevant to the environment is likely to have some relevance to Aboriginal heritage protection.

Native Title Act 1993 (Commonwealth) and *Native Title (Tasmania) Act 1994*

Although these Acts provide for the recognition of native title, no such determinations have been made in Tasmania.

Indigenous Protected Area

An Indigenous Protected Area is an area of freehold land over which the traditional Indigenous owners have entered into a voluntary agreement with the Australian Government for the purposes of promoting biodiversity and cultural resource conservation. An Indigenous Protected Area is declared in perpetuity by the Indigenous land owners on behalf of their community members. An Indigenous Protected Area declaration is not a legal process that affects land tenure.

New legislation

On 8 June 2016 the Minister for Environment, Parks and Heritage announced the Government's plans to amend the *Aboriginal Relics Act 1975* to address a number of major inadequacies of the legislation. The proposed amendments include:

- removing the 1876 date reference
- increasing penalties for damage to Aboriginal heritage
- considering the potential for scaled offences and removing the ignorance defence
- having a statutory timeline for a future review of the Act; and
- changing the name of the Act to the *Aboriginal Heritage Act 1975*.

Forest practices system

The *Forest Practices Code*, established under the *Forest Practices Act 1985*, provides for the assessment, planning, management and protection of Aboriginal heritage within production forests.

One hundred and three (103) new Aboriginal heritage sites were identified in forested land in the period July 2011–June 2016. Most of these were single stone artefacts or small scatters. A few were sandstone overhangs which may have served as Aboriginal shelters. In none of these were artefacts found. All sites were recorded on the Conserve Aboriginal database administered by Forestry Tasmania and records were also sent to AHT for recording on the Aboriginal Heritage Register.

Due to the limited ground surface visibility in forested environments, most new sites were located after harvest or during cultivation for plantations when the mineral soil was visible. All new sites have been protected in informal reserves or machinery exclusion zones.

Forestry Tasmania has not applied for any permits under the *Aboriginal Relics Act 1995* since at least 2000.

Given the difficulty of identifying Aboriginal heritage before forest harvesting, the level of disturbance to Aboriginal heritage during the reporting period is unknown, but is likely to be low as the rate of conversion of native forest to plantations or agriculture over the reporting period has declined markedly relative to the previous reporting period.

***Forestry Act 1920* (repealed December 2013)**

The *Forestry Act 1920*, Schedule 3, included among the objectives for management of forest reserves '*to conserve sites or areas of cultural significance*' and '*to encourage cooperative management programs with Aboriginal people in areas of significance to them*'. The management plan (Sustainability Charter) for State forest included the following two objectives:

- identify, protect, and maintain Aboriginal and historic cultural heritage values; and
- seek active consultation with the Aboriginal community to develop opportunities for collaborative management of Aboriginal sites and values.

Procedures have been developed and implemented to ensure Aboriginal sites are managed in accordance with legislative requirements.

On permanent timber production zone land, identified cultural heritage sites were specifically recognised in the Management Decision Classification (MDC) system as Special Management

Zones for Aboriginal and cultural heritage sites. As at 30 June 2016 about 20 000 ha of permanent timber production zone land was zoned for Indigenous and non-Indigenous cultural heritage special management (of which about 5 500 ha was zoned for Indigenous cultural heritage value and the balance for other cultural heritage values).

Forest Management Act 2013 **(enacted 2013)**

This Act replaced the *Forestry Act 1920*, and covers the management of permanent timber production zone land by Forestry Tasmania. As well as the *Aboriginal Relics Act 1975*, and the *Forest Practices Act 1985*, cultural heritage on permanent timber production zone land is managed in accordance with Forestry Tasmania's Aboriginal Heritage Policy, High Conservation Values Management Plan, and the Burra Charter 2013. The MDC system continues to be used to record and identify cultural heritage sites.

National Parks and Reserves Management Act 2002

For all public reserve categories listed in Schedule 1 of the *National Parks and Reserves Management Act 2002*, the objective is '*to encourage cooperative management programs with Aboriginal people in areas of significance to them in a manner consistent with the purposes of reservation and the other management objectives*'. The management objectives for all reserves under the Act provide for the conservation of Aboriginal heritage values. The Act does not preclude Aboriginal cultural activities on reserved land if these do not adversely affect the flora and fauna.

The National Parks and Reserved Land Regulations 2009 protect all 'Aboriginal relics' and items of archaeological or historical interest.

Both Aboriginal Heritage Tasmania and Parks and Wildlife Service remain under the same government agency, the Department of Primary Industries, Parks, Water and Environment.

The Aboriginal Land Council of Tasmania continues to hold a lease to occupy and use 10 ha of reserved land at larapuna/Eddystone Point. Informal arrangements are in place to facilitate Aboriginal cultural activities in certain reserves.

The Tasmanian Wilderness World Heritage Area Draft Management Plan, covering nearly 25% of Tasmania, was released for public comment. The draft plan gives increased recognition of Aboriginal cultural heritage and a greater emphasis on involving Tasmanian Aboriginal people in management of the TWWHA by investigating joint management arrangements.

New activities proposed in reserves are assessed for impacts on Aboriginal sites and the Aboriginal community is consulted where there are known interests, in accordance with the *Tasmanian Reserve Management Code of Practice 2003*, under the PWS Reserve Activity Assessment system.

In north-west Tasmania, laraturunawn/Sundown Point (132 ha), Trial Harbour (0.826 ha) and nungu/West Point (580 ha), previously Aboriginal Sites under the former *National Parks and Wildlife Act 1970*, remain as State Reserves under the *National Parks and Reserves Management Act 2002*. There is ongoing consideration of the transfer of these lands, and others including larapuna/Eddystone Point and Rebecca Creek, to Aboriginal ownership. Recreational vehicle management and protection of Aboriginal heritage in the Arthur Pieman Conservation Area continued to be highly contested involving a High Court challenge to the Tasmanian Government's decisions on some recreational vehicle access.

The government is still considering removal of shacks from nungu/West Point in order to protect Aboriginal heritage. The laraturunawn/Sundown Point and nungu/West Point sites, as

well as one at Maxwell River, are also Aboriginal Protected Sites under the *Aboriginal Relics Act 1975*.

References

ABARES (2013). Australia's State of the Forests Report**.** Australian Government Department of Agricultureal and Resource Economics and Sciences (ABARES).

Smyth (2001) Joint management of national parks in Australia. Chapter 4 in Baker, R., J. Davies and E. Young (eds.), *Working on Country – Contemporary Indigenous Management of Australia's Lands and Coastal Regions*, Oxford University Press, Oxford.

INDICATOR 6.4.b REGISTERED PLACES OF NON-INDIGENOUS CULTURAL VALUES IN FORESTS THAT ARE FORMALLY MANAGED TO PROTECT THESE VALUES

This indicator reports on the extent of public land that is specifically dedicated to the management of historic heritage values. These areas are managed for the heritage values that may relate to historic mining, timber-extraction or agricultural sites, as well as historic tracks, tramways, huts, fences and the like.

World Heritage listed places

The Australian Convict Sites serial property was placed on the World Heritage Area list in 2010. Three places in forested reserves are included in this listing: Coal Mines (Tasman Peninsula) convict site, the Darlington Probation Site on Maria Island and Port Arthur Historic Site (which includes Garden Point and Point Puer).

Nationally listed places

Historic and natural places of national significance are listed on the National Heritage List, which prohibits any actions likely to have a significant impact on the heritage values of the places. This register comes under the provisions of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. In Tasmania there are six sites listed primarily for their historic values. Four of these sites are in forested areas or have forested components – the Recherche Bay (North East Peninsula) French exploration site, the Coal Mines (Tasman Peninsula) convict site, the Darlington Probation Site on Maria Island and Port Arthur Historic Site (which includes Garden Point and Point Puer). There has been no increase in the number of these sites in the reporting period 2011–16.

State listed places

Historic places of state significance are listed on the Tasmanian Heritage Register (THR), which prohibits any actions likely to have a significant impact on the heritage values of the places. This register comes under the provisions of the Tasmanian *Historic Cultural Heritage Act 1995*. There are a total of over 5000 sites on the THR, of which 164 are managed by various state government bodies such as Parks and Wildlife Service (PWS) and Crown Land Services. The Tasmanian Heritage Council continues to progressively assess properties on public land for inclusion on the THR. Approximately 30 of these government owned/managed sites are in forested reserves (see Table 6.4.b.1).

Under the state *Nature Conservation Act 2002,* 29 places are designated Historic Sites covering a total area of 16 100 ha, of which approximately 4320 ha are forested (there are four designated Historic Sites in forested areas). This remains unchanged from 2006. Regulations governing the use of all reserved land under the Act prohibit unauthorised removal, damage, defacement or disturbance of any object of archaeological, historical or scientific interest. Historic heritage sites within formal reserves are managed in accordance with the *Tasmanian Reserve Management Code of Practice*. Individual sites are identified and may be further protected by prescriptions contained within relevant reserve management plans.

Heritage Tasmania maintains and is progressively building a register of ‘significant’ sites under the *Historic Cultural Heritage Act 1995*. Most of these are in urban/rural areas.

Public land management agencies (Forestry Tasmania, PWS and Hydro Tasmania), with many heritage places identified across the public land estate, maintain separate agency databases now that the Tasmanian Historic Places Index (THPI) is no longer centrally maintained. PWS has entered all known heritage places on parks and reserves in its Asset Management System.

On permanent timber production zone land historic sites of significance are protected by formal and informal reserves. Areas specifically zoned for the management of historic heritage are identified in the Management Decision Classification (MDC) system as Special Management Zones for Cultural Heritage. About 1000 sites on State forest were specifically managed to protect non-Indigenous cultural heritage, which has been reduced to 700 with the allocation of most reserve areas to other land management organisations resulting from the transition to the permanent timber production zone land.

During the reporting period 2011–16, Forestry Tasmania has identified 77 new non-Indigenous cultural heritage sites.

Forestry Tasmania still runs the Tasmanian Historic Places Index, but only updates it for permanent timber production zone lands. As at 30 June 2016, the Forestry Tasmania version of the database contained 4403 records (all tenures). 1126 of these are on permanent timber production zone land, of which about 200 are new since 2011. These places range from those that are highly significant in historic heritage terms to some which have not had their significance assessed.

Individual historic sites on public and private land that are subject to forest practices plans are assessed and managed in accordance with the *Forest Practices Code 2015*. The *Forest Practices Code* requires that all sites found in the preparation of a forest practices plan are recorded and protected.

Table 6.4.b.1 Places of non-Indigenous cultural heritage of state significance in forests that are formally managed to protect the cultural values

Note: Includes sites that are physically in open areas but set in larger forested reserves.

National parks and reserves
Borradaile Plain Hut
Max Chows Hut
Basil Steers February Plains No.2 Hut
Basil Steers February Plains No. 1 Hut
Du Cane Hut
Lake Ball Hut
Lake Meston Hut
Paddy Hartnetts Kia Ora Snaring Hut
The Dasher Snaring Hut
Trappers Hut
Whitely's Hut
Steppes Historic Site
Corinna Graves
Waldheim Chalet
Mt George Signal Station
Mt Direction Signal Station
Hog Island Probation Station
Sarah Island
Cynthia Bay Old Rangers House
Cynthia Bay Picnic Shelter
Cynthia Bay Mimosa
Ida Bay Railway
Maria Island (this listing is for the whole island and includes multiple heritage sites)
Mt Nelson Signal Station
McLachlan & Co. Southport Whaling Station
Imlay's Southport Whaling Station
Grass Point Whaling Station – Adventure Bay
Ramsgate Whaling and Settlement Site – Cockle Creek
Permanent timber production zone land
Mt Cameron water race
Private forest
Thomas Francis Meagher Cottage Lake Sorell

Recognition of non-Indigenous cultural heritage in forests has increased over the reporting period, with more sites included in international, national and state level heritage lists. The new listings have emphasised convict and early natural resource uses, such as whaling, mining and snaring.

INDICATOR 6.4.c THE EXTENT TO WHICH INDIGENOUS VALUES ARE PROTECTED, MAINTAINED AND ENHANCED THROUGH INDIGENOUS PARTICIPATION IN FOREST MANAGEMENT

This indicator reports the extent to which Indigenous people participate in forest management.

Since the *2007 Sustainability indicators report*, agency restructuring has resulted in further changes to administrative arrangements for the *Aboriginal Relics Act 1975*. The former Aboriginal Heritage Office, renamed Aboriginal Heritage Tasmania (AHT), remains as a distinct business unit, now part of the Natural and Cultural Heritage Division within the Department of Primary Industries, Parks, Water and Environment (DPIPWE). AHT is responsible for maintaining the Aboriginal Heritage Register formally known as the Tasmanian Aboriginal Site Index, and advising on permits under section 9 and 14 of the Act. Permits are issued by the Director of National Parks and Wildlife or Minister for Environment, Parks and Heritage. AHT advises on survey and management of Aboriginal heritage sites and has been involved in site surveys and advising PWS in relation to Aboriginal site management in forests.

In 2014 and 2015 regular meetings were held between FPA staff, Aboriginal Heritage Tasmania staff and representatives of stakeholder groups, with the aim of improving the provisions of the *Resource Guide for managing Cultural Heritage in Wood Production Forests*, first published in 2012. The Aboriginal provisions of the *Resource Guide* were separated from those covering colonial and post-colonial heritage, and management prescriptions were updated and clarified. Meetings were held with Aboriginal Heritage Tasmania and the interim Aboriginal Heritage Council and other stakeholders in order to finalise a draft of a document to update the *Resource Guide.* A second meeting was held with the interim Aboriginal Heritage Council during the revision period. The final document entitled *Procedures for managing Aboriginal cultural heritage when preparing forest practices plans* was endorsed by the Aboriginal Heritage Council and recognised as an "agreed procedure" between the FPA and DPIPWE in March 2016. The new document was circulated to Forest Practices Officers (FPOs) in April 2016. It clarifies the responsibilities of FPOs and improves procedures for managing and protecting Aboriginal cultural heritage in forests during coupe planning and harvest operations, and during post-harvest operations such as cultivation.

In anticipation of the adoption of the *Procedures for managing Aboriginal cultural heritage when preparing forest practices plans* as an 'agreed procedure' between the FPA and DPIPWE, five courses to train over 100 FPOs and two Tasmanian Fire Service staff members in Aboriginal heritage management were conducted by the FPA in late 2015 in conjunction with staff from Aboriginal Heritage Tasmania and local Aboriginal community groups (see *Forest Practices News* December 2015). Two courses were conducted in the south, using the extensively quarried Oyster Cove chert outcrop as a field demonstration area, and three were conducted in Launceston using the nearby Trevallyn Dam forests containing artefact scatters as a field area. FPOs who completed these courses qualified as FPA-endorsed Aboriginal heritage FPOs, allowing them to access Aboriginal information on the Conserve database and to conduct surveys as specified in the *Procedures* document.

In partnership with the Aboriginal Land Council of Tasmania, PWS established two Aboriginal Field Officer positions at wukalina/Mt William National Park, as part of cooperating towards future joint management of the park. Several Aboriginal people are employed in various roles within the PWS.

PWS continued the four-year Aboriginal ranger trainee program that commenced in 2010. Jointly funded by PWS and the Australian Government's *Working on Country* regional program, the Aboriginal trainee ranger program aims to provide five Indigenous people with

training and competencies to enable them to move into ranger positions in PWS. During the reporting period four trainees graduated and progressed to permanent positions. One trainee is continuing. A further program is being considered.

South East Tasmania Aboriginal Corporation no longer has any land management capability as they disbanded their field unit and have become an administrative organisation. Therefore joint SETAC/PWS training exercises no longer occur. weetapoona Inc (Murrayfield) do have a land management capability and PWS has an agreement with them. PWS contracts Pakana Services (NRM SOUTH) - who take on young unskilled aboriginal trainees – for a large amount of on ground works, bush cutting and track clearing in reserves. There has been preliminary discussion about expanding on this and becoming more involved with planning and decision making about land management.

New PWS staff received an introduction to Aboriginal values and heritage as part of induction programs. PWS staff also attended cultural awareness training programs to assist them in enhancing understanding of Aboriginal culture and developing good working relations with Aboriginal communities.

Within reserves established under the *Nature Conservation Act 2002*, sites of Aboriginal heritage importance are generally protected and, where appropriate and agreed by the Aboriginal community, interpreted. Existing activities and new proposals in reserves that may impact on Aboriginal heritage values are assessed under the PWS Reserve Activity Assessment system and managed according to guidelines in the *Tasmanian Reserve Management Code of Practice 2003*, including consultation with relevant Aboriginal groups.

PWS has worked closely with the ALCT to facilitate the wukalina walk at Mt William National Park. This is a commercial walk initiative for the Tasmanian Aboriginal community.

A draft Aboriginal Acknowledgement Statement Policy was prepared.

Stage 1 of Aboriginal story integration has been completed for the 3 Capes Track, and art installations developed by the Aboriginal community.

Formal Aboriginal involvement in reserve management continued through dedicated Aboriginal community positions on reserve advisory committees: the statutory National Parks and Wildlife Advisory Council and the Arthur-Pieman Conservation Area Management Advisory Committee.

INDICATOR 6.4.d THE IMPORTANCE OF FORESTS TO PEOPLE

Management of Tasmania's forest estate provides a range of benefits to society, including environmental, social and economic benefits. The modern management approach reflects changes in community priorities and values over time, including a greater emphasis on conservation, while also developing a robust and world-leading forest practices system to enable ongoing access to forests to supply wood products.

From a socio-economic perspective, the forest industry remains a key component of regional communities in Tasmania.

Forests are valued in the community for a range of attributes, from forests as a source of income and job security to broader values encompassing renewable resources, biodiversity, clean air and water.

Tasmania has extensive areas of forested land located within the formal reserve network. The total Tasmanian Reserve Estate, as at 30 June 2014 (Parks and Wildlife Service), indicates a total terrestrial reserved area of 3 412 500 ha, or 50.1% of the area of Tasmania (Parks & Wildlife, 2014).

In the period since *State of the forests Tasmania 2012*, the management of 500 000 ha of land, dispersed across the State, has attracted considerable attention at a state, national and international level. Under the *Tasmanian Forests Agreement Act 2013*, this land was identified as Future Reserve Land, and scheduled for proclamation as reserves under the *Nature Conservation Act 2002*. Native forest harvesting was prohibited on the Future Reserve Land. The Future Reserve Land included areas of former production forest and informal reserves. In 2013, approximately 100 000 ha of Future Reserve Land was added to the Tasmanian Wilderness World Heritage Area and became nature conservation reserves.

In 2014, a new Tasmanian Government was elected with a policy position to not support the Tasmanian Forest Agreement. The *Tasmanian Forests Agreement Act 2013* was repealed and the remaining Future Reserve Land was converted to a new category of land, called future potential production forest land. Native forest harvesting continues to be prohibited on future potential production forest land. However, the legislation allows small scale native forest harvesting to be undertaken on future potential production forest land from October 2017. The legislation also allows for the future potential production forest land to be converted back to production forest from 2020.

The changes in management approach, and ongoing debate over the future role of the future potential production forest land, reflect the divergent community reviews about the role of forests. The debate also emphasises the ongoing importance of forests to people, whether it be for income, recreation or environmental benefits.

The need to balance the often conflicting views and values of our communities is reflected in the actions of commercial forest managers striving to demonstrate the sustainability of their forest practices.

Forest management certification continues to grow in importance as a means of demonstrating to communities and consumers that forests are managed consistent with community expectations. This has extended to forest managers seeking, and holding, multiple certifications.

Forestry Tasmania has in 2016 released its updated *Forest Management Plan* (the Plan) (https://www.sttas.com.au/sites/default/files/media/documents/plans/fmprevised2016.pdf). Contained within the Plan is their *Sustainable Forest Management Policy*. The policy sets out

how Forestry Tasmania will manage the permanent timber production zone land. Forestry Tasmania will:

- Operate in an environmentally, socially and economically responsible manner
- Actively engage with stakeholders
- Strive to maximise recovery that minimise waste and prevent pollution
- Undertake and support research so that operational practices are underpinned by sound science
- Meet or exceed relevant legislation and other requirements subscribed to by the organisation
- Maintain a forest management system and conduct forest management in a manner that is certified to be compliant with ISO 14001, AS 4801 and the Australian Forestry Standard
- Commit to actively work towards long-term incorporation of Forest Stewardship Council Principles and Criteria into the Forest Management System
- Develop objectives and targets that assist in achieving Forestry Tasmania's strategic objectives identified in the Forest Management Plan
- Ensure that staff and contractors have sufficient information, skills, training and resources to implement this policy
- Regularly monitor, audit, review and publically report on its performance
- Commit to continual improvement in their sustainability performance
- Communicate this policy and make it publicly available.

These policy statements reflect the changing community socio-economic expectations of forest management that Forestry Tasmania are seeking to meet.

References

Department of Primary Industries, Parks, Water and Environment, *Budget Papers 2015–16*, Hobart.

Parks and Wildlife Service, Hobart, http:--www.parks.tas.gov.au-indeX.aspX?base=5710

6.5. Employment and community needs

This sub-criteria reports on direct and indirect employment in the forest sectors and wage rates. The health and welfare of workers is critical to the forest industry and trends in work injury rates are also reported.

INDICATOR 6.5.a DIRECT AND INDIRECT EMPLOYMENT IN THE FOREST SECTOR

Forestry employment has tracked the experience of the forest industry more broadly over the last five years. A significant decline in employment in the five year period to 2012 has been partly offset by a recovery in employment since that time. Overall employment numbers remain well down on peak employment figures of the mid-2000s.

October 2014 (J. Schirmer et al, 2014) provides the most recent comprehensive analysis of employment numbers in the forest industry from 2008 to November 2013. The following extract from the report highlights some of the changes the forestry industry has experienced:

Tasmanian forest industry employment declined from 6963 people in 2008, to 2715 people in November 2013, and had increased to 3658 by May 2016 (Table 6.5.a.1).

During 2013, employment stabilised to some extent for the first time since 2008, with the number of people employed in the industry falling by 40 between November 2012 and November 2013. During this same period, full-time equivalent employment grew slightly despite the loss of 40 jobs, a consequence of many part-time workers in the industry increasing their work hours during 2013, particularly in the harvest and haulage sector.

The number of businesses operating in the industry has fallen steadily over time, with the decline continuing in 2012 even as employment numbers stabilised. This ongoing fall in business numbers is largely due to a number of small firms exiting the industry completely after having undertaken relatively little work in the industry for several years.

The Australian Bureau of Statistics (ABS) produces the *Labour Force, Australia, Detailed, Quarterly* (cat. no. 6291.0.55.003) This data source provides a quarterly estimate of employment in the forestry sector in Tasmania, noting, however, that this data is based on a limited sample size and is therefore subject to significant fluctuation.

Table 6.5.a.1 shows the average estimated employment for the twelve months ending May 2016. It provides a broad indication of the numbers of people employed in the forestry sector in Tasmania compared with the rest of Australia. With Tasmania currently representing only 2.13% of the Australian total population, the table provides an indication of the greater reliance of Tasmania on the forest industry as an employer than for other Australian States.

Table 6.5.a.1 Forestry Sector employment in Tasmania compared to rest of Australia (for 12 months ending May 2016).

Sector	Australia			Tasmania			Tasmania as % of Australia
	Employed total (FTE)	Employed full-time	Employed part-time	Employed total (FTE)	Employed full-time	Employed part-time	Employed Total:
Forestry	**9 625**	7200	2783	**1500**	1150	350	**15.58%**
Wood product manufacturing	**82 525**	69 350	13 300	**1625**	1525	300	**1.97%**
Pulp and paper manufacturing	**12 750**	10 775	2183	**533**	383	350	**4.18%**
Totals	**104 900**	87 325	18 267	**3658**	3058	1000	**3.49%**

Source: Australian Bureau of Statistics

Table 6.5.a.2 Percentage of Tasmania's employed population working in the Forestry Sector

Total employed persons - Tasmania - ABS data	(000's)
May 2016	237.7
June 2016	235.9
July 2016	234.4
August 2016	235.3
Average of four previous months	**235 827**
Percentage of timber workers	**1.55%**

Source: Australian Bureau of Statistics

Table 6.5.a.2 shows that the average total number of employed persons in Tasmania, from May 2016 to August 2016, was 235 827. Based on an estimate of 3 658 FTE, the forestry sector represented a total of 1.55% of all employed persons in Tasmania. This represents 0.71% of the total Tasmanian population (Table 6.5.a.3).

The proportion of all employed persons in Tasmania employed in the forestry sector has decreased when compared with ten years ago, when approximately 5% of the workforce was in the forestry sector. However, it is remains a major employer in non-urban and regional communities in Tasmania.

The most recent breakdown of employment in the forests sector by municipality was completed in 2013 (J. Schirmer et al., 2014).

The changes in the forest industry since 2012, particularly in the plantation sector, have resulted in both increased investment and employment opportunities.

Table 6.5.a.3 Percentage of Tasmania's Forestry Workers of the Total Tasmanian Population

March quarter 2016 - Tasmania's total population	518 500
Percentage of forestry workers of the total population	0.71%

Source: Australian Bureau of Statistics

In common with other sectors, forest industry jobs are increasingly mechanised, with greater emphasis on technical skills associated with that process of mechanisation.

Ascertaining the indirect employment dependent of the forestry sector in Tasmania is a difficult task. The Independent Verification Group (O'Hara et al., 2013) reported an industry multiplier of between 1.92 and 2.85. If a multiplier in the middle of this range were applied today, the forestry sector is supporting an additional 8780 full-time equivalent jobs in other sectors of the economy.

The forestry industry supports a range of service providers to the industry, such as suppliers, manufacturers, and maintenance providers of logging and wood processing equipment, fuel and fertiliser suppliers, financial and training service providers. Increased spending from wages earned also creates and supports jobs in other sectors, including in retail, hospitality, education and health. Without this indirect employment, many regional communities would be disadvantaged both socially and economically.

Apiary Industry

There are no recent estimates of employment in the apiary industry.

There are four Tasmanian Apiary businesses that operate in this space: Australian Honey Products, R. Stephens Apiary, Blue Hills Honey, and the Tasmanian Honey Company. For most part, the remainder of the apiary industry is classified as a micro business, with manufacturing being undertaken more as a hobby than a commercial operation. Apiarists primarily operate in regional areas thereby providing direct employment in small centres and indirect employment through an emerging tourist interest in the industry.

Reserve management, tourism and recreation

Direct employment in reserve forest management includes 297 full time equivalent (FTE) staff in the Parks and Wildlife Management Service, as well as the people employed in the 263 businesses operating in reserves. Indirect employment includes staff of the many tourism businesses operating outside reserves that rely on reserved forests as attractors for clients as well as people working for suppliers of goods and services.

Much of this employment is in rural and regional areas around the state. The *2007 Sustainability indicators report* indicated that the 1998–99 estimate of between 3550 and 4200 positions indirectly created as a result of visits to reserves managed by the Parks and Wildlife Service was a significant underestimate due to the subsequent 50% growth in visitors. As outlined in INDICATOR 6.3.b, visitation to reserves has increased within this reporting period. No research has been undertaken to provide more up-to-date information.

References

Schirmer J, Dunn C, Loxton E (2014) Socio-economic impacts of forest industry change Tasmanian forest industry employment and production, 2012–13. Tasmanian Government, Hobart.

O'Hara T, Farley M, Smith B (2013) Key Socio-Economic Impacts in Transitioning to Wood Supply Arrangements Detailed in the Tasmanian Forest Agreement (TFA). Independent Verification Group, Hobart.

INDICATOR 6.5.b WAGE RATES AND INJURY RATES WITHIN THE FOREST SECTOR

A sustainable industry will ensure high levels of workforce health and welfare and wage rates comparable with national averages for occupations.

Wage rates

The Fair Work Ombudsman has developed the Timber Industry Award 2010 (Award) where pay rates are updated from 1 July each subsequent year.

The Award is the minimum pay that employees in the timber industry must be paid for undertaking a particular job. It is not necessarily what employees are paid whilst working in those jobs, as employers may well pay above Award rates.

Table 6.5.b.1 Annual Salary-Wage rates in selected forestry occupations.

POSITION	**Wage-salary** ($ per annum) as at 30 June 2011	**Wage-salary** ($ per annum) as at 1 July 2016	**Percentage Change**
Timber Industry Award 2010 – General Timber Stream level 3	32 744	37 367	**14.1%**
Timber Industry Award 2010 – General Timber Stream level 2	31 744	35 989	**13.4%**
Tasmanian State Service Band 6 Level 1-1-2 *(Forest Policy Officer – General Stream)*	76 016	86 230	**13.4%**
Senior Ranger (Parks and Wildlife Service) Band 5, Level 3 *(2008 Tasmanian State Service Award)*	83 888 (includes 15% loading)	93 629 (includes15% loading)	**12%**
Regional Manager (Parks and Wildlife) Band 8, Level 4 *(2008 Tasmanian State Service Award)*	106 612	117 979	**11%**

There is no data available that collates the total value of wages and salaries paid to Tasmanians working in the timber industry. The ABS ceased producing this data in the 2006–07 financial year.

The Tasmanian Department of Treasury and Finance summarises the ABS Cat No 6302.0 when this data is released. For May 2016, the average weekly ordinary time earnings (AWOTE) for a full-time person was $1337 in Tasmania. This remains the lowest of all jurisdictions and 88.2% of the national average level. The Tasmanian AWOTE is consistent with wage data for other regional centres in Australia.

Injury rates

WorkSafe Tasmania reports injury frequency rates for Tasmanian industries against ANZSIC industry codes.

The injury frequency rate (also known as all claims frequency rate) is measured as the number of workers' compensation claims reported in any given year divided by the number of hours worked during the same year, multiplied by one million.

The injury frequency rate is calculated using data from WorkSafe Tasmania's statistical collections relating to workers' compensation. As the data covers only those injuries that result in a claim being lodged by a worker for compensation, the frequency rate of injuries may be underestimated.

Table 6.5.b.2 provides data on the injury frequency rate for selected forest industry sectors for the periods 2011–12 to 2015–16.

Table 6.5.b.2 Injury frequency rate (number of claims per million hours worked)

ANZSIC Code	Description of industry	2011–12	2012–13	2013–14	2014–15	2015–16
152	**Converted Paper Product Manufacturing**	7.03	15.02	0.00	6.69	57.71
30	**Forestry and Logging**	15.03	23.82	26.83	28.99	17.82
141	**Log Sawmilling and Timber Dressing**	55.63	34.76	17.56	44.32	48.16
149	**Other Wood Product Manufacturing**	59.88	46.79	36.43	37.90	36.63
151	**Pulp, Paper and Paperboard Manufacturing**	42.74	23.30	22.45	22.76	19.30

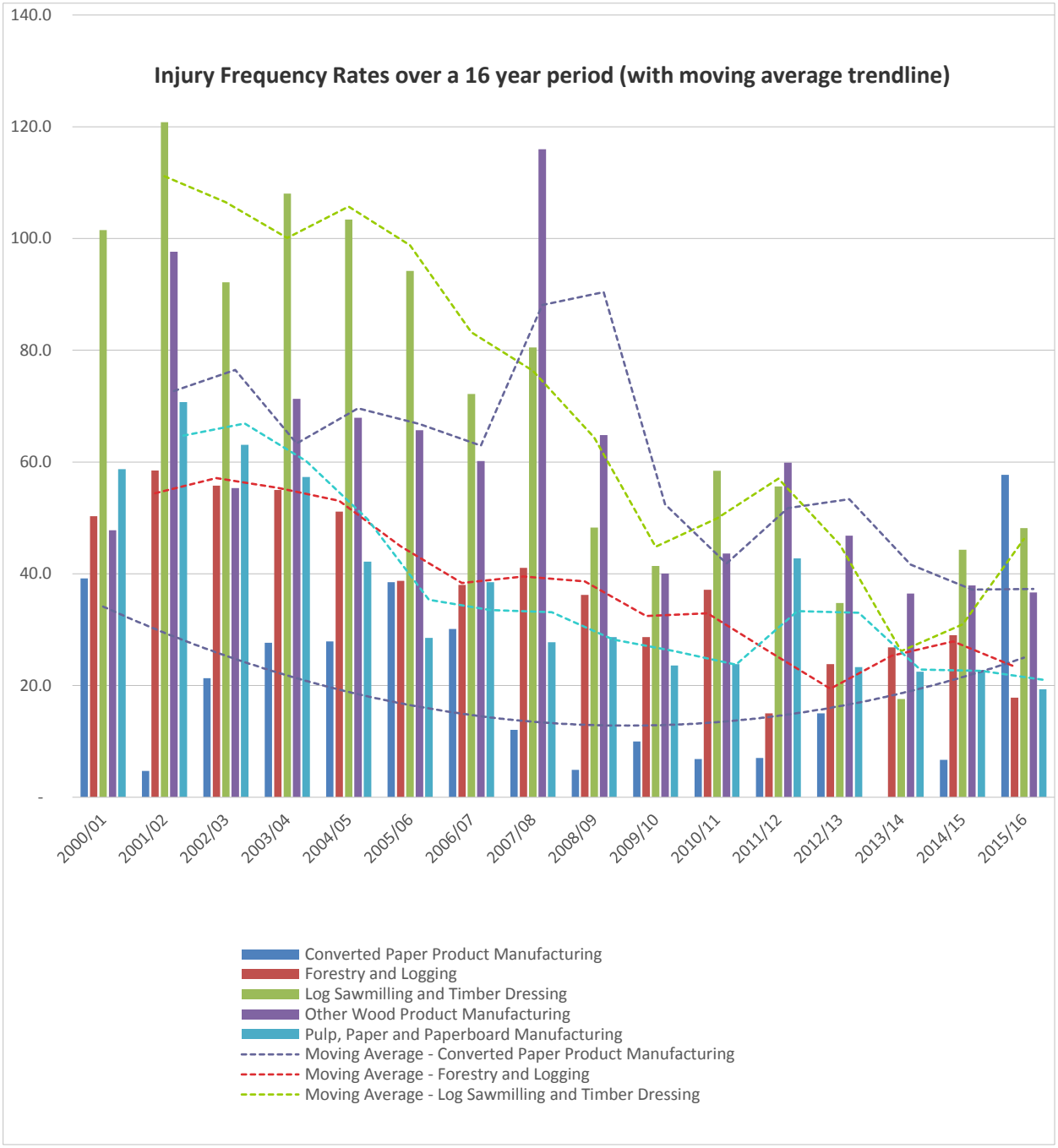
Source: WorkSafe Tasmania

From Table 6.5.b.2, it may be seen that the general trend for the previous five years is that injury frequency rates in the timber industry have been reducing.

Converted Paper Product Manufacturing has had a significant increase in the injury frequency rate over the previous five year period, rising from 7.03 in 2011–12, to 57.71 in 2015–16.

Forestry and Logging industry statistics demonstrate a slight increase in the number of incidents over the last five years. However, it is noted that there has been an almost 40% decrease for the period from 2014–15 to 2015–16.

Figure 6.5.b.1 Injury frequency rate trends



Source: WorkSafe Tasmania

Figure 6.5.b.1 shows the injury frequency rate over the past 16 years. Trend-lines indicate the frequency rates have experienced a downward trend since the early 2000s. Some sectors have, however, experienced more recent increases. Anecdotally, indications are that stricter reporting requirements have led to an increased reporting of incidents, rather than the rate of incidents themselves increasing.

Fatality rates

WorkSafe Tasmania have reported no fatalities in any of the industry groups reported above over the previous five years.

INDICATOR 6.5.c RESILIENCE OF FOREST DEPENDENT COMMUNITIES TO CHANGING SOCIAL AND ECONOMIC CONDITIONS

This indicator provides a measure of the extent to which communities are able to respond and adapt to change successfully.

The third five-yearly review of the implementation of the Regional Forest Agreement for the period 2007–2012 highlights that the Tasmanian forest industry is an important contributor to the State, and regional communities in particular. The forestry sector in Tasmania has been particularly affected over the last five years by significant events, including a persistently high Australian dollar, a structural reduction in production native forests and the restructure of the industrial plantation estate, following collapse of plantation management businesses.

Schirmer et al. (2014) highlight some of the impacts on employment experienced during 2011 to 2013, which was a particularly difficult period for the forest industry in Tasmania.

Between 2011 and 2013, the native forest sector experienced a 31.2% decline in employment. The hardwood plantation sector was relatively stable during 2011–2013, after employment fell rapidly between 2008–2011, and employment in the softwood plantation sector experienced very slight growth during 2011–2013, although substantially less than in 2008.

An indication of the local impacts of the forest industry downturn can be seen through the loss of direct forestry jobs from 2008 to 2013 at a Local Government Area (LGA) level:

- Launceston – 484 jobs lost
- Dorset – 365 jobs lost
- Burnie – 322 jobs lost
- West Tamar – 315 jobs lost; and
- Meander Valley – 311 jobs lost.

Another way of measuring the impact on small communities is to examine the proportion of forestry jobs lost as a percentage of all jobs in an LGA. From 2008–2013:

- 9.4% of all jobs were lost in Glamorgan – Spring Bay LGA
- 8.9% of jobs were lost in the Dorset LGA
- 7.4% of jobs were lost in the Southern Midlands LGA
- 6.2% of jobs were lost in the Central Highlands LGA; and
- 5.0% of jobs were lost in Kentish.

The LGAs that have experienced the greatest loss of employment as a result of the decline in the forest industry are primarily rural LGAs with smaller populations and employment bases. Where these LGAs are heavily dependent on forestry employment, these job losses have a significant impact on the general working community. This is further evidenced by the economic multiplier (between 1.92 and 2.85) each forestry job is understood to have on other related and non-related sectors of the economy (O'Hara et al, 2013).

The last two to three years has seen a marked increase in employment in the sector, highlighted in INDICATOR 6.5.a. The early phase of this recovery is captured by Schirmer, where businesses in the forest industry were reporting cautious optimism about their future. A majority of respondents believed they would increase capital expenditure, and increase profits. Approximately 40% of respondents indicated that they would consider hiring more staff to cope with the expected increase in demand for forestry products in the future.

The downturn in the forestry sector over the last decade has resulted in a wholesale restructure of the forest industry, and forest businesses. These businesses are now in a position to capitalise on the improved trading conditions that have emerged over the last two years. This can be expected to have material long-term benefits for the regional communities that still have a large dependency on the forestry sector, in spite of the undoubted hardship that has been experienced over the last five years.

References

Schirmer J, Dunn C, Loxton E (2014) Socio-economic impacts of forest industry change Tasmanian forest industry employment and production, 2012–13. Tasmanian Government, Hobart.

O'Hara T, Farley M, Smith B (2013) Key Socio-Economic Impacts in Transitioning to Wood Supply Arrangements Detailed in Tasmanian Forest Agreement (TFA). Independent Verification Group, Hobart.

INDICATOR 6.5.d RESILIENCE OF FOREST DEPENDENT INDIGENOUS COMMUNITIES TO CHANGING SOCIAL AND ECONOMIC CONDITIONS

INDICATOR 6.5.d provides a measure of the extent to which Indigenous communities are able to respond and adapt to change successfully. Communities with a high economic and cultural dependence on forest and forest-related industries should be sustainable into the future. This indicator should also take into account that the use of forests provides/improves access to resources for survival and the maintenance of traditional values and cultural heritage.

No Tasmanian Aboriginal community is highly or directly dependent on forests and/or forest products and/or services and therefore changes to forests will have limited impact on their social and economic status. However, the Tasmanian Government, public agencies and private forest managers recognise the importance of forests and forest sites containing cultural objects and sites of significance to Aboriginal communities and engage these communities in management planning and operations. For example in 2015 the Forest Practice Authority worked with Aboriginal Heritage Tasmania and members of an Aboriginal community in Launceston to run three training courses for foresters in Tasmania, and forestry companies consult with Aboriginal communities at the advanced planning stage regarding operations that may impact Aboriginal heritage.

Forestry Tasmania has implemented two policies to recognise and support the Tasmanian Aboriginal people as traditional owners of permanent timber production zone land and the significance of heritage, including places, objects and stories, for maintaining continuous links with that land.

Forestry Tasmania's Aboriginal Heritage Policy provides the principles by which Forestry Tasmania manages places of Aboriginal heritage. Under this policy, and in collaboration with the Aboriginal community, Forestry Tasmania aims to:

- foster positive and respectful relationships with the Aboriginal community and relevant statutory bodies and agencies to inform and guide forest planning and management activities
- identify, protect and manage places of Aboriginal cultural significance in accordance with the *Aboriginal Relics Act 1975*, the *Forest Practices Code 2015*, and the Australian ICOMOS Burra Charter 2013
- permit access by the Aboriginal community to land and traditional cultural materials where safety and environmental limitations allow
- explore and promote participation and economic opportunities for the Aboriginal community to manage and maintain their heritage, including employment of Aboriginal community members; and
- develop and implement appropriate training to assist staff to gain an awareness of Aboriginal culture and allow for identification of Aboriginal heritage.

CRITERION 7: LEGAL, INSTITUTIONAL AND ECONOMIC FRAMEWORK FOR FOREST CONSERVATION AND SUSTAINABLE MANAGEMENT

This criterion and associated indicators relate to the overall policy framework that guides and directs the conservation and sustainable management of forests. It includes the broader societal conditions and processes which are often external to the forest but which support efforts to conserve, maintain or enhance one or more of the conditions, attributes, functions and benefits captured in criteria 1–6.

INDICATOR 7.1.a EXTENT TO WHICH THE LEGAL FRAMEWORK SUPPORTS THE CONSERVATION AND SUSTAINABLE MANAGEMENT OF FORESTS

This indicator reports on the evolution of the legal framework for management of forest on all land tenures in Tasmania, environmental management systems and community perspectives. It also addresses the extent to which transparency and public participation in policy and decision-making for the continuous improvement of forest management is ensured.

The Tasmanian Regional Forest Agreement (RFA) is a 20-year bilateral agreement between the Tasmanian and Australian governments signed on 8 November 1997. It is a framework document that is underpinned by Tasmania's forest management system. The RFA's key principles are:

- ecologically sustainable forest management (the management of all land tenures to maintain the overall capacity of forests to provide goods; protect biodiversity; and protect the full suite of forest values at the regional level)
- certainty for conservation of the environment and heritage values (through the establishment and maintenance of a Comprehensive, Adequate and Representative reserve system); and
- certainty of resource access for the forestry industry.

Under the Tasmanian RFA, the Tasmanian and Australian governments agreed to establish a Comprehensive, Adequate and Representative (CAR) reserve system for forests, which meets the national agreed criteria to ensure long-term conservation and protection of Tasmania's forest biodiversity, old-growth forest and wilderness values.

The CAR reserve system was built on Tasmania's pre-existing reserve network, through the addition of new reserves on both public and private land. The reserve system has been further extended through a range of programs and agreements. Those relevant to forest management include:

- the 2005 Tasmanian Community Forest Agreement
- the 2010–2013 Tasmanian Forest Agreement process
- the Crown Land Assessment and Classification Project; and
- various private land conservation programs.

The reserve system extends over land, inland waters, estuaries and marine areas and includes both public and private land.

The *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act), is Australia's main federal environmental legislation. The EPBC Act is designed to protect and manage matters of national environmental significance. However, due to the comprehensive nature of the Tasmanian RFA and the Commonwealth fulfilling its duties in relation to the RFA for assessment of environmental impacts prior to the RFA, virtually all forestry operations conducted in accordance with the RFA are exempt from the assessment and approval requirements of Part 3 of the EPBC Act.

The *Policy for Maintaining a Permanent Native Forest Estate* is in place to ensure the maintenance of the native forest resource base for all its various conservation, production and amenity values by placing limits on broadscale clearance and conversion of native forest in Tasmania.

The policy regulates how native forests are to be maintained as they are managed for a variety of uses. The maintenance of native forests refers to the limitations on clearance and conversion of native forests to other lands uses or non-native vegetation covers.

The policy was first issued in 1997, in accordance with the Tasmanian RFA. The policy is implemented through the *Forest Practices Act 1985* and is periodically reviewed and amended.

The *Forest Practices Act 1985* is designed to ensure that forest operations are conducted in an environmentally acceptable manner on public and private forest. The Act forms part of a broader legislative and policy framework that provides a basis for sustainable forest management in Tasmania.

The *Forest Practices Act 1985* also includes the provision for private timber reserves (PTRs), which are a means by which private land holders are able to ensure the security of their forest resources without requiring permits according to the *Land Use Planning and Approvals Act 1993*.

At June 2006, 421 709 ha of private property were covered by PTRs, which had increased to 471 255 ha at June 2011, and decreased to 442 623 ha at June 2016. These figures represent approximately 46%, 44% and 40% of the total area of private forests within the estate in those respective years. Part of the decline in area under PTRs since 2011 can be attributed to the collapse of a number of managed investment schemes (MIS) and the resulting lack of commitment by some landowners to ongoing plantation forestry, with land reverting to non forestry use.

The *Forest Practices Code* (the Code) was released in 1987 and has been updated in 1993, 2000 and 2015. It provides a practical set of guidelines and standards for forest management, timber harvesting and other forest operations. It provides for the protection of environmental values during forest operations, in particular: soils; geomorphology; visual landscape; water quality and flow; flora, fauna, genetic resources and cultural heritage.

The *National Parks and Reserves Management Act 2002* is the principal Act that sets out the management objectives for conservation reserves declared under the *Nature Conservation Act 2002*. On nature conservation reserves there are legislated management objectives for reserve classes, statutory management plans that require formal public consultation, input from the statutory National Parks and Wildlife Advisory Council, independent review of responses to public comment on draft management plans by the Tasmanian Planning Commission, adherence to the *Tasmanian Reserve Management Code of Practice* and development applications subject to detailed environmental impact assessment processes.

A new management plan was approved for one nature reserve and a management statement was finalised for one reserve during the reporting period 2011–2016. The draft of the new

Tasmanian Wilderness World Heritage Area Management Plan was released for public comment and the plan was prepared for final approval. Work continued on a general management plan, covering approximately 700 reserves around the state. The proportion of the area of reserves covered by approved management plans dropped to around 60% due to the increase in reserved area.

The *Tasmanian Forests Agreement Act 2013* provided legislative backing to the 2012 Tasmanian Forest Agreement, negotiated by key forestry stakeholders, and created the concept of permanent timber production zone land which replaced 'multiple-use forest', and which describes those areas of forest under the management of Forestry Tasmania. It also designated 500 000 ha of permanent timber production zone land as Future Reserve Land and prohibited native forest timber harvesting from that land. Approximately 95 700 ha of Future Reserve Land has since been proclaimed as reserves under the *Nature Conservation Act 2002*, 90% of which is coincident with the 2013 extensions to the Tasmanian Wilderness World Heritage Area.

The *Forestry (Rebuilding the Forest Industry) Act 2014* purpose was to repeal the *Tasmanian Forests Agreement Act 2013* and to provide for the invigoration of the forest industry. The main feature of the Act was the conversion of 399 000 ha of Future Reserve Land to Crown Land, to be known as future potential production forest land. The administration of the future potential production forest land was transferred from Forestry Tasmania to the Department of Primary Industries, Parks, Water and Environment.

The *Forest Management Act 2013* repealed the *Forestry Act 1920*, and provides for the future management of the permanent timber production zone land by Forestry Tasmania as the Forest Manager. It reinforces that the Forest Manager must manage the permanent timber production zone land consistent with the principles of forest management established under the *Forest Practices Code*. It also declared approximately 221 000 ha of forest reserves to be either regional reserves or conservation areas under the *Nature Conservation Act 2002*.

A list of the main legislation relevant to sustainable forest management in Tasmania is provided in Table 7.1.a.1.

Table 7.1.a.1 Main legislation relevant to sustainable forest management in Tasmania, as of 30/06/2016

AGENCY	Main legislation	Purpose	Tenures to which legislation applies
Forestry Tasmania	*Forest Management Act 2013)*	Empowers Forestry Tasmania to manage and control PTPZ land, and to undertake forest operation on that land for the purpose of selling wood products	PTPZ land
Forestry Tasmania and Crown Land Services	*Forestry (Rebuilding the Forest Industry) Act 2014*	Establishes the timeline and framework for harvesting on PTPZ land by Forestry Tasmania and management of FPPF land by Crown Land Services.	PTPZ and FPPF land
Forest Practices Authority	*Forest Practices Act 1985*	Establishes the forest practices system to provide for the sustainable management of forests on any land subject to forest operations. Provides for publication, enforcement and review of the *Forest Practices Code.* Provides for the establishment of private timber reserves on private land to provide security of long term forestry use for land owners.	All tenures
DPIPWE	*Environmental Management and Pollution Control Act 1994*	Establishes the “duty of care” principle to prevent or minimise environmental harm. Defines potentially harmful activities requiring assessment and approval. Identifies notification requirements for environmental incidents.	All tenures
Department of Justice	*Land Use Planning and Approvals Act 1993*	Establishes the Resource Management and Planning System for Tasmania. Forest practices on public land and forest operations on private timber reserves are exempt from the Act.	All tenures
DPIPWE	*Threatened Species Protection Act 1995*	Provides for the conservation management of scheduled threatened species of flora and fauna.	All tenures
DPIPWE	*Aboriginal Relics Act 1975*	Provides for the identification and protection of all Aboriginal relics (sites).	All tenures
DPIPWE	*Historic Cultural Heritage Act 1995*	Identifies, assesses and protects historic (post settlement) cultural heritage.	All tenures
Tasmania Fire Service	*Fire Service Act 1979*	Provides for the control and use of fire in the urban and rural environment.	All tenures
DPIPWE	*Crown Lands Act 1976*	Makes provisions with respect to the management, sale, and disposal of the lands of the Crown.	Crown Lands
Department of Premier and Cabinet	*Aboriginal Lands Act 1995 (as amended in 1999)*	Promotes reconciliation with the Tasmanian Aboriginal community by granting to Aboriginal people certain parcels of land of historic or cultural significance.	All tenures
Private Forests Tasmania	*Private Forests Act 1994*	Promotes the development of private forestry in Tasmania.	Private land
DPIPWE	*Forestry Rights Registration Act 1990*	Provides for the registration on land title of certain forestry rights.	Any land with title
Forestry Tasmania	*Timber Promotion Act 1970*	Establishes the Tasmanian Timber Promotion Board to promote the use of wood, in Tasmania.	-

AGENCY	Main legislation	Purpose	Tenures to which legislation applies
DPIPWE	*Regional Forest Agreement (Land Classification) Act 1998*	Provides for the various categories of reserves.	-
Department of Justice	*Public Land (Administration and Forests) Act 1991 and Resource Planning and Development Commission Act 1997*	Provides authority to conduct public land use inquiries, approve planning schemes and report on State policies.	Public land
DPIPWE	*Nature Conservation Act 2002*	Regulates the conservation and protection of flora, fauna and geological diversity within Tasmania; classifies reserved lands in Tasmania and establishes values & objectives for each reserve class and provides for conservation covenants and reservation of private lands. Sets out the processes and criteria for compensation where a forest practices plan has been refused because of the presence of threatened native vegetation communities or threatened species.	All tenures
DPIPWE	*National Parks and Reserves Management Act 2002*	Provides for the management of reserves under the *National Parks and Reserves Management Act 2002* according to management objectives for each reserve class.	Reserves declared under the *Nature Conservation Act 2002*
DPIPWE	*Water Management Act 1999*	Provides for the management of groundwater and surface water.	All tenures
DPIPWE	*Weed Management Act 1999*	Provides for the management of weed control.	All tenures
State Growth	*Mineral Resources Development Act 1995*	Provides for mineral exploration and fossicking.	Private and some types of public land
DPIPWE	*Agricultural and Veterinary Chemicals (Control of use) Act 1995*	Prevents restricted chemicals being used without a permit, stipulates labelling requirements.	All tenures
State Growth	*Forestry (Fair Contracts Codes) Act 2001*	Provides for the approval of codes to improve the fairness of contracts within the forest industry, and to give such codes legal effect.	All tenures
Workplace Standards Tasmania	*Work Health and Safety Act 2012*	Provides for the health and safety of person employed, engaged and affected by industry.	All tenures
Commonwealth of Australia	*Environmental Protection and Biodiversity Conservation Act*	Directly applies to all non-forestry operations. The RFA provides a means of implementation of the EPBC Act provisions through application of the Forest Practices Act, the *Forest Practices Code* and “agreed procedures” on threatened species management between DPIPWE and the Forest Practices Authority.	All tenures

AGENCY	Main legislation	Purpose	Tenures to which legislation applies
Commonwealth of Australia	*Regional Forest Agreement Act 2002*	Gives effect to certain obligations of the Commonwealth, to certain aspects of the National Forest Policy Statement, and created the Forest and Wood Products Council	All tenures

In addition to the formal legislation, the Tasmanian and Australian Governments have a number of regulatory instruments and policies that support sustainable forest management; these are listed in Table 7.1.a.2.

Table 7.1.a.2 Main policies relating to forest management and conservation

AGENCY	Main policy	Purpose	Tenures to which policy applies
Australian Government	National Forest Policy Statement 1992	Provides a framework for the future management of forests. It has 11 broad national goals.	-
Australian and Tasmanian Government	1997 Tasmanian Regional Forest Agreement	A legally binding 20 year agreement, with a five yearly review period, that applies to all of Tasmania and it provides specific actions which create a balance between the environmental, social, economic and heritage values that forests provide.	All tenures
Australian Government	Plantations for Australia: the 2020 Vision	Seeks to enhance regional wealth creation and international competitiveness through a sustainable increase in Australia's plantation resources.	All tenures
Australian and Tasmanian Government	2005 Tasmanian Community Forest Agreement	Is a supplement to, and builds on, the RFA by increasing the reserve system and revitalising the timber industry.	All tenures
State Growth	Policy for Maintaining a Permanent Native Forest Estate	Sets threshold levels for the maintenance of a permanent native forest estate by forest communities at both the bioregional and state levels to meet one of the requirements of the Tasmanian RFA.	All tenures
Tasmanian Planning Commission	State policy on the Protection of Agricultural Land 2009	Aims to foster sustainable agriculture in Tasmania by ensuring the continued productive capacity of the state's agricultural land resource.	Private agricultural lands
Australian Government	Australia's Strategy for the National Reserve System 2009–2030	Provides national guidance to enhance establishment, planning, management, monitoring and community partnerships for the National Reserve System.	All tenures
Australian Government	Burra Charter 2013	Defines the basic principles and procedures to be followed in the conservation of Australian heritage places	All tenures
Australian Government	Australia's Biodiversity Conservation Strategy 2010–2030	A national strategy for the conservation, sustainable use and the fair and equitable sharing of benefits arising from Australia's biodiversity	

The legal forest management and conservation framework in Tasmania provides a high level of checks and balances. As well as the regulatory requirements imposed on other land uses, forestry activities must comply with additional standards required under the *Forest Practices Code* and associated planning tools.

On nature conservation reserves the following mechanisms are in place:

- legislated management objectives for reserve classes
- statutory management plans that require formal public consultation input from the statutory National Parks and Wildlife Advisory Council
- independent review of responses to public comment on draft management plans by the Tasmanian Planning Commission
- adherence to the *Tasmanian Reserve Management Code of Practice*; and
- development applications subject to detailed environmental impact assessment processes.

A new management plan was approved for one nature reserve. A draft management plan for the Tasmanian Wilderness World Heritage Area was released for public comment, covering seven national parks and 45 other reserves, nearly 25% of Tasmania. Work continued on the General Management Plan (GMP), to cover all reserves without a statutory management plan (approximately 750). The foundation GMP document was revised following an internal two year trial and natural values significance reporting was developed for the reserve estate. The proportion of area of reserves covered by approved management plans has dropped to approximately 60%, due to the increase in reserved area.

There are three primary elements to achieving ecologically sustainable forest management in Tasmania's approach:

1. the *Forest Practices Code* to ensure the achievement of sustainable forestry operations
2. the development of a comprehensive, adequate and representative (CAR) forest reserve system to securely protect nature conservation values
3. the maintenance of a permanent native forest estate to ensure that we maintain the resource base for all its various production, conservation and amenity values.

The *Policy for Maintaining a Permanent Native Forest Estate* specifically addresses the third of these elements by ensuring that Tasmania maintains a permanent forest estate that comprises areas of native forest managed on a sustainable basis both within formal reserves and within multiple-use forests across public and private land.

The Policy is implemented by the Forest Practices Authority through the Authority's consideration of applications for approval of Forest Practices Plans under the *Forest Practices Act 1985*.

In the period 2011–2016 the *Policy for Maintaining a Permanent Native Forest Estate* was revised on a number of occasions. The revisions mainly included clarifying terminology and implementation mechanisms. The 2015 revision included an invitation from the Tasmanian Government to members of the public to comment on the *Policy for Maintaining a Permanent Native Forest Estate*, and any issues relevant to the ongoing implementation of the Policy. Following the completion of the public consultation period, all submissions were assessed and considered along with other relevant information. Review recommendations were expected to be put to Government in mid–2016, but due to the 2 July 2016 Federal election, completion of the review has been extended to 1 July 2017.

Consistent with the *Policy for Maintaining a Permanent Native Forest Estate* process to date, the timeframe for implementation of bans on broad scale clearing and conversion of native forest on private land has been extended for the same period (to 1 July 2017), pending

completion of the *Policy for Maintaining a Permanent Native Forest Estate* review. The Policy was updated in June 2016 to reflect these changes pending the completion of the review.

None of the key biodiversity provisions, including existing limits to clearing on private land, have been altered by this extension of the *Policy for Maintaining a Permanent Native Forest Estate*.

The scope of the legislation which provides for sustainable forest management is outlined below. Tasmania has adopted the Montreal Process Criteria and Indicators to provide a framework for assessment of current Tasmanian processes. Within this framework, which is also used for national reporting, a qualitative assessment of each parameter is made in Table 7.1.a.3.

Table 7.1.a.3 Scope of the ecologically sustainable forest management (ESFM) provisions in legal frameworks

ESFM aspect – extent to which the legal framework provides for:	Permanent Timber Production Zone land	Nature conservation reserves	Other Crown land	Private land
Forest management planning and review:				
Accountable management body	Y	Y	Y	N
Dispute resolution process	Y	Y	Y	Y
Forest management planning	Y	Y	Y	Y
Management review	Y	Y	Y	P
Planning for environmental values	Y	Y	Y	Y
Planning review	Y	Y	Y	P
Policy review	Y	Y	Y	P
Property rights	Y	Y	Y	Y
Periodic assessment of forest related resources	Y	Y	Y	Y
Public participation:				
Legislation requires broad based public consultation for forest related policy	Y	Y	Y	Y
Legislation requires broad based public consultation to develop forest related management plans	Y	Y	Y	P
Legislation requires publication of specific forest-related information	Y	Y	Y	Y
Right to information legislation allows public access to information related to forests	Y	Y	Y	P
Indigenous participation:				
Formal Indigenous participation in management	P	P	P	P
Indigenous participation in planning	P	P	P	P
Recognition of cultural values	Y	Y	Y	Y
Has mechanisms to recognise the customary and traditional rights of Indigenous peoples	Y	Y	Y	Y
Traditional management on relevant public land (eg joint management/ co management)	P	P	P	NA
Access to forests for traditional activities	P	P	P	P
Access to Indigenous cultural heritage on forest land	P	P	P	P
Allows for the performance of traditional practices	P	P	P	P

ESFM aspect – extent to which the legal framework provides for:	Permanent Timber Production Zone land	Nature conservation reserves	Other Crown land	Private land
Allows for the protection of Indigenous intellectual property	P	P	P	P
Other aspects				
Recognition of scientific values	Y	Y	Y	P
Recognition of voluntary reserves on private land	NA	NA	NA	Y
Regulation of forest clearing	Y	Y	Y	Y
Resource assessment	Y	Y	Y	P
Secure land tenure	Y	Y	Y	Y
SFM an explicit objective	Y	Y	Y	P

Ratings:

Y = Yes. The legal framework exists with ESFM provisions that are fairly comprehensive;

P = Partly. The legal framework or mechanism exists but does not cover all ESFM aspects or is limited in its application;

N = No. The legal framework does not exist or include ESFM provisions.

NA = Not applicable

[1.] Access includes an ability to enter and undertake activities such as foraging, hunting, or ceremonial.

Based on data in Table 7.1.a.3, the framework for ecologically sustainable forest management has been established at a high level for public land. The framework for private land is also comprehensive, but slightly less than for public land. The majority of commercial private forest managers have established systems which ensure compliance with legislation as an integral management objective specified under independently certified ISO and EMS standards. These organisations have also obtained or are seeking to obtain certification under the Australian Forestry Standard (AFS) and/or the Forest Stewardship Council (FSC).

The extent of legislative requirements which apply best practice for a range of activities in a way that provides for sustainable forest management are summarised in Table 7.1.a.4. Even though there have been some legislative changes during the reporting period the ratings in the table showed no change between 2011 and 2016.

Table 7.1.a.4 Legislative requirement to apply best practice for sustainable forest management activities by tenure category

	PTPZ land		Nature conservation reserve		Other Crown land		Private land	
Activities	**2011**	**2016**	**2011**	**2016**	**2011**	**2016**	**2011**	**2016**
Access to the forest								
Planning and siting roads	Y	Y	Y	Y	Y	Y	Y	Y
Road design and construction	Y	Y	Y	Y	Y	Y	Y	Y
Upgrading existing roads and tracks	Y	Y	Y	Y	Y	Y	Y	Y
Rock quarries and gravel pits	Y	Y	Y	Y	Y	Y	Y	Y
Bridge, causeway and ford construction	Y	Y	Y	Y	Y	Y	Y	Y
Road maintenance	Y	Y	Y	Y	Y	Y	P	P
Harvesting								
Design, planning and equipment	Y	Y	NA	NA	Y	Y	Y	Y
Wet weather	Y	Y	NA	NA	Y	Y	Y	Y
Snig tracks and landings	Y	Y	NA	NA	Y	Y	Y	Y
Water quality and stream protection	Y	Y	NA	NA	Y	Y	Y	Y
Salvage operations	Y	Y	NA	NA	Y	Y	Y	Y
Steep country	Y	Y	NA	NA	Y	Y	Y	Y
Forest practices plans	Y	Y	NA	NA	Y	Y	Y	Y
Conservation of other values								
Flora	Y	Y	Y	Y	Y	Y	Y	Y
Fauna	Y	Y	Y	Y	Y	Y	Y	Y
Rare or endangered species	Y	Y	Y	Y	Y	Y	Y	Y
Landscape	Y	Y	Y	Y	Y	Y	Y	Y
Archaeology (cultural heritage)	Y	Y	Y	Y	Y	Y	Y	Y

Geomorphology	Y	Y	Y	Y	Y	Y	Y	Y
Care of soils	Y	Y	Y	Y	Y	Y	Y	Y
Water quality and flow	Y	Y	Y	Y	Y	Y	Y	Y
Forest establishment								
Reforestation	Y	Y	NA	NA	Y	Y	Y	Y
Maintaining forests								
Fire management	Y	Y	Y	Y	Y	Y	P	P
Pest, disease, weed control	Y	Y	Y	Y	Y	Y	N	NP
Use of chemicals	Y	Y	Y	Y	Y	Y	Y	Y
Thinning	Y	Y	NA	NA	Y	Y	Y	Y
Non-wood products / uses	Y	Y	Y	Y	Y	Y	P	P
Apiary	Y	Y	Y	Y	Y	Y	N	N
Grazing	Y	Y	Y	Y	Y	Y	N	N
Recreation	Y	Y	Y	Y	Y	Y	N	N
Socio-economic								
Occupational health and safety	Y	Y	Y	Y	Y	Y	Y	Y

Rating

Y = Yes. There is a legislative requirement to apply best practice for this activity in this tenure category

P = Partly. There is a legislative requirement to apply best practice for this activity in this tenure but this requirement does not cover all aspects or is limited in its application.

N = No. There is no legislative requirement to apply best practice for this activity in this tenure.

NA = Not applicable

INDICATOR 7.1.b EXTENT TO WHICH THE INSTITUTIONAL FRAMEWORK SUPPORTS THE CONSERVATION AND SUSTAINABLE MANAGEMENT OF FORESTS

This indicator reports the extent to which the institutional framework supports the conservation and sustainable management of forests. It specifically looks at Tasmania's commitment to building community awareness, regional assessment and planning, and includes policy review as an essential basis for continuous improvement of sustainable management of forests. The Comprehensive, Adequate and Representative (CAR) reserve system for forests and the forest practices system underpin the institutional framework in Tasmania. The maintenance of appropriate levels of human resource skills, the enforcement of laws, regulations and guidelines and the adoption of forest certification are mechanisms that can be utilised in demonstrating Tasmania's commitment to sustainable forest management.

The Comprehensive, Adequate and Representative Reserve System

Under the Tasmanian RFA, the Tasmanian and Australian Governments agreed to establish a Comprehensive, Adequate and Representative (CAR) reserve system for forests, which meets the national agreed criteria to ensure the long-term conservation and protection of Tasmania's forest biodiversity, old-growth forest and wilderness values.

The CAR reserve system was built on Tasmania's pre-existing reserve network, through the addition of new reserves on both public and private land. The reserve system has been further extended through a range of programs and agreements. Those relevant to forest management include:

- the 2005 Tasmanian Community Forest Agreement
- the 2010–13 Tasmanian Forest Agreement process
- the Crown Land Assessment and Classification Project; and
- various private land conservation programs.

The reserve system extends over land, inland waters, estuaries and marine areas and includes both public and private land.

As at June 2016, the Tasmanian system of reserves on land comprised 3.41 million ha, 50.1% of the land area of Tasmania and 58% (1.56 million ha) of its native forests. Reserved public land comprised 3.26 million ha (of which 2.73 million ha is formal reserve). In addition there were 149 000 ha of private land reserved, of which 107 000 are contained in perpetual reserves. There were 792 land based reserves; 783 of these are managed by the Parks and Wildlife Service.

A Tasmanian Reserve Estate spatial layer has been created by DPIPWE to be used as the authoritative source of information on the extent, type and distribution of the Reserve system in Tasmania. The business rules for compiling the Tasmanian reserve estate spatial layer have been documented to ensure the layer is updated in a consistent manner and to provide users with clear information on attributes of the Tasmanian reserve system.

The Tasmanian Reserve Estate spatial layer supports natural resource management planning, prioritisation, reporting and decision-making and has been explicitly created to provide the basis of a range of reporting statistics for:

- the CAR reserve system developed under the RFA
- state and national State of the Environment and State of the Forests Reports
- the National Reserve System
- Marine Protected Areas reporting; and
- Government annual reports.

The Forest Practices System

The Tasmanian forest practices system has evolved over more than thirty years to become a sophisticated, robust system which is applied across all tenures. The forest practices system is based on a co-regulatory approach, combining self-management by the forest industry and independent monitoring and enforcement by the FPA.

All Forest Practices Officers are trained and authorised by the FPA and they must comply with the directions of the CFPO. Most are employed within the industry to plan, supervise and monitor forest practices, although their responsibility under the *Forest Practices Act 1985* is to the FPA. Forest Practices Officers attend the location of each proposed FPP and undertake an on-ground survey for natural and cultural values that may have been identified as part of the desktop assessment.

The forest practices system aims to foster co-operation and communication among all stakeholders, including the government, private landowners, the forest industry and the broader community. There is an emphasis on planning, training, education and continuous improvement.

Development and Maintenance of Skills

The requirement to develop and maintain essential skills is recognised by Tasmania's forest managers as underpinning the institutional framework necessary to support sustainable systems and practices. These skills include relevant tertiary and technical training in forest practices, operational competencies, safety, fire management and visitor services.

Ongoing support for continuing development of existing and new employees' skills is promoted through training opportunities across a wide range of disciplines. Opportunities are provided through Tasmania's public educational institutes (University of Tasmania, Skills Tasmania and TasTAFE), training organisations (such as ForestWorks), Forest Practices Authority (FPA) courses and informally by presentations and workshops including Forestry Tasmania's 'lunch time talks'.

PWS is pro-active in sourcing opportunities for the provision of full qualifications (currently approximately 40% of all employees) aligned to functional roles. Registered Training Organisation partners include Tasmania Fire Service, Handa Training Solutions and TasTAFE.

In March 2016 the Arbre Forest Industries Training and Career Hub opened in Launceston. The Hub is a non-profit organisation set up to provide training in forest harvesting, transport and silviculture and to link potential employees with employers. It is overseen and managed by a governing board whose representation includes Forico, Forestry Tasmania, Timberlands Pacific, Norske Skog, Casegrande Lumber Pty Ltd and IFARM.

Table 7.1.b.1 lists major public non-legislative policies under which forest management activities are undertaken on public and private land.

Table 7.1.b.1 Responsibilities and major policies of major organisations which have managed forests during all or part of the reporting period

Name of organisation	Responsibilities for forests (and tenure)	Major non-legislative policies relevant to the organisation
Private land		
Gunns Limited[18]	Forests managed by Gunns Limited	Gunns Forest Management Statement Gunns Sustainable Forest Management Policy Gunns Environmental Policy Gunns Permanent Native Forest Estate Policy
Norske Skog	Forests managed by Norske Skog (Australia) Pty Ltd	Forest Management Plan Chain of Custody Policy Permanent Forest Estate Policy Sustainable Forest Management Policy Environment Policy OHS Policy Quality Commitment Policy
Forico Pty Ltd	Eucalypt and pine plantations, native forests owned by New Forests Pty Ltd on ex- Gunns estate and joint ventures with independent private owners	Environmental Sustainability Policy Work Health and Safety Policy Chain of Custody Policy Stakeholder Engagement Policy
RMS (ex FEA estate)	iFarm (Forest Management) Pentarch Pty Ltd (Harvesting)	Statement of Intent – Sustainable Forest Management Statement of Intent – Stakeholder Engagement Statement of Intent – Native Forest Management
Tasmanian Land Conservancy	Private land purchased for conservation purposes	formal management plan for each Reserve
Public land		
Forestry Tasmania	Permanent Timber Production Zone land	Sustainable Forest Management Policy Sustainability Charter (Forest Management Plan) 2008 Forest Management Plan 2014 Forest Management Plan 2016 Occupational Health and Safety Policy Giant Tree Policy Special Timbers Strategy Rainforest Policy Pesticide and Fertiliser Policy Carbon Management Policy
Timberlands Pacific	Pine plantations managed by Timberlands Pacific on behalf of New Forests	Fuel and Oil Policy Safety and Environmental Policy Standard Operating Procedures

[18] Gunns Limited: a) receivers and managers were appointed on 25 September 2012: b) Liquidators were appointed on 5 March 2013; c) Delisted from the Australian Stock Exchange on 30 August 2013.

Name of organisation	Responsibilities for forests (and tenure)	Major non-legislative policies relevant to the organisation
Norske Skog	Forests managed by Norske Skog (Australia) Pty Ltd	Forest Management Plan Chain of Custody Policy Permanent Forest Estate Policy Sustainable Forest Management Policy Environment Policy OHS Policy Quality Commitment Policy
DPIPWE (Parks and Wildlife Service)	National parks and reserves (including the Tasmanian Wilderness World Heritage Area and parts of the Australian Convict Sites World Heritage Area)	*Tasmanian Reserve Management Code of Practice, 2003* Management Plans for national parks and major reserves Management Statements for selected smaller reserves General Management Plan for reserves without specific plans Environmental Risk Management Policy Reserve Activity Assessment System Fire Management Policy Reserves Standards Framework Policy
DPIPWE – Crown Land Services	Future Potential Production Forest land	Tasmanian Reserve Management Code of Practice, 2003 Reserve Activity Assessment System Environmental Risk Management Policy

Forest Management by Tenure

Since 2014 (see INDICATOR 7.1.a), the Parks and Wildlife Service (PWS) has managed nearly all formal reserves and many informal reserves, whilst the future potential production forest land has been administered by Crown Land Services, an organisational grouping within PWS. Management of the formal reserves is subject to the *National Parks and Reserves Management Act 2002* and associated Regulations. The *Tasmanian Reserve Management Code of Practice 2003* is used in reserve management by the Parks and Wildlife Service.

Forestry Tasmania is the Tasmanian Government Business Enterprise responsible under the *Forest Management Act 2013* for sustainably managing approximately 812 000 ha of public forest on the permanent timber production zone land, subject to the *Forest Practices Act 1985* and associated Regulations. All elements of the way that Forestry Tasmania manages its lands are described in its Forest Management Plan, available online.

Private professional forest management organisations have also developed sophisticated environmental management systems that are consistent with the 1997 Tasmanian Regional Forest Agreement and the 2005 Tasmanian Community Forest Agreement.

Table 7.1.b.2 indicates the extent to which sustainable forest management provisions are integrated within institutional policy frameworks on public and private lands. Overall, there is a strong commitment to integrating such policies irrespective of land tenure. However, there are differences which reflect management objectives and practical issues. The variability of integration of such policies as applied on private forest land reflects the spectrum of forest

management systems employed, and is generally more exhaustive. The reporting period 2011–16 has seen the adoption of formal environmental management systems by many of the smaller professional forest managers who manage private properties, in addition to the larger private industrial companies operating on their own freehold land (see discussion on Certification below).

Table 7.1.b.2 Extent of the sustainable forest management provisions in institutional policy frameworks

Extent to which the non-legislative policy framework provides for:	Permanent Timber Production Zone land	Nature conservation reserves	Other Crown land including FPPF	Private
Forest management planning and review				
Accountable management body	Y	Y	P	P
Dispute resolution process	Y	Y	Y	P
Forest management planning	Y	Y	Y	P
Management review	Y	Y	Y	P
Planning for environmental values	Y	Y	Y	P
Planning review	Y	Y	Y	P
Policy review	Y	Y	Y	Y
Property rights	Y	Y	Y	Y
Periodic assessment of forest related resources	Y	Y	Y	P
Public participation				
Broad based public consultation for forest related policy	Y	Y	Y	Y
Broad based public consultation to develop forest related management plans	P	Y	P	P
Publication of specific forest-related information	Y	Y	Y	P
Allows public access to information related to forests	P	Y	P	P
Indigenous participation				
Indigenous participation in management	P	P	P	P
Indigenous participation in planning	P	P	P	P
Recognises cultural values	Y	Y	Y	P
Recognises native title rights	P	P	P	P

Extent to which the non-legislative policy framework provides for:	Permanent Timber Production Zone land	Nature conservation reserves	Other Crown land including FPPF	Private
Recognises the customary and traditional rights of Indigenous peoples	Y	Y	Y	P
Allows traditional management on relevant public land (eg joint management/ co management)	N	P	P	N
Allows access for traditional activities	P	P	P	N
Allows access to Indigenous cultural heritage	Y	Y	P	P
Allows the performance of traditional practices	P	P	P	P
Allows for the protection of Indigenous intellectual property	Y	Y	Y	Y
Other aspects				
Recognition of scientific values	Y	Y	Y	Y
Recognition of voluntary reserves on private land	-	Y	-	Y
Regulation of forest clearing	Y	Y	Y	Y
Resource assessment	Y	Y	P	P
Secure land tenure	Y	Y	P	Y
SFM an explicit objective	Y	Y	P	P

Ratings:

Y = Yes. This aspect of sustainable forest management (SFM) is covered fairly comprehensively by policies in this tenure.

P = Partly. This aspect of SFM is only partially covered (or has limited application) by policies in this tenure.

N = No. This aspect of SFM is not covered by policies in this tenure.

Access includes an ability to enter and undertake activities such as foraging, hunting, or ceremonial.

Cross-sectoral involvement

Table 7.1.b.3 provides a summary of the area (in ha) for which management plans have been developed and in which cross-sectional involvement occurs during the development of the plans. Cross-sectoral involvement means the cooperation and sharing of information among public agencies, private companies, and the wider community.

Table 7.1.b.3 Area of land under local and regional management plans, cross-sectoral involvement 2015–2016. (*Note: the areas are land area, not forest area*)

Forest Manager	Area under management plan (ha)	Does cross-sectoral involvement occur in the development of the plan?	What is the review period for the management plan	Is the plan integrated with other aspects of resource planning?
Forestry Tasmania	0.8 million	yes	10 years	yes
Parks and Wildlife	1.7 million	yes	5–10 years	yes
Professional Forest Management Companies	0.3 million	yes	various	yes
Private forest owners	Unknown	NA	NA	NA
Private forest reserve programs (areas under conservation covenant)	98 700	yes	dependent upon program	yes

During the reporting period 2011–16, new registration of land under conservation covenants totalled 19 423 ha. This are includes both forest and non-forest vegetation. Forest areas within the private covenant estate are required to be managed in accordance with the individual Covenant terms and associated management plans, which typically place restrictions on the clearing of native vegetation and require land management issues such as weeds to be addressed.

Community Consultation

Ensuring the community is informed about, and engaged in, public forest management decisions is fundamental to effective institutional forest management and conservation systems.

The *Forest Practices Act 1985* ensures regional consultation and planning through the mechanism of 3-year plans. Any entity who anticipates harvesting more than 100 000 tonnes of timber in a given year must prepare a plan detailing the harvest locations, expected timber volumes, cartage routes, and reafforestation measures and provide it to the Board of the Forest Practices Authority and to local government authorities affected by the harvest or cartage.

Community involvement in private forest management (as defined under the *Forest Practices Act 1985*) is mandatory under Section A3.2 of the *Forest Practices Code*. In addition, provisions under both the Australian Forestry Standard and the Forest Stewardship Council require community consultation.

The Progress Board of the Tasmania Together process, described in previous *State of the Forests Tasmania* reports, was disbanded by the Tasmanian Parliament in 2012. This process has not been active during the reporting period 2012–2016. Further information on government agency initiatives which support community participation on forest management and conservation planning is at APPENDIX 7.1.b.

Enforcement of laws, regulations and guidelines

Government agencies with legislative authority to undertake investigate and measure compliance against legal instruments include the:

- FPA which undertakes annual audits of forest practices plans and also investigates all potential breaches under the *Forest Practices Act 1985*. It has the authority to apply

sanctions where breaches of the *Forest Practices Code* and the plan have been identified. Investigations can be carried out by any Forest Practices Officer (FPO). There were on average 195 FPOs accredited with the Authority during the reporting period 2012–2016 (see Table 7.1.b.5).

- DPIPWE (Natural and Cultural Heritage Division) which employs six (2016) trained enforcement and compliance officers to ensure compliance with its Acts and Regulations.
- DPIPWE (PWS) had a total of 134 authorised officers (mostly Rangers) undertaking compliance work in 2016 as a part of their daily duties, including three Compliance Officers responsible for major investigations and coordination of all compliance activity state-wide.

Table 7.1.b.4 provides an overview of the monitoring and compliance systems in place across tenures. The number of monitoring and compliance activities carried out annually over the reporting period 2011 to 2016 are not readily available.

Table 7.1.b.4 Monitoring and compliance systems in forested land, by tenure

ACTIVITY	RATING OF MONITORING AND COMPLIANCE SYSTEMS			
	Permanent Timber Production Zone land	Nature conservation reserves	Private land	Other Crown land inc. FPPF land
Arson	P	P	P	P
Animals (bringing into areas where they are not allowed)	N	P	N	P
Behaviour	P	P	N	P
Camping (in unauthorised areas)	P	P	N	P
Vegetation clearing (small scale)	P	P	P	P
Fee avoidance	N	P	P	P
Land clearing	F	P	F	P
Resource protection (dumping rubbish, soil disturbance, fires)	P	P	P	P
Signage (damaging signs)	P	P	P	P
Theft of forest produce (firewood, fence posts etc)	P	P	P	P
Vehicle (accessing unauthorised areas)	P	P	P	P

Rating:

F = Fully effective

P = Partly effective, some improvements can be made and enforcement effort undertaken.

N = Not in place

Forest Practices Officers

Under the regulatory framework established through the *Forest Practices Act 1985*, the forest industry has a responsibility to adequately supervise and monitor its forestry operations to ensure compliance.

The FPA accredits Forest Practices Officers (FPOs) who have legislative authority under the *Forest Practices Act 1985* to undertake compliance and enforcement activities across all tenures where forest activities are contrary to the Act or the *Forest Practices Code 2015*. Consistent with the co-regulatory approach, FPOs include employees of private companies and public agencies, private contractors and self employed individuals.

There were 234 Forest Practices Officers (FPOs) accredited in 2010–11 who were warranted to supervise and monitor forestry operations to ensure that they comply with the *Forest Practices Act 1985*. This number decreased at the beginning of the current reporting period due to the downturn in the forest industry, but has remained steady at just under 200 statewide since (Table 7.1.b.5).

Table 7.1.b.5 Number of Forest Practices Officers (FPOs) authorised to undertake compliance and enforcement activities

Financial year	Number of FPOs
2006–07	220
2007–08	244
2008–09	228
2009–10	225
2010–11	234
2011–12	193
2012–13	194
2013–14	196
2014–15	195
2015–16	199

Certificates of Compliance for Forest Practices Plans

Changes to the *Forest Practices Act 1985* implemented from 1 July 1999 introduced a requirement for a compliance report to be lodged with the FPA within 30 days of the completion of operations prescribed within a FPP. Compliance reporting began in 2001–02. Reports provide evidence that an FPP:

- fully complied with all provisions of the plan; or
- did not fully comply with all the provisions of the plan:
    - no further action required – this generally involves a change in the operation which does not result in any adverse long term environmental harm, such as the stocking standard in a plantation being below the target specified in the forest practices plan but still at an adequate level to achieve site occupancy.
    - the matter was resolved through corrective action – this generally means that the FPO undertaking the final compliance check has detected non-compliance and has issued a notice under the Forest Practices Act to require corrective action to ensure compliance with the plan.
    - further action required – this generally involves a non-compliance issue that requires further investigation and action by the FPA.

Changes to the *Forest Practices Act 1985* implemented from 1 July 2005 require reports on compliance to be lodged within 30 days of the completion of each discrete operational phase

within the FPP. Discrete operational phases include activities such as road construction, harvesting and reforestation.

The *2007 Sustainability Indicators Report* documented an unsatisfactory level of lodgement of compliance reports for independent private forest owners. During the reporting period 2006–2011 there was a substantial increase in the rate of lodgement of reports by independent private forest owners, from 42% in 2006–07 to 93% in 2011. This result was achieved through ongoing enforcement by the FPA together with increased support by FPOs and forest managers. In the current reporting period, CoC lodgement levels for independent private forest owners averaged 80% for the period 2012–2015, but dropped to 38% in 2016.

Generally, the level of compliance has been high, with on average 86% of operations not requiring a corrective action or further investigation for the reporting period 2011–2016.

Table 7.1.b.6 Certificates of compliance (CoCs) lodged with the Forest Practices Authority (and percentage)

YEAR	CoCs due	CoCs lodged	No activity	Compliance (for certificates lodged)			
				Fully complied	Not fully complied		
					No further action required	Corrective Action required	Further investigation required
2015–16	1609	1371	108	1240	100	2	6
		91%		83%	7%	<0.5%	<0.5%
2014–15	1079	1056	78	834	134	1	9
		98%		85%	14%	<0.5%	1%
2013–14	1270	1096	71	928	85	2	9
		86%		91%	8%	0.1%	1%
2012–13	747	696	29	591	66	0	10
		93%		85%	9%	0	1.5%
2011–12	970	835		702	122	2	8
		86%		84%	15%	0%	1%
2010–11	1047	1 012		845	139	11	17
		96.7%		83.5%	13.7%	1.1%	1.7%
2009–10	821	794		673	95	5	21
		96.7%		85%	12%	0.6%	2.6%
2008–09	931	925		801	101	3	20
		99.4%		86%	11%	0.3%	2.1%
2007–08	911	735		686	41	1	7
		81%		93%	6%	0.1%	1%
2006–07	3995	3 081		2 417	523	55	86
		77%		78%	17%	2%	3%

Note: Table 7.1.b.6, *data for 2006–07 reported on the number of CoCs for individual discrete operational phases (DOPs), eg roading, harvesting or reforestation, which may all be covered by the one forest practices plan. Data for 2007 to 2013 reported on lodgement of final CoCs only. Data for 2013 onwards again report on individual DOPs. The 'no activity' category was added in 2012–13 to reflect instances where the FPP expired and no operations had taken place.*

Annual assessment of forest practices plans

The FPA undertakes an annual assessment program covering a representative sample of 10-15% of the number of FPPs certified that year. The FPPs are selected by stratified random sample to incorporate all aspects of forest planning and operational practices undertaken by companies and agencies, and individual forest owners or managers.

The assessment program provides an independent and objective instrument, which identifies where further improvements can be made to ensure forest planning and operations meet the objectives of the *Forest Practices Act 1985* and the *Forest Practices Code 2015*.

A comparison of assessments from 2011–12, 2012–13 and 2013–14 provides consistent comparison of the performance rating achieved by tenure from over these three years and is presented in Table 7.1.b.7 . A 'Sound' rating is considered by the Forest Practices Authority as the standard required to meet the requirements of the *Forest Practices Act 1985* and the *Forest Practices Code 2015*. Table 7.1.b.7 indicates that over these three years, on average, 91.3% of all forest operations across all tenures met or exceed the required minimum standards.

Table 7.1.b.7 Percentage of performance rating achieved by tenure Years 2011–12, 2012–13 and 2013–14

Standard	Year	Industrial private forest	Independent private forest	State forest	Annual Average	3 Year Average
Unacceptable	**2011–12**	0.4	2.0	0.0	**0.8**	
	2012–13	0.0	0.8	0.0	**0.3**	**2.9**
	2013–14	0.0	0.7	0.7	**0.5**	
Below Sound	**2011–12**	8.1	10.5	5.7	**8.1**	
	2012–13	6.1	13.1	3.1	**7.4**	**6.7**
	2013–14	3.0	7.6	4.3	**5.0**	
Sound	**2011–12**	12.4	28.7	9.5	**16.9**	
	2012–13	10.8	3.5	3.3	**5.9**	**8.6**
	2013–14	4.6	2.2	2.6	**3.1**	
Above Sound	**2011–12**	3.8	19.9	3.1	**8.9**	
	2012–13	1.4	1.0	1.9	**1.4**	**3.5**
	2013–14	0.0	0.0	0.7	**0.2**	
High	**2011–12**	75.3	38.9	81.7	**65.3**	
	2012–13	89.0	74.3	91.7	**85.0**	**80.5**
	2013–14	87.1	94.8	92.1	**91.3**	

Figures for 2013 onwards again report on CoCs for individual discrete operational phases. The performance ratings achieved in 2014–15 and 2015–16 are shown below in Table 7.1.b.8.

A 'Sound' rating is considered by the Forest Practices Authority as the standard required to meet the requirements of the *Forest Practices Act 1985* and the *Forest Practices Code 2015*. Table 7.1.b.8 indicates that over these two years, on average, 92.6% of all forest operations across all tenures met or exceed the required minimum standards.

Table 7.1.b.8 Percentage of performance rating achieved by tenure (2014–15 to 2015–16)

Standard	Year	Industrial private forest	Independent private forest	State forest	Annual Average	2 Year Average
Unacceptable	**2014–15**	0.4	3.3	0.6	**1.4**	**1.2**
	2015–16	0.3	1.4	1.2	**1.0**	
Below Sound	**2014–15**	5.1	10.2	4.6	**6.6**	**6.1**
	2015–16	6.1	7.0	4.1	**5.7**	
Sound	**2014–15**	86.5	94.5	94.8	**91.9**	**92.6**
	2015–16	93.5	91.6	94.7	**93.3**	

Investigation and Enforcement

Under the *Forest Practices Act 1985*, the FPA must investigate all complaints relating to alleged breaches or poor practice. Formal legal investigations by the FPA are undertaken into serious breaches, sometimes in consultation with the Tasmanian Police.

The forest practices system is designed to achieve high environmental standards, with an emphasis on planning, training and education. Where problems arise, the FPA expects that they will be dealt with through early detection and corrective action. Corrective action may mean remedial treatment in the forest. Importantly, it also means reviewing and improving systems to ensure that similar failures do not arise in the future. From time to time, a failure occurs that generally reflects inadequate systems or insufficient care. In these cases, penalties are appropriate to reinforce the importance of all parties striving for full compliance with the requirements of the *Forest Practices Act 1985*.

Legal enforcement may be taken in several ways:

- FPOs may give verbal or written notification in order to inform persons that they must comply with the *Forest Practices Act 1985* or an FPP. Failure to comply with the second notice may lead to prosecution.
- The FPA may prosecute for failure to have operations covered by an FPP, for failing to comply with an FPP or for failing to lodge a compliance report.
- The FPA may impose fines as an alternative to prosecution.

Table 7.1.b.9 shows the number of formal investigations undertaken by the FPA since 1995–96. The level of investigations and actions reflect annual trends and cannot be taken to indicate the effectiveness of the system.

The majority of breaches can generally be attributed to human error or lack of knowledge about the requirements of the forest practices system. Most breaches are dealt with by corrective actions, in accordance with the philosophy of the *Forest Practices Act 1985* to ‘make good’ and to effect improvement. In comparing the percentage of major breaches on an annual basis there does appear to be an overall reduction leading to the imposition of penalties and/or legal action which may reflect greater awareness of the legal obligations which apply to all land managers undertaking forest operations. However overall levels of activity in the forest industry may also be a factor.

Table 7.1.b.9 Number of investigations completed by the Forest Practices Authority 1995–96 to 2015–16

YEAR	Total number formal investigations	Investigated and no breaches identified	Number of minor breaches	Number of major breaches
1995–96	82	23	19	**40**
1996–97	140	29	48	**63**
1997–98	80	16	34	**30**
1998–99	74	21	23	**30**
1999–00	77	33	40	**4**
2000–01	83	34	39	**10**
2001–02	58	21	30	**7**
2002–03	90	28	46	**16**
2003–04	128	39	57	**32**
2004–05	136	42	64	**30**
2005–06	93	36	38	**19**
2006–07	62	23	32	**7**
2007–08	86	28	42	**16**
2008–09	60	24	27	**9**
2009–10	98	43	36	**17**
2010–11	101	48	39	**14**
2011–12	92	25	39	**15**
2012–13	36	10	17	**9**
2013–14	55	17	30	**8**
2014–15	44	12	26	**6**
2015–16	**32**	**11**	**12**	**9**

Note: Minor breaches include: notices to rectify; warnings,, but no further action.

Major breaches include penalties, legal action and breaches where no action was pursued due to insufficient evidence and/or legislative time constraints.

Enforcement in Conservation Reserves

The Parks and Wildlife Service (PWS) manages a terrestrial reserve estate of 3.3 million ha in 453 reserves covering approximately 50%[1] of Tasmania. Over half the area of the reserve system lies within the Tasmanian Wilderness World Heritage Area, one of the largest conservation reserves in Australia (1.584 million ha at the time of writing) covering approximately 23% of the land area of Tasmania and one of only three temperate wilderness areas remaining in the Southern Hemisphere.

The key objective of the PWS is to manage the state's representative and world renowned public reserve system to achieve the principal goal of conserving natural and cultural heritage while providing for sustainable use and economic opportunities for the Tasmanian community.

[1] The percentage figure quoted in the 2001–06 report incorrectly included marine waters

In 2008 the existing strategic plan was replaced by the PWS *Strategic Plan 2008–10*, providing a framework for reserve system management.

Several key advisory groups continue to provide regular and informed community input to reserve management – the National Parks and Wildlife Advisory Committee, the World Heritage Area Consultative Committee and, for part of the reporting period, the Arthur Pieman Advisory Committee. Consultation and liaison with a wide range of local communities and interest groups continues across the state.

Enforcement of relevant Acts and Regulations on reserved land is co-ordinated by the PWS State Compliance Unit (SCU), which was established in 2011with a staff of three compliance officers. The Wildlife Operations Unit of DPIPWE continues to deal with a broad range of natural and cultural heritage enforcement matters, both within and outside the reserve system.

Initial tasks for the SCU have revolved around the simplification and consolidation of PWS compliance procedures, along with authorised officer training and mentoring, to increase the level of compliance activity across the state. Most authorised officers are rangers or field officers, operating from field centres throughout Tasmania. In this way, PWS aims to more efficiently conduct compliance operations in the future.

Table 7.1.b.10 indicates the amount of enforcement work undertaken by PWS and DPIPWE field staff.

Where possible, infringement notices are issued in preference to preparing court files. A large proportion of court files related to the illegal taking of firewood. Some significant commercial-scale operations were disrupted as a result. Charges were laid both under the *National Parks and Reserved Land Regulations 2009* and the *National Parks and Reserves Management Act 2002*. PWS has put in place a framework for a significant increase in the amount of compliance activity surrounding timber theft. The lynch-pin of this framework is the creation of the SCU, which has and will continue to formulate strategies for a coordinated multi-tiered response to these offences. This activity takes the form of proactive and reactive strategies aimed both at identifying and prosecuting offenders as well as preventing the occurrence through education and other pressures

Illegal off-road vehicle access accounted for a high percentage of infringement notices, plus several court prosecutions.

Enhanced remote area technical surveillance capability has meant a much higher offence detection rate, with offenders frequently identified through their vehicle details or faces being caught on camera.

Infringement notices for failing to display park entry passes have been largely replaced by a system where offenders are given a notice of breach, giving them seven days to rectify the situation before enforcement action is considered. Compliance as a result is approximately 90%.

Table 7.1.b.10 Cautions and Notices issued by PWS and DPIPWE field officers during period 2011–16

LEGISLATION	2011-12	2012-13	2013-14	2014-15	2015-16
National Parks and Reserves Management Act 2002					
Formal Cautions	4	4	3	1	1
Prosecutions	10	4	5		
National Parks and Reserved Land Regulations 1999–2009					
Formal Cautions	88	51	63	80	76
Infringement Notices	138	57	45	61	121
Prosecutions	38	6	2	15	6
Crown Lands Act 1976					
Verbal Cautions	0	0	0	0	0
Formal Cautions	0	0	0	0	0
Prosecutions	0	0	0	3	0
Crown Lands Regulations 2001					
Verbal Cautions	0	0	0	0	0
Formal Cautions	0	0	0	0	0
Prosecutions	0	0	0	0	0

Management for carbon

Some areas of forest are now being managed primarily for carbon, subject to private market-regulatory mechanisms as part of off-market carbon trading schemes.

Forest Certification

Within developed economies, there is an increased tendency to include production aspects such as animal welfare, labour circumstances, environmental impact etc. on labels of products. Market forces have generally been the principal driver for the adoption of such standards.

Certification schemes are based on principles, criteria, and standards that encompass economic, social, and environmental measures. They do not provide on-the-ground prescriptions, although they do influence management decisions.

As natural, renewable resource providers, Tasmanian forest managers are leaders in ecologically sustainable development. All professional forest management organisations undertake in-house assessment programs to assess standards achieved before, during and after forest operations. All of Tasmania's Permanent Timber Production Zone land, and the majority of private industrial forests, are now certified under at least one of a number of voluntary certification systems which recognise environmental, economic, social and cultural forest management performance and sustainability in the forest industry.

Increasingly in an internationally competitive trading environment, forest certification provides assurance to purchasers of wood and paper products that they are purchasing products produced under a system of sustainable forest management. The majority of Tasmania's commercial forest managers are able to demonstrate their sustainable management credentials through

independent certification under national and international standards such as the Australian Forestry Standard (AFS), Forest Stewardship Council (FSC) and the International Standards for Environment Management Systems (ISO 14001).

PWS has developed an environmental management system for public reserves managed under the *National Parks and Reserve Management Act 2002* that is consistent with ISO 14001. The PWS environmental impact assessment process, the Reserve Activity Assessment (RAA) System, is fully documented and functional.

The Australian Forestry Standard (AFS) is recognised internationally by the Programme for the Endorsement of Forest Certification Scheme (PEFC), the world's largest forest certification body. The AFS is based on ISO 14001 and the Montreal Process Criteria, and is compatible with other international certification schemes. The Australian Forestry Standard (AS 4708) and the associated Chain of Custody Standard (AS 4707) were developed in accordance with Standards Australia procedures and have been accepted as Australian Standards®.

The Forest Stewardship Council is a global organisation and operates in Australia through the national organisation FSC Australia.

During the reporting period 2012–2016, several organisations which held ISO 14001 accreditation have made the business decision to no longer maintain it, as they now hold AFS or FSC certification. Two forest management companies, Forico and Norske Skog, have chosen to continue to maintain ISO 14001 accreditation for their environmental management systems.

At 30 June 2016, approximately one million ha were covered by AFS Forest Management certification (Table 7.1.b.11), comprising lands under the management control of Forestry Tasmania, Timberlands Pacific, and Norske Skog on Permanent Timber Production Zone land, and Forico, Norske Skog, SFM Forest Products, Pentarch, and AKS Forest Solutions on private land.

Table 7.1.b.11 Area of Tasmanian forest covered by AFS Forest Management certification by tenure (hectares)

TENURE	2001 area	2006 area	2011 area	2016 area
Permanent Timber Production Zone land – Forestry Tasmania	0	1 450 000	1 505 266	813 300
Permanent Timber Production Zone land – privately managed				55 326
Private land	0	274 000	359 000	212 598
Other Crown land	0	0	0	0
TOTAL	**0**	**1 724 000**	**1 864 266**	**1 081 224**

At 30 June 2016, almost 260 000 ha in Tasmania were covered by FSC Forest Management certification (Table 7.1.b.12), comprising lands under the management control of Norske Skog and Timberlands Pacific on permanent timber production zone land, and Forico, Norske Skog and SFM Forest Products on private land. One private landowner did hold FSC Forest Management Certification at the start of the reporting period, but has not chosen to maintain it through 2016.

Table 7.1.b.12 Area of Tasmanian forest covered by FSC Forest Management certification by tenure (hectares)

TENURE	2011 area	2016 area
Permanent Timber Production Zone land	0	0
Permanent Timber Production Zone land – privately managed		56 549
Private land	33 481	202 879
Other Crown land	0	0
TOTAL	**33 481**	**259 428**

INDICATOR 7.1.c EXTENT TO WHICH THE ECONOMIC FRAMEWORK SUPPORTS THE CONSERVATION AND SUSTAINABLE MANAGEMENT OF FORESTS

In this indicator, 'economic framework' refers to the economic commitments and policy mechanisms of governments that promote the conservation and sustainable management of forests. In this context, the actions of Government may be ones that facilitate or encourage commercial managers of forests to invest in strategies, technology and processes that improve conservation and sustainable management outcomes. They may also be policies and regulatory frameworks that inhibit or prevent forest managers from taking actions that could result in negative conservation and sustainable management outcomes.

At the broadest level, the Australian and Tasmanian Governments establish the key economic parameters across the whole economy in terms of a policy and legislative framework with regard to taxation, regulation of business, competition policy, foreign investment and consumer regulation.

Specific to forestry, the National Forest Policy Statement and Regional Forest Agreements continue to provide the basis for management of forests to achieve economic, social and environmental outcomes.

Government decisions remain critical through the removal of impediments and streamlining decision making processes and, where appropriate, provision of direct financial contributions or policy initiatives to address market failures. Examples of the role of government include:

- reducing sovereign risk
- investing in efficient infrastructure and utilities
- supporting training and skill development
- facilitating high level marketing and branding
- establishing policy/legislative settings as they relate to tax, trade, research and development, and environmental regulations
- providing resource and market intelligence
- establishing favourable bilateral and multi-lateral trade agreements; and
- setting the parameters to incentivise and/or require conservation on private lands.

The forest practices system continues to play a central role in determining the areas of production forest, on both public and private land, that can be harvested. The continuous improvement model of forest practices secures environmental and conservation benefits, while maintaining access to forests for wood products. However, forest regulations and policy arrangements also result in significant areas of public and private land being managed for non-commercial returns. These impact on businesses as direct lost opportunity costs.

The increasing importance of independent forest management certification is more closely linking conservation and sustainable forest management to economic decisions, such as market access. In this context, market and consumer preferences, independent of Government, are emerging as a critical element of the economic framework to support conservation and sustainable management of forests.

In 2012, the Tasmanian Forest Agreement sought to create a new forestry paradigm in Tasmania, by resolving long-standing disputes over land use between the forest industry and

environmental groups. Impetus for the Agreement was provided through the crippling effects of the global financial crisis and the collapse of Gunns Limited on the Tasmania forest industry.

Through the implementation of the Tasmanian Forest Agreement, 500 000 ha of land was identified for reservation, and made unavailable for forest harvesting. The agreement for reservation was accompanied by a financial support package committed by the Australian and Tasmanian Governments, amounting to $420 million. A high proportion of this funding was allocated to providing direct financial support to forestry businesses and employees affected by the reduction in forestry activity. Funding was also allocated to programs to better utilise and value add to resources available from remaining commercial forests. Specific work has been undertaken in relation to:

- utilisation of forest harvest and processing residues; and
- management of special species timber resources.

In addition, Forestry Tasmania was provided with funding to progress its application to achieve Forest Stewardship Council Certification.

More broadly, the forest industry and government agencies have continued a process of ongoing improvement that has included:

- continual improvement in management of threatened species, soil and water in production forests
- ongoing community engagement and management of smoke impacts from controlled forest burns
- significant increases in areas of forest from which native forest harvesting is excluded, including transfer of areas of public production forests into the reserve system; and
- ongoing training in all aspects of forest practices.

Historically, levels of production in Tasmania's forests have enabled the costs of a range of non-commercial forest management activities to be absorbed by commercial forest managers. Significant areas of forest outside of Tasmania's formal reserve system continue to be managed for non-wood production values such as conservation, water quality and fire protection.

However, the structural decrease in the area of public production forest, and continuing low-levels of activity on private native forest, have necessitated reconsideration of how the financial costs of forest management for conservation outcomes are apportioned.

The Tasmanian Government has conducted an exhaustive review of Forestry Tasmania's business model to identify how the benefits of conservation and sustainable forest management can be best achieved, while maintaining a productive and financially sustainable commercial forestry sector. This has led the Tasmania Government to determine that the non-commercial and commercial functions of Forestry Tasmania should be separated, to provide a more transparent operating model. Forestry operations are expected only to meet the costs associated with commercial functions.

Funding has been invested through Private Forests Tasmania to research and demonstrate the benefits of tree farming, and commercial forestry, on land currently utilised for other primary production. This work is intended to demonstrate to private land owners how appropriate management of tree lots can be used to increase productivity of agricultural land, while also providing opportunities for additional income streams for timber harvesting.

The transition to greater reliance on plantation resources, and the reduced size of the production native forest estate, necessitate ongoing investment in research and development to maximise productivity.

The Australian Government has committed $4 million to establish the National Institute of Forest Products Innovation (Institute) in two key hubs, one in Mt Gambier and one in Launceston in 2016. The Tasmanian Government has committed $2 million in funding for the Launceston hub and further matched funding is being sought from industry. This would provide a total combined government and industry investment of $12 million in the Institute. Research and innovation will assist the forest industry in products and new markets.

Emerging challenges also present new opportunities to derive income streams from sustainably managed forests. In 2014, the Australian Government introduced the *Carbon Farming Initiative Amendment Act 2014* and the Emissions Reduction Fund. This allows businesses to reduce their carbon impact, earn Australian carbon credit units for the reductions they achieve and earn income from selling those units. Examples of eligible activities relevant to forests are listed below:

- protecting native forests by reducing land clearing
- planting trees to grow carbon stocks; and
- regenerating native forest on previously cleared land.

The list of eligible projects is continually being added to.

INDICATOR 7.1.d CAPACITY TO MEASURE AND MONITOR CHANGES IN THE CONSERVATION AND SUSTAINABLE MANAGEMENT OF FORESTS

A comprehensive and current measurement and monitoring program provides the basis for all forest planning to support sustainable forest management. Indicator 7.1.d reports the capacity to measure and monitor changes in the conservation and sustainable management of forests.

A capacity to monitor change does not indicate whether such activities are undertaken. Effective monitoring systems also require sufficient resources over time. Monitoring systems in Tasmania reflect resource allocation based on determined priorities. The majority of data for conservation reserve forest and future potential production forest are maintained by the Department of Primary Industries, Parks, Water and Environment (DPIPWE) and the Parks and Wildlife Service (PWS). State forest data are held and managed by Forestry Tasmania (FT) until 2014 and for permanent timber production zone land thereafter; while equivalent data for forests on private land are collated by Private Forests Tasmania (PFT).

Government agencies and private industrial forest companies have formal and informal systems in place which contribute to the level of knowledge necessary to measure, monitor and report on the sustainability of forests in Tasmania. Formal systems include voluntary third-party certification schemes such as the Australian Forestry Standard and Forest Stewardship Council (see INDICATOR 7.1.b).

APPENDIX 7.1.d details programs established to improve the capacity to monitor and measure changes across all of the sustainable forest management indictors on private and public lands.

Monitoring has a central role in the working of the Tasmanian forest practices system and is prescribed in Schedule 7 of the *Forest Practices Act 1985*. The Research and Advisory Program of the Forest Practices Authority employs scientists who undertake monitoring and research projects in areas related to cultural heritage, botany, geomorphology, soil science, visual landscape and zoology and that contribute to the scientific knowledge underpinning the *Forest Practices Code* provisions for natural and cultural values and associated planning tools.

The research undertaken can be categorised: that which assesses the effectiveness of current Code prescriptions, that which assists the development of specific prescriptions and the more strategic and longer term research that clarifies risks and enables decisions to be taken on a broad range of issues.

Two types of monitoring are undertaken by the FPA:

- Implementation monitoring (or monitoring of compliance) – used to determine whether prescribed management is actually conducted.
- Effectiveness monitoring – used to determine whether the management specified has achieved its objective and whether the outcome was actually a consequence of management.

The effectiveness of the biodiversity provisions of the *Forest Practices Code* was reviewed in 2012 (Koch et al., 2012). This review identified gaps and was used to determine priorities for monitoring (FPA, 2012). Note that this assessment has not yet commenced for the management actions for threatened flora species or communities and is planned for action in 2017/18.

Each year the Biodiversity program of the FPA attempts to implement a number of the priority effectiveness monitoring projects. The actual projects implemented depend on available funds, logistic considerations and staff/student availability. The FPA reports annually on the findings of biodiversity related projects worked on during the financial year (*Monitoring the effectiveness of the biodiversity provisions of the Tasmanian Forest Practices Code*, Forest

Practices Authority, 2014, 2015, 2016). Most projects are done in collaboration with other research providers including the University of Tasmania, Forestry Tasmania, DPIPWE and private companies. Projects implemented by other researchers are included in the summary reports if the results contribute information that can be used to evaluate the effectiveness of management of biodiversity values, in areas covered by the forest practices system (see Table 2.1.2 in each of the FPA Annual Reports 2011 through 2016).

Building on the broad scale monitoring systems in Tasmania, site specific surveys are also undertaken to ensure non-wood values are assessed before forest disturbance activities commence (as required by the *Forest Practices Code 2015* and the *Tasmanian Reserve Management Code of Practice*). These surveys aim to identify and protect historic and Indigenous heritage sites (Criterion 6), geomorphic features (Criterion 4), and threatened species and communities (Criteria 1 and 2). Information from these surveys is contributed to statewide databases for conservation and forest-practices planning. These surveys are intended to identify values that may be affected by proposals and any actions to be taken to avoid or mitigate negative impacts and provide a baseline for future monitoring and assessment.

Under the *Forest Practices Act 1985*, a formal/stratified sample of up to 15% of forest practices plans across the full range of forest operations on private and public land is assessed independently each year. The assessment rates performance outcomes against 87 specific factors, covering the standard of the plans, forest practices planning and operational performance and is reported in the Forest Practices Authority annual report (INDICATOR 7.1.b).

Annual public *Stewardship Reports* were prepared by Forestry Tasmania through 2014 and then incorporated into the *Annual Report* thereafter, to report on the implementation of its state-wide *Sustainability Charter*.

Forestry Tasmania published a revised Forest Management Plan in January 2016.

Forestry Tasmania models the sustainable yield from permanent timber production zone land and monitors actual production, to ensure that the harvesting of eucalypt native forests and eucalypt plantations is consistent with its statutory obligations and with its objectives for sustainable forest management.

Clause 98 of the Tasmanian Regional Forest Agreement requires a five yearly review of the sustainable yield of high quality eucalypt sawlogs from State forests (now permanent timber production zone land). Previous reviews in 1998, 2002 and 2007 incorporated the effects of successive changes in the resource base over that period. The *Sustainable high quality eucalypt sawlog supply from Tasmania's Permanent Timber Production Zone land (Review No. 4)* published in 2014 confirms Forestry Tasmania's ability to supply at least 137 000 cubic metres per year of high quality eucalypt sawlogs from permanent timber production zone land, for the next 90 years. In particular, this review confirms Forestry Tasmania's ability to supply the required quantity of high quality eucalypt sawlogs,and the required quantity of eucalypt peeler billets, from eucalypt native forests over the period to 30 June 2027. However, these yield predictions are generated from biologically based forest estate modelling of productive capacity, and do not imply supply based on economic criteria. The predicted yields represent a significant reduction from the equivalent values reported in each of the three previous reviews, reflecting the outcomes of the Tasmanian Forest Agreement, *Tasmanian Forests Agreement Act (Tas) 2013* and *Forest Management Act (Tas) 2013*.

Reporting of state trends is achieved through the *State of the forest* and the *State of the environment* five-yearly reports.

The Parks and Wildlife Service has developed a state-wide management effectiveness system, the *Monitoring and Reporting System for Tasmania's National Parks and Reserves* (Parks and Wildlife Service, 2013). This jurisdictional performance measurement system is evidence-based, operationally practical, and transparent to stakeholders. There are three types of reporting outputs (i) brief status and trends reports on key performance areas; (ii) evaluated case studies of the monitored effectiveness of major projects, and (iii) periodic evaluation reports on the effectiveness of reserve management plans.

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INDICATOR 7.1.e CAPACITY TO CONDUCT AND APPLY RESEARCH AND DEVELOPMENT AIMED AT IMPROVING FOREST MANAGEMENT AND DELIVERY OF FOREST GOODS AND SERVICES

A scientific understanding of the characteristics and functions of Australian forest ecosystems is needed to underpin their management. Research and development provides the basis for understanding of forest ecosystems for the continual improvement of conservation biology and forest management operations. This leads to advances in silviculture, conservation management and harvesting and reforestation practices. Reporting on these methods is a means of assessing sustainable forest management.

The capacity to conduct and apply research and development can be measured by the number of personnel engaged in this activity, the related expenditure, and the number of research publications produced. Data in regard to these measures were therefore sought from a number of agencies, research funders and research providers, including the Tasmanian Department of Primary Industries, Parks Water and Environment (DPIPWE), Forestry Tasmania, the Forest Practices Authority, the University of Tasmania, the ARC Centre for Forest Value and three private companies.

Capacity

The capacity in Tasmania to conduct forest-related research in 2015–16 can be quantified by the expenditure on research and the number of research staff employed.

Table 7.1.e.1 Magnitude of Tasmanian forest and forestry research and development effort (financial year 2015–16)

	Forestry Tasmania	Private companies	Other agencies		Total
			FPA	DPIPWE	
Personnel engaged on forest-related R&D (number of Full Time Equivalent positions)	4.8	4.5	1.98	2.5	13.78
Expenditure on forest-related R&D ($million)	0.63	0.57	0.27	NA	
Research publications in last 5 years (number)					**1010**

Note: The number of full time equivalent (FTE) researchers reported in the 'Private companies' grouping in Table 7.1.e.1 includes data from Norske Skog, Timberlands Pacific and Forico only.

In previous reporting periods, much of the Tasmanian forest-related research effort occurred through the CRC for Forestry. This CRC was funded under round nine of the CRC Program for a seven-year period, covering July 2005 to June 2012, and its resources included $26.6 million of CRC Program cash, $10.5 million in cash from its member participants, and in-kind resources from its member participants of $46.7 million. Tasmanian member participants in the CRC for Forestry included the CSIRO, the Department of Economic Development, Tourism and the Arts, the Forests and Forest Industry Council of Tasmania, the Forest Practices Authority, Forestry Tasmania, Gunns Ltd, Norske Skog, and the University of Tasmania. The research of the CRC for Forestry was organised into four programs: Managing and Monitoring for Growth and Health, High-value Wood Resources, Harvesting and Operations, and Trees in the Landscape.

Forestry Tasmania's Forest Management Branch undertakes, and collaborates in, research into native forest silviculture, plantation silviculture, biology and conservation (including forest health surveillance), and together with the Parks and Wildlife Service (part of DPIPWE), manages the Warra Long-term Ecological Research Site in southern Tasmania. At least one-third of Forestry Tasmania's research expenditure is devoted to development and extension work involved in the strategic or operational uptake of research.

The research topics to which Forestry Tasmania's research capacity is directed is summarised in Table 7.1.e.2. The majority of current researchers are in flora and fauna ecology, silviculture, tree breeding, hydrology, diseases and pests. It is notable that the research effort in silviculture has been maintained, even though this is regarded less and less as an academic discipline. Not captured in these figures is the increasing research effort undertaken at the landscape level, signifying the emerging disciplines of conservation biology, landscape ecology, landscape genetics and dynamic forest management, for example, as well as the increasing recognition of the need to manage forests at this scale.

Table 7.1.e.2 Full-time personnel engaged in forest-related research and development in 2015–16 (FTE): Forestry Tasmania and DPIPWE only

	Plantations	Native forest	Total
Silvicultural research	0.1	0.05	0.15
Tree breeding (not horticultural)	0.4	0	0.4
Forest hydrology	0	0.15	0.15
Timber use	0.15	0	0.15
Fire behaviour	0	0	0
Forest pathology	0.6	0.5	1.1
Agroforestry	0	0	0
Fauna ecology (including genetics)	0	0.5	0.5
Fire ecology	0	0.65	0.65
Forest entomology	0.5	1.0	1.5
Flora ecology (including genetics)	0	1.3	1.3
Non-timber forest products	0	0.15	0.15
Climate change	0	0.45	0.45
Statistical analysis	0.2	0.4	0.6
Other	0.1	0.1	0.2
TOTAL	**2.05**	**5.25**	**7.3**

The Warra Long-Term Ecological Research Site is the Tasmanian focal area for research into wet eucalypt forests and their management. Research at Warra is supported by nine site partner agencies. Warra benefited from the creation of the TERN – the Terrestrial Ecosystem Research Network (http://www.tern.org.au) - (a Commonwealth facility funded through the National Collaborative Research Infrastructure Scheme) in 2009.

New research infrastructure investment at Warra provided through TERN includes: the Warra Flux Tower (part of the OzFlux Network); the Warra Supersite (Australian Supersites Network); a 5 x 5km AusCover plot and three 1-ha AusPlots Forests plots. Fully documented datasets from ongoing measurements made at Warra are now lodged on TERN data portals.

Warra continues to host a lot of research activity. Over 220 research projects have now been conducted at Warra (see http://www.warra.com), many on-going. This research has generated 320 reports and publications – over 100 of these in international peer-reviewed journals. The number of long-term 'flagship' projects at Warra has expanded and includes (together with the TERN-funded infrastructure): the Silvicultural Systems Trial, the Log Decay Study, the Mt Weld Altitudinal Monitoring Plots; Warra Weirs Hydrological monitoring; The Wildfire Chronosequence Plots; and the Experimental Forest Landscape. Science findings from these studies have been used to inform operational management. This includes: Variable Retention silviculture for harvesting mature wet eucalypt forests; Landscape Context Planning System to help ensure sufficient forest in the surrounding landscape is retained long-term to sustain dependent forest species; and guidelines for managing the coarse woody debris habitat for dependent species.

FPA research in the earth sciences and cultural heritage fields in the last five years has concentrated on landscape-scale erosion history and erosion risks, determining the influence of Aboriginal-lit fires on vegetation and landscape character, stream monitoring, determining the principles of carbon sequestration in Tasmanian native forests, and developing procedures for systematic recording and protection of cultural heritage.

The Forest Practices Authority has updated and improved the Mature Habitat Availability Map which can be used to strategically manage mature forest features such as tree hollows. FPA staff are collaborating with FT and ANU staff to explore the use of LiDAR for creating a similar map with greater spatial resolution. FT and FPA used existing GIS layers to try and model the agreed definitions of habitat for a number of threatened fauna species. A workshop was held to get expert feedback on the expected accuracy and utility of the different models.

FPA research is done in collaboration with researchers, students and staff in government departments, institutions, and companies such as University of Tasmania, Murdoch University, University of Queensland, Australian National University, University of the Fraser Valley in BC Canada, DPIPWE, Forestry Tasmania, Private Forests Tasmania, Timberlands Pacific, Gunns, Forico, Timberlands Pacific and Norske-Skog. FPA researchers have also provided assistance to researchers working in similar fields overseas, specifically in Papua New Guinea and the USA.

On 4 June 2016 the Australian Government announced the establishment of the National Institute for Forest Products Innovation to be jointly based in Launceston, Tasmania and Mt Gambier, South Australia.

The ARC Centre for Forest Value (http://www.utas.edu.au/arc-forest-value/home) situated on the University of Tasmania's Hobart campus was established in early 2016. The research effort of the centre is to be attributed one-third each to forest ecology/forest restoration, timber in service, and supply chain/information management. At capacity it will have two directors, two managers, one half-time research assistant, four chief investigators, three post-doctoral fellows and 10 PhD students. There are also other affiliated PhD students. The Centre has as its focus the training of forest scientists to work within the forest industry with a market-driven approach. The Centre has eight industry partners including Greening Australia, Forestry Tasmania, SFM Environmental Solutions, Forico, Neville-Smith Forest Products, Next 50 Architects, Forest and Wood Products Australia, and the Island Workshop Prefab Lab.

Research aimed at improving forest management in Tasmanian forests is being conducted at the University of Tasmania as well as several other institutions nationwide, including CSIRO, the University of Melbourne, Australian National University, and the University of Southern Queensland.

The research questions being addressed by the students at the ARC Centre for Forest Value are still being determined at the time of writing (M. Neyland, pers. comm.).

Two initiatives currently receiving attention at University of Tasmania are the decline in the *Eucalyptus morrisbyi* population at Calverts Hill in south-eastern Tasmania and also the decline in the *E. gunnii* subsp *divaricata* populations in the Central Highlands of Tasmania. Long-term monitoring of the flowering of *E. globulus* is also being conducted (see also INDICATOR 1.3.a).

Just over a thousand (1010) scientific publications relating to Tasmanian forests and forestry industry were recorded in Tasmania during the current reporting period 1 July 2011–30 June 2016. These are listed in Appendix 7.1.e. In previous *State of the forests Tasmania* reports, publications were included if their content was specifically relevant to Tasmanian forests and forestry issues in nine priority areas of research, as listed in Attachment 13 of the 1997 Tasmanian Regional Forest Agreement (RFA).

In the current edition of the report, the number and scope of the subject categories have been expanded to reflect contemporary research trends in forest protection and management and the forestry industry in Tasmania, for example the social impacts of forestry and forest policy development, forest ecosystem services, forestry education, wood products research, and harvesting and transport. Research publications include refereed journal articles, books and book chapters, and technical reports. Conference papers and presentations and higher degree theses are limited to those produced in Tasmania or specifically relevant to forests in Tasmania. In some cases where serial issues of newsletters, annual reports etc. were published in a common format during the reporting period, only the most recent of these has been listed in detail, with abbreviated reference to preceding issues in the series. Appendix 7.1.e indicates that there were 1010 research publications relevant to forests in Tasmania produced during the last five years on the following topics: biodiversity and conservation management (38%), silviculture, tree growth and productivity (16%), social and economic analysis, forest policy and education (8%), pests and diseases (8%), fire (7%), wood products, wood properties and utilisation (5%), soil and water conservation (5%), non-wood values of forests (4%), carbon budgets (4%), harvesting and transport (3%) and heritage conservation (3%).

APPENDICES

APPENDIX 1.1: ECOSYSTEM DIVERSITY

Table 1.1.a Extent of forest types by tenure

RFA Forest Vegetation Community	Land Classification (Tenure)				TOTAL (ha)	Change in area since 1996 %	Change in area since 2001 %	Change in area since 2006 %	Change in area since 2011 %
	Conservation reserves (ha) (b)	Permanent Timber Production Zone (ha) (c)	Other publicly managed land (ha)	Private freehold land (ha)					
Dry eucalypt forests									
Coastal E. *amygdalina* dry sclerophyll forest	61 000	32 000	26 000	59 000	177 000	-7.1	-6.6	-4.3	-1.5
Dry E. *delegatensis* forest	82 000	67 000	40 000	92 000	281 000	-2.9	-2.6	-2.0	-0.1
Dry E. *nitida* forest	137 000	5 000	12 000	5 000	159 000	-0.7	-0.6	-0.4	-0.3
Dry E. *obliqua* forest	43 000	38 000	28 000	47 000	155 000	-5.4	-4.3	-2.6	-0.8
E. *amygdalina* forest on dolerite	23 000	11 000	13 000	123 000	169 000	-5.1	-4.7	-3.5	-1.9
E. *amygdalina* forest on sandstone	5 000	4 000	4 000	17 000	29 000	-2.4	-2.3	-2.1	-0.6
E. *morrisbyi* forest	20	0	0	0	20	0.0	0.0	0.0	0.0
E. *pauciflora* on Jurassic dolerite	2 000	2 000	1 000	13 000	18 000	-3.9	-3.9	-3.2	-1.5
E. *pauciflora* on sediments	5 000	1 000	700	8 000	15 000	-6.2	-6.2	-5.2	-4.0
E. *pulchella* / *globulus* / *viminalis* grassy shrubby dry sclerophyll forest	27 000	7 000	16 000	98 000	147 000	-2.6	-2.4	-1.4	-0.5
E. *risdonii* forest	200	0	20	200	400	-0.6	-0.6	0.0	0.0
E. *rodwayi* forest	200	300	100	8 000	8 000	-3.0	-2.9	-2.2	-0.5
E. *sieberi* forest on granite	4 000	5 000	7 000	2 000	17 000	-1.3	-1.3	-0.8	-0.3

Table 1.1.a Extent of forest types by tenure

RFA Forest Vegetation Community	Land Classification (Tenure)				TOTAL (ha)	Change in area since 1996 %	Change in area since 2001 %	Change in area since 2006 %	Change in area since 2011 %
	Conservation reserves (ha) (b)	Permanent Timber Production Zone (ha) (c)	Other publicly managed land (ha)	Private freehold land (ha)					
E. *sieberi* on other substrates	9 000	14 000	16 000	7 000	45 000	-1.9	-1.7	-1.3	-0.6
E. *tenuiramis* on dolerite	5 000	1 000	1 000	700	8 000	-0.7	-0.7	0.0	0.0
E. *tenuiramis* on granite	3 000	0	40	200	3 000	-0.5	-0.5	-0.4	-0.4
E. *viminalis* and/or E. *globulus* coastal shrubby forest	300	10	30	900	1 000	-0.6	-0.6	-0.5	-0.2
E. *viminalis / ovata / amygdalina / obliqua* damp sclerophyll forest	10 000	9 000	4 000	13 000	37 000	-9.2	-5.9	-2.9	-0.9
Furneaux E. *nitida* forest	20 000	0	500	9 000	29 000	-1.4	-1.4	-1.3	-1.2
Furneaux E. *viminalis* forest	100	0	0	20	100	0.0	0.0	0.0	0.0
Grassy E. *globulus* forest	6 000	200	400	7 000	14 000	-2.7	-1.7	-1.0	-0.3
Grassy E. *viminalis* forest	3 000	1 000	600	101 000	106 000	-6.9	-6.9	-5.4	-3.0
Inland E. *amygdalina* forest	2 000	1 000	900	18 000	22 000	-13.1	-11.7	-9.0	-6.3
Inland E. *tenuiramis* forest	8 000	1 000	300	44 000	53 000	-3.3	-3.2	-2.0	-1.1
Shrubby E. *ovata* forest	300	200	200	5 000	6 000	-17.2	-16.1	-12.2	-9.8
Wet eucalypt forests									
E. brookeriana wet forest	1 000	1 000	500	1 000	4 000	-11.5	-9.5	-7.0	-3.6
E. regnans forest	17 000	34 000	10 000	4 000	66 000	-13.1	-8.3	-3.0	-0.3
King Island *E. globulus / brookeriana / viminalis* forest	200	400	40	2 000	2 000	-1.8	-1.8	-1.6	-0.8
Tall E. delegatensis forest	91 000	110 000	28 000	39 000	268 000	-6.3	-3.6	-1.6	-0.1

Table 1.1.a Extent of forest types by tenure

RFA Forest Vegetation Community	Land Classification (Tenure)				TOTAL (ha)	Change in area since 1996 %	Change in area since 2001 %	Change in area since 2006 %	Change in area since 2011 %
	Conservation reserves (ha) (b)	Permanent Timber Production Zone (ha) (c)	Other publicly managed land (ha)	Private freehold land (ha)					
Tall E. nitida forest	68 000	2 000	3 000	500	74 000	-0.5	-0.4	-0.3	-0.1
Tall E. obliqua forest	109 000	159 000	58 000	61 000	386 000	-9.3	-6.4	-2.5	-0.4
Wet E. viminalis forest on basalt	700	600	30	2 000	3 000	-25.2	-21.6	-15.9	-15.0
Sub-alpine eucalypt forests									
E. *coccifera* dry forest	41 000	3 000	5 000	7 000	55 000	0.0	0.0	0.0	0.0
E. *subcrenulata* forest	10 000	200	50	10	10 000	0.0	0.0	0.0	0.0
Non-eucalypt forest									
Acacia *melanoxylon* forest on flats	2 000	5 000	700	1 000	9 000	-4.2	-3.9	-3.3	-2.5
Acacia *melanoxylon* forest on rises	4 000	4 000	2 000	3 000	12 000	-7.8	-5.3	-2.5	-1.3
Allocasuarina verticillata forest	600	0	90	700	1 000	-1.9	-1.9	-1.2	-0.9
Banksia *serrata* woodland	100	0	0	40	200	-1.7	-1.7	-1.7	-1.7
Callidendrous and thamnic rainforest on fertile sites	119 000	28 000	28 000	10 000	185 000	-3.7	-3.0	-0.8	-0.2
Callitris rhomboidea forest	400	0	100	300	800	-0.3	-0.3	-0.3	0.2
Huon pine forest	8 000	1 000	90	10	9 000	-0.2	-0.2	-0.2	0.0
King Billy pine forest	17 000	1 000	2 000	10	20 000	-0.1	-0.1	-0.1	-0.1
King Billy pine with deciduous beech	800	20	30	0	800	0.0	0.0	0.0	0.0
Leptospermum sp./ *Melaleuca squarrosa* swamp forest	11 000	2 000	800	4 000	18 000	-3.9	-3.6	-2.6	-1.7

Table 1.1.a Extent of forest types by tenure

RFA Forest Vegetation Community	Land Classification (Tenure)				TOTAL (ha)	Change in area since 1996 %	Change in area since 2001 %	Change in area since 2006 %	Change in area since 2011 %
	Conservation reserves (ha) (b)	Permanent Timber Production Zone (ha) (c)	Other publicly managed land (ha)	Private freehold land (ha)					
Melaleuca ericifolia forest	400	10	60	100	600	-1.3	-1.3	-1.2	-0.6
Notelaea ligustrina and/or *Pomaderris apetala* forest	200	20	10	30	300	-3.4	-2.8	-1.4	-1.3
Pencil pine forest	300	0	0	0	300	0.0	0.0	0.0	0.0
Pencil pine with deciduous beech	200	0	0	0	200	0.0	0.0	0.0	0.0
Silver wattle (*Acacia dealbata*) forest	9 000	17 000	9 000	15 000	49 000	-9.7	-6.1	-2.3	-0.6
Thamnic rainforest on less fertile sites	291 000	33 000	40 000	10 000	375 000	-0.9	-0.6	-0.3	-0.1
Hardwood Plantation (d)	40	58 000	600	168 000	226 000	}106.0	54.5	27.5	-3.9
Softwood Plantation (d)	400	54 000	50	21 000	76 000				
TOTAL	**1 255 000**	**711 000**	**359 000**	**1 029 000**	**3 354 000**	**0.0**	**-0.3**	**0.0**	**-1.0**

(a) *Forest extent is as at the first quarter of 2015 and tenure is as at 30 June 2016*
(b) *Nature Conservation Act and Crown Lands Act Reserves*
(c) *Includes Multiple-Use Forest*

Table 1.1.b.1 (a) Conservation & Public Reserves					
RFA Forest Vegetation Community	**Growth Stage** (hectares) [(d)]				
	Regen-eration	**Regrowth**	**Mature (including overmature)**	**Unknown**	**TOTAL**
Dry Eucalypt Forest					
Coastal *E. amygdalina* dry sclerophyll forest	0	2 000	54 000	4 000	61 000
Dry *E. delegatensis* forest	0	12 000	67 000	3 000	82 000
Dry *E. nitida* forest	0	31 000	105 000	800	137 000
Dry *E. obliqua* forest	70	6 000	36 000	1 000	43 000
E. amygdalina forest on dolerite	0	1 000	21 000	200	23 000
E. amygdalina forest on sandstone	0	70	4 000	60	5 000
E. morrisbyi forest	0		20		20
E. pauciflora on Jurassic dolerite	0	100	2 000	100	2 000
E. pauciflora on sediments	30	300	5 000	200	5 000
E. pulchella/E. globulus/E. viminalis grassy shrubby dry sclerophyll forest	20	2 000	25 000	40	27 000
E. risdonii forest	0	100	20		200
E. rodwayi forest	0	70	100	50	200
E. sieberi forest on granite	0	30	4 000	90	4 000
E. sieberi on other substrates	0	300	8 000	200	9 000
E. tenuiramis on dolerite	0	400	5 000	40	5 000
E. tenuiramis on granite	0	0	3 000	0	3 000
E. viminalis and/or *E. globulus* coastal shrubby forest	0	20	200	0	300
E. viminalis/ E. ovata/E. amygdalina/ E. obliqua damp sclerophyll forest	0	2 000	8 000	300	10 000
Furneaux *E. nitida* forest	0	20	20 000	0	20 000
Furneaux *E. viminalis* forest	0	0	100	0	100
Grassy *E. globulus* forest	0	300	6 000	10	6 000
Grassy *E. viminalis* forest	0	100	2 000	70	3 000
Inland *E. amygdalina* forest	0	300	2 000	20	2 000
Inland *E. tenuiramis* forest	0	1 000	6 000	40	8 000
Shrubby *E. ovata* forest	0	50	200	20	300
Wet Eucalypt Forest					
E. brookeriana wet forest	0	600	400	10	1 000
E. regnans forest	800	4 000	12 000	200	17 000
Table 1.1.b.1 (a) Conservation & Public Reserves (cont'd.)					

King Island *E. globulus/E. brookeriana/E. viminalis* forest	0	100	100	0	200
Tall *E. delegatensis* forest	1 000	12 000	76 000	2 000	91 000
Tall *E. nitida* forest	90	11 000	57 000	60	68 000
Tall *E. obliqua* forest	3 000	25 000	79 000	1 000	109 000
Wet *E. viminalis* forest on basalt	0	300	400	30	700
Sub-alpine Eucalypt Forest					
E. coccifera dry forest	0	9 000	28 000	3 000	41 000
E. subcrenulata forest	100	2 000	8 000	200	10 000
Non-eucalypt Forest					
Acacia melanoxylon forest on flats	0	0	0	2 000	2 000
Acacia melanoxylon forest on rises	0	0	0	4 000	4 000
Allocasuarina verticillata forest	0	0	0	600	600
Banksia serrata woodland	0	0	0	100	100
Callidendrous and thamnic rainforest on fertile sites	0	0	0	119 000	119 000
Callitris rhomboidea forest	0	0	0	400	400
Huon Pine forest	0	0	0	8000	8 000
King Billy Pine forest	0	0	0	17 000	17 000
King Billy Pine with deciduous beech	0	0	0	800	800
Leptospermum sp./*Melaleuca squarrosa* swamp forest	0	0	0	11 000	11 000
Melaleuca ericifolia forest	0	0	0	400	400
Notelaea ligustrina and/or *Pomaderris apetala* forest	0	0	0	200	200
Pencil Pine forest	0	0	0	300	300
Pencil Pine with deciduous beech	0	0	0	200	200
Silver wattle (*Acacia dealbata*) forest	0	0	0	9 000	9 000
Thamnic rainforest on less fertile sites	0	0	0	291 000	291 000
Conservation & Public Reserves Total	**5 000**	**124 000**	**646 000**	**480 000**	**1 255 000**

Table 1.1.b.1 (b) Permanent Timber Production Zone (PTPZ) land [f]					
RFA Forest Vegetation Community	**Growth Stage** (hectares) [d]				
	Regen-eration	**Regrowth**	**Mature (including overmature)**	**Unknown**	**TOTAL**
Dry Eucalypt Forest					
Coastal *E. amygdalina* dry sclerophyll forest	4 000	5 000	21 000	2 000	32 000
Dry *E. delegatensis* forest	3 000	25 000	37 000	2 000	67 000
Dry *E. nitida* forest	200	3 000	2 000	300	5 000
Dry *E. obliqua* forest	3 000	18 000	16 000	1 000	38 000
E. amygdalina forest on dolerite	400	3 000	7 000	300	11 000
E. amygdalina forest on sandstone	400	2 000	2 000	0	4 000
E. pauciflora on Jurassic dolerite	50	100	1 000	100	2 000
E. pauciflora on sediments	80	80	1 000	100	1 000
E. pulchella/E. globulus/E. viminalis grassy shrubby dry sclerophyll forest	500	2 000	4 000	30	7 000
E. rodwayi forest	40	60	200	20	300
E. sieberi forest on granite	500	500	4 000	100	5 000
E. sieberi on other substrates	1 000	3 000	9 000	300	14 000
E. tenuiramis on dolerite	30	400	600	40	1 000
E. viminalis and/or *E. globulus* coastal shrubby forest	0	0	0	0	10
E. viminalis/ E. ovata/E. amygdalina/ E. obliqua damp sclerophyll forest	1 000	4 000	4 000	300	9 000
Grassy *E. globulus* forest	70	80	60	20	200
Grassy E*. viminalis* forest	20	700	500	60	1 000
Inland *E. amygdalina* forest	40	300	600	60	1 000
Inland *E. tenuiramis* forest	20	400	800	10	1 000
Shrubby *E. ovata* forest	0	50	80	40	200
Wet Eucalypt Forest					
E. brookeriana wet forest	200	500	500	20	1 000
E. regnans forest	5 000	20 000	8 000	1 000	34 000
King Island *E. globulus/E. brookeriana/E. viminalis* forest	0	300	60	0	400
Tall *E. delegatensis* forest	14 000	35 000	58 000	3 000	110 000
Tall *E. nitida* forest	200	500	1 000	60	2 000
Tall *E. obliqua* forest	30 000	69 000	56 000	5 000	159 000
Wet *E. viminalis* forest on basalt	30	300	200	20	600
Sub-alpine Eucalypt Forest					

Table 1.1.b.1 (b) Permanent Timber Production Zone (PTPZ) land (cont'd.) [f]					
E. coccifera dry forest	30	400	2 000	400	3 000
E. subcrenulata forest	20	60	90	0	200
Non-eucalypt Forest					
Acacia melanoxylon forest on flats	0	0	0	5 000	5 000
Acacia melanoxylon forest on rises	0	0	0	4 000	4 000
Callidendrous and thamnic rainforest on fertile sites	0	0	0	28 000	28 000
Huon Pine forest	0	0	0	1000	1 000
King Billy Pine forest	0	0	0	1000	1 000
King Billy Pine with deciduous beech	0	0	0	20	20
Leptospermum sp./*Melaleuca squarrosa* swamp forest	0	0	0	2 000	2 000
Melaleuca ericifolia forest	0	0	0	10	10
Notelaea ligustrina and/or *Pomaderris apetala* forest	0	0	0	20	20
Silver wattle (*Acacia dealbata*) forest	0	0	0	17 000	17 000
Thamnic rainforest on less fertile sites	0	0	0	33 000	33 000
Permanent Timber Production Zone (PTPZ) land Total	**64 000**	**193 000**	**236 000**	**108 000**	**600 000**

Table 1.1.b.1 (c) Other Publicly Managed Land [g]					
RFA Forest Vegetation Community	**Growth Stage** (hectares) [d]				
	Regen-eration	**Regrowth**	**Mature (including overmature)**	**Unknown**	**TOTAL**
Dry Eucalypt Forest					
Coastal *E. amygdalina* dry sclerophyll forest	1000	2 000	21 000	1 000	26 000
Dry *E. delegatensis* forest	1000	5 000	32 000	2 000	40 000
Dry *E. nitida* forest	300	2 000	7 000	2000	12 000
Dry *E. obliqua* forest	2 000	6 000	20 000	1 000	28 000
E. amygdalina forest on dolerite	300	2 000	10 000	200	13 000
E. amygdalina forest on sandstone	20	600	3 000	60	4 000
E. pauciflora on Jurassic dolerite	0	200	1 000	200	1 000
E. pauciflora on sediments	0	80	600	50	700
E. pulchella/E. globulus/E. viminalis grassy shrubby dry sclerophyll forest	600	2 000	13 000	0	16 000
E. risdonii forest	0	10	10	0	20
E. rodwayi forest	0	10	80	20	100
E. sieberi forest on granite	300	800	6 000	200	7 000
E. sieberi on other substrates	700	1 000	14 000	200	16 000
E. tenuiramis on dolerite	60	200	900	40	1 000
E. tenuiramis on granite	0	0	40	0	40
E. viminalis and/or *E. globulus* coastal shrubby forest	0	20	0	0	30
E. viminalis/ E. ovata/E. amygdalina/ E. obliqua damp sclerophyll forest	600	600	3 000	200	4 000
Furneaux *E. nitida* forest	0	200	300	0	500
Grassy *E. globulus* forest	0	40	400	0	400
Grassy *E. viminalis* forest	0	200	500	10	600
Inland *E. amygdalina* forest	0	100	800	10	900
Inland *E. tenuiramis* forest	0	100	100	0	300
Shrubby *E. ovata* forest	0	70	90	10	200
Wet Eucalypt Forest					
E. brookeriana wet forest	0	50	400	0	500
E. regnans forest	700	3 000	6 000	200	10 000
King Island *E. globulus/E. brookeriana/E. viminalis* forest	0	20	10	0	40
Tall *E. delegatensis* forest	1 000	7 000	19 000	1 000	28 000
Tall *E. nitida* forest	30	2000	2 000	70	3 000

Table 1.1.b.1 (c) Other Publicly Managed Land (cont'd.) [g]					
Tall *E. obliqua* forest	5 000	17 000	35 000	1 000	58 000
Wet *E. viminalis* forest on basalt	0	20	10	0	30
Sub-alpine Eucalypt Forest					
E. coccifera dry forest	0	600	3 000	700	5 000
E. subcrenulata forest	0	10	40	0	50
Non-eucalypt Forest					
Acacia melanoxylon forest on flats	0	0	0	700	700
Acacia melanoxylon forest on rises	0	0	0	2 000	2 000
Allocasuarina verticillata forest	0	0	0	90	90
Banksia serrata woodland	0	0	0	0	0
Callidendrous and thamnic rainforest on fertile sites	0	0	0	28 000	28 000
Callitris rhomboidea forest	0	0	0	100	100
Huon Pine forest	0	0	0	90	90
King Billy Pine forest	0	0	0	2000	2 000
King Billy Pine with deciduous beech	0	0	0	30	30
Leptospermum sp./*Melaleuca squarrosa* swamp forest	0	0	0	800	800
Melaleuca ericifolia forest	0	0	0	60	60
Notelaea ligustrina and/or *Pomaderris apetala* forest	0	0	0	10	10
Silver wattle (*Acacia dealbata*) forest	0	0	0	9 000	9 000
Thamnic rainforest on less fertile sites	0	0	0	40 000	40 000
Other Publicly Managed Land Total	**13 000**	**53 000**	**199 000**	**93 000**	**358 000**

Table 1.1.b.1 (d) Private freehold land					
RFA Forest Vegetation Community	**Growth Stage** (hectares) [(d)]				
	Regen-eration	**Regrowth**	**Mature (including overmature)**	**Unknown**	**TOTAL**
Dry Eucalypt Forest					
Coastal *E. amygdalina* dry sclerophyll forest	200	9 000	40 000	9 000	59 000
Dry *E. delegatensis* forest	7 000	16 000	60 000	10 000	92 000
Dry *E. nitida* forest	0	500	4 000	400	5 000
Dry *E. obliqua* forest	1 000	15 000	27 000	3 000	47 000
E. amygdalina forest on dolerite	2 000	18 000	92 000	12 000	123 000
E. amygdalina forest on sandstone	30	3 000	13 000	1 000	17 000
E. morrisbyi forest	0	0	0	0	0
E. pauciflora on Jurassic dolerite	400	2 000	9 000	2 000	13 000
E. pauciflora on sediments	400	1 000	5 000	1 000	8 000
E. pulchella/E. globulus/E. viminalis grassy shrubby dry sclerophyll forest	1 000	14 000	80 000	3 000	98 000
E. risdonii forest	0	100	40	0	200
E. rodwayi forest	200	1 000	5 000	1 000	8 000
E. sieberi forest on granite	10	400	1 000	400	2 000
E. sieberi on other substrates	10	2 000	5 000	500	7 000
E. tenuiramis on dolerite	0	90	600	0	700
E. tenuiramis on granite	0	0	200	0	200
E. viminalis and/or *E. globulus* coastal shrubby forest	0	20	900	20	900
E. viminalis/ E. ovata/E. amygdalina/ E. obliqua damp sclerophyll forest	700	8 000	3 000	1 000	13 000
Furneaux *E. nitida* forest	0	300	9 000	20	9 000
Furneaux *E. viminalis* forest	0	0	20	0	20
Grassy *E. globulus* forest	20	1 000	6 000	300	7 000
Grassy *E. viminalis* forest	100	12 000	79 000	10 000	101 000
Inland *E. amygdalina* forest	60	5 000	12 000	2 000	18 000
Inland *E. tenuiramis* forest	200	12 000	31 000	800	44 000
Shrubby *E. ovata* forest	30	2 000	3 000	800	5 000
Wet Eucalypt Forest					
E. brookeriana wet forest	0	800	500	90	1 000
E. regnans forest	200	2 000	1 000	700	4 000
King Island *E. globulus/E. brookeriana/E. viminalis* forest	0	1 000	700	10	2 000

Table 1.1.b.1 (d) Private freehold land (cont'd.)					
Tall *E. delegatensis* forest	2 000	12 000	20 000	5 000	39 000
Tall *E. nitida* forest	0	200	300	30	500
Tall *E. obliqua* forest	900	39 000	17 000	5 000	61 000
Wet *E. viminalis* forest on basalt	20	900	700	300	2 000
Sub-alpine Eucalypt Forest					
E. coccifera dry forest	100	900	5 000	1 000	7 000
E. subcrenulata forest	0	0	10	0	10
Non-eucalypt Forest					
Acacia melanoxylon forest on flats	0	0	0	1 000	1 000
Acacia melanoxylon forest on rises				3 000	3 000
Allocasuarina verticillata forest	0	0	0	700	700
Banksia serrata woodland	0	0	0	40	40
Callidendrous and thamnic rainforest on fertile sites				10 000	10 000
Callitris rhomboidea forest	0	0	0	300	300
Huon Pine forest	0	0	0	10	10
King Billy Pine forest	0	0	0	10	10
Leptospermum sp./Melaleuca squarrosa swamp forest	0	0	0	4 000	4 000
Melaleuca ericifolia forest	0	0	0	100	100
Notelaea ligustrina and/or *Pomaderris apetala* forest	0	0	0	30	30
Pencil Pine forest	0	0	0	0	0
Silver wattle (*Acacia dealbata*) forest	0	0	0	15 000	15 000
Thamnic rainforest on less fertile sites	0	0	0	10 000	10 000
Private Freehold Land Total	**16 000**	**179 000**	**529 000**	**116 000**	**840 000**
TOTAL (across all tenures)	**99 000**	**549 000**	**1 609 000**	**796 000**	**3 052 000**

Notes:

(a) Native forest growth stage as at 30th June 2016 on publicly-managed land, and 31st December 2015 on private land.

(b) Non-eucalypt communities cannot readily be mapped by growth stage.

(c) Tenure as at 30th June, 2016.

(d) Rounded to nearest 10 ha if less than 100 ha, else to nearest hundred hectares. Figures in Total rows are the rounded actual totals.

(e) Nature Conservation Act and Crown Lands Act.

(f) Forest Management Act 2013.

(g) Publicly-managed land includes land managed by Public Authorities.

Table 1.1.b.2 Distribution of growth stages (a, b) of each native forest type within broad tenure (c) groups

Figures are the area of each growth stage expressed as a percentage of the total area of that vegetation community within a tenure group.

RN = Regeneration RG = Regrowth MO = Mature/Overmature UNK = Unknown

RFA Forest Vegetation Community	Land Tenure Group											
	Conservation & Public Reserves				Other publicly managed land (a)				Private freehold land			
	RN	RG	MO	UNK	RN	RG	MO	UNK	RN	RG	MO	UNK
	%	%	%	%	%	%	%	%	%	%	%	%
Dry Eucalypt Forest												
Coastal *E. amygdalina* dry sclerophyll forest	0	4	89	7	9	13	72	6	0	16	68	16
Dry *E. delegatensis* forest	0	15	82	4	4	27	65	4	7	17	65	11
Dry *E. nitida* forest	0	23	76	1	3	29	57	11	0	10	82	8
Dry *E. obliqua* forest	0	14	84	2	6	36	54	4	2	33	58	7
E. amygdalina forest on dolerite	0	5	94	1	3	25	70	2	1	15	74	9
E. amygdalina forest on sandstone	0	1	97	1	5	27	68	1	0	16	78	6
E. morrisbyi forest	0	0	100	0	0	0	0	0	0	0	52	48
E. pauciflora on Jurassic dolerite	0	7	87	6	2	9	79	10	3	14	67	16
E. pauciflora on sediments	1	5	91	3	3	7	82	7	5	14	65	16
E. pulchella/E. globulus/E. viminalis grassy shrubby dry sclerophyll forest	0	7	93	0	5	20	75	0	1	15	82	3
E. risdonii forest	0	86	14	0	0	43	57	0	0	78	21	1
E. rodwayi forest	0	32	46	22	9	16	67	8	3	18	65	14
E. sieberi forest on granite	0	1	97	3	7	11	79	3	0	18	62	19
E. sieberi on other substrates	0	3	95	2	7	14	77	2	0	23	69	8
E. tenuiramis on dolerite	0	7	92	1	4	27	66	3	0	14	86	0
E. tenuiramis on granite	0	0	100	0	0	0	100	0	0	0	97	3
E. viminalis and/or *E. globulus* coastal shrubby forest	0	8	92	0	5	66	14	16	0	2	96	3
E. viminalis/ E. ovata/E. amygdalina/ E. obliqua damp sclerophyll forest	0	17	80	3	12	33	52	4	5	58	25	11
Furneaux *E. nitida* forest	0	0	100	0	0	37	63	0	0	4	96	0
Furneaux *E. viminalis* forest	0	0	100	0	0	0	0	0	0	0	100	0
Grassy *E. globulus* forest	0	5	95	0	10	19	68	3	0	17	79	4
Grassy *E. viminalis* forest	0	4	93	3	1	45	50	4	0	12	78	10
Inland *E. amygdalina* forest	0	11	88	1	2	22	72	4	0	26	65	9
Inland *E. tenuiramis* forest	0	16	84	0	1	36	61	1	0	26	71	2
Shrubby *E. ovata* forest	0	18	74	9	1	35	50	14	1	33	50	16
Wet Eucalypt Forest												
E. brookeriana wet forest	0	58	41	1	9	34	56	1	0	57	36	7
E. regnans forest	5	24	70	1	12	53	32	3	4	54	27	15
King Island *E. globulus/E. brookeriana/E. viminalis* forest	0	49	51	0	0	81	19	0	0	59	41	0
Tall *E. delegatensis* forest	1	13	84	2	11	30	56	3	6	31	50	12
Tall *E. nitida* forest	0	16	84	0	4	40	53	3	0	39	55	6

RN = Regeneration RG = Regrowth MO = Mature/Overmature UNK = Unknown

RFA Forest Vegetation Community	Land Tenure Group											
	Conservation & Public Reserves				Other publicly managed land (a)				Private freehold land			
	RN	RG	MO	UNK	RN	RG	MO	UNK	RN	RG	MO	UNK
	%	%	%	%	%	%	%	%	%	%	%	%
Tall *E. obliqua* forest	3	23	73	1	16	39	42	3	1	63	27	8
Wet *E. viminalis* forest on basalt	0	42	54	4	5	53	38	4	1	47	38	14
Sub-alpine Eucalypt Forest												
E. coccifera dry forest	0	22	69	8	1	14	71	15	2	13	68	17
E. subcrenulata forest	1	17	80	2	10	29	60	2	0	33	67	0
Non-eucalypt Forest												
Acacia melanoxylon forest on flats	0	0	0	100	0	0	0	100	0	0	0	100
Acacia melanoxylon forest on rises	0	0	0	100	0	0	0	100	0	0	0	100
Allocasuarina verticillata forest	0	0	0	100	0	0	0	100	0	0	0	100
Banksia serrata woodland	0	0	0	100	0	0	0	0	0	0	0	100
Callidendrous and thamnic rainforest on fertile sites	0	0	0	100	0	0	0	100	0	0	0	100
*Callitris rhomboide*a forest	0	0	0	100	0	0	0	100	0	0	0	100
Huon Pine forest	0	0	0	100	0	0	0	100	0	0	0	100
King Billy Pine forest	0	0	0	100	0	0	0	100	0	0	0	100
King Billy Pine with deciduous beech	0	0	0	100	0	0	0	100	0	0	0	0
Leptospermum sp./*Melaleuca squarrosa* swamp forest	0	0	0	100	0	0	0	100	0	0	0	100
Melaleuca ericifolia forest	0	0	0	100	0	0	0	100	0	0	0	100
Notelaea ligustrina and/or *Pomaderris apetala* forest	0	0	0	100	0	0	0	100	0	0	0	100
Pencil Pine forest	0	0	0	100	0	0	0	0	0	0	0	100
Pencil Pine with deciduous beech	0	0	0	100	0	0	0	0	0	0	0	0
Silver wattle (*Acacia dealbata*) forest	0	0	0	100	0	0	0	100	0	0	0	0
Thamnic rainforest on less fertile sites	0	0	0	100	0	0	0	100	0	0	0	100
Grand Total	**0**	**0**	**0**	**100**	**0**	**0**	**0**	**100**	**0**	**0**	**0**	**100**

Table 1.1.b.3 Change in distribution of growth stages (a,b) of each native forest community

Figures are the area of each growth stage expressed as a percentage of the total area of that vegetation community.

RN = Regeneration RG = Regrowth MO = Mature/Overmature UNK = Unknown

Table 1.1.b.3 Change in distribution of growth stages (a,b) of each native forest community

	Distribution in 1996				Distribution in 2016 (c)				Change in percentage points since 1996 (c)			
	RN	RG	MO	UNK	RN	RG	MO	UNK	RN	RG	MO	UNK
RFA Forest Vegetation Community	%	%	%	%	%	%	%	%	%	%	%	%
Dry Eucalypt Forest												
Coastal *E. amygdalina* dry sclerophyll forest	2	10	88	0	3	11	77	10	1	1	-12	10
Dry *E. delegatensis* forest	4	16	81	0	4	20	70	6	0	5	-11	6
Dry *E. nitida* forest	0	23	77	0	0	23	75	2	0	0	-2	2
Dry *E. obliqua* forest	6	23	70	0	3	29	63	4	-3	6	-7	4
E. amygdalina forest on dolerite	2	12	86	0	1	15	76	7	-1	3	-9	7
E. amygdalina forest on sandstone	3	13	85	0	1	17	78	4	-1	4	-7	4
E. morrisbyi forest	0	0	100	0	0	0	97	3	0	0	-3	3
E. pauciflora on Jurassic dolerite	0	14	86	0	2	12	71	14	2	-1	-15	14
E. pauciflora on sediments	0	10	90	0	3	10	76	10	3	0	-13	10
E. pulchella/E. globulus/E. viminalis grassy shrubby dry sclerophyll forest	1	11	88	0	1	14	83	2	1	2	-5	2
E. risdonii forest	0	81	19	0	0	80	19	1	0	-1	0	1
E. rodwayi forest	0	17	83	0	3	19	65	14	3	2	-19	14
E. sieberi forest on granite	3	5	92	0	5	10	81	5	2	5	-11	5
E. sieberi on other substrates	8	9	82	1	5	13	79	3	-3	4	-2	2
E. tenuiramis on dolerite	4	9	87	0	1	13	84	1	-3	4	-3	1
E. tenuiramis on granite	0	1	99	0	0	0	100	0	0	-1	1	0
E. viminalis and/or *E. globulus* coastal shrubby forest	0	4	96	0	0	5	92	3	0	0	-3	3
E. viminalis/ E. ovata/E. amygdalina/ E. obliqua damp sclerophyll forest	5	34	61	0	6	38	50	6	1	4	-11	6
Furneaux *E. nitida* forest	0	2	98	0	0	2	98	0	0	0	0	0
Furneaux *E. viminalis* forest	0	0	100	0	0	0	100	0	0	0	0	0
Grassy *E. globulus* forest	0	14	86	0	1	12	85	2	1	-2	-1	2
Grassy *E. viminalis* forest	1	11	88	0	0	12	78	9	0	1	-10	9
Inland *E. amygdalina* forest	0	22	78	0	0	24	68	8	0	2	-10	8
Inland *E. tenuiramis* forest	0	25	75	0	0	25	73	2	0	1	-2	2
Shrubby *E. ovata* forest	0	35	64	0	1	33	51	15	1	-2	-13	15
Wet Eucalypt Forest												
E. brookeriana wet forest	1	35	64	0	4	48	46	3	3	13	-18	3
E. regnans forest	8	45	47	1	10	46	41	3	2	1	-5	3
King Island *E. globulus/E. brookeriana/E. viminalis* forest	0	63	37	0	0	62	38	0	0	-1	1	0
Tall *E. delegatensis* forest	5	22	72	0	7	25	65	4	2	2	-8	4
Tall *E. nitida* forest	0	18	82	0	0	18	82	0	0	0	0	0

RN = Regeneration RG = Regrowth MO = Mature/Overmature UNK = Unknown

Table 1.1.b.3 Change in distribution of growth stages (a,b) of each native forest community

	Distribution in 1996				Distribution in 2016 (c)				Change in percentage points since 1996 (c)			
	RN	RG	MO	UNK	RN	RG	MO	UNK	RN	RG	MO	UNK
RFA Forest Vegetation Community	%	%	%	%	%	%	%	%	%	%	%	%
Tall *E. obliqua* forest	8	41	52	0	10	39	48	3	2	-2	-4	3
Wet *E. viminalis* forest on basalt	0	42	57	0	2	47	41	10	1	5	-16	10
Sub-alpine Eucalypt Forest												
E. coccifera dry forest	0	19	81	0	0	20	69	10	0	1	-11	10
E. subcrenulata forest	1	18	81	0	1	18	79	2	0	0	-2	2
Non-eucalypt Forest												
Acacia melanoxylon forest on flats	0	0	0	100	0	0	0	100	0	0	0	0
Acacia melanoxylon forest on rises	0	0	0	100	0	0	0	100	0	0	0	0
Allocasuarina verticillata forest	0	0	0	100	0	0	0	100	0	0	0	0
Banksia serrata woodland	0	0	0	100	0	0	0	100	0	0	0	0
Callidendrous and thamnic rainforest on fertile sites	0	0	0	100	0	0	0	100	0	0	0	0
Callitris rhomboidea forest	0	0	0	100	0	0	0	100	0	0	0	0
Huon Pine forest	0	0	0	100	0	0	0	100	0	0	0	0
King Billy Pine forest	0	0	0	100	0	0	0	100	0	0	0	0
King Billy Pine with deciduous beech	0	0	0	100	0	0	0	100	0	0	0	0
Leptospermum sp./Melaleuca squarrosa swamp forest	0	0	0	100	0	0	0	100	0	0	0	0
Melaleuca ericifolia forest	0	0	0	100	0	0	0	100	0	0	0	0
Notelaea ligustrina and/or *Pomaderris apetala* forest	0	0	0	100	0	0	0	100	0	0	0	0
Pencil Pine forest	0	0	0	100	0	0	0	100	0	0	0	0
Pencil Pine with deciduous beech	0	0	0	100	0	0	0	100	0	0	0	0
Silver wattle *(Acacia dealbata)* forest	0	0	0	100	0	0	0	100	0	0	0	0
Thamnic rainforest on less fertile sites	0	0	0	100	0	0	0	100	0	0	0	0

(a) *Native forest growth stage as at 30th June 2016 on publicly-managed land, and 31st December 2015 on private land.*

(b) *Non-eucalypt communities cannot readily be mapped by growth stage.*

(c) *Change in growth stage may also be partially due to continuous forest remapping, which is continually updated.*

Table 1.1.c.1 Area of native forest type protected by IUCN category[(a)]

Table 1.1.c.1 Area of native forest type protected by IUCN category [(a)]									
RFA Forest Vegetation Community	**IUCN Category**								**TOTAL**
	Ia	**II**	**II/Ib**	**III**	**IV**	**V**	**VI**	**Not Classified** [(b)]	
Dry eucalypt forests									
Coastal *E. amygdalina* dry sclerophyll forest	100	20 000	200	2 000	16 000	2 000	23 000	28 000	90 000
Dry E. *delegatensis* forest	50	16 000	26 000	800	16 000	5 000	26 000	48 000	138 000
Dry E. *nitida* forest	0	4 000	90 000	20	3 000	4 000	37 000	11 000	148 000
Dry E. *obliqua* forest	200	10 000	6 000	1 000	10 000	3 000	14 000	32 000	77 000
E. *amygdalina* forest on dolerite	400	3 000	400	2 000	21 000	500	3 000	16 000	46 000
E. *amygdalina* forest on sandstone	200	50	0	0	3 000	100	4 000	4 000	11 000
E. *morrisbyi* forest	20	0	0	0	0	0	0	0	20
E. *pauciflora* on Jurassic dolerite	0	0	300	200	2 000	200	1 000	2 000	6 000
E. *pauciflora* on sediments	200	0	4 000	0	2 000	0	1 000	1 000	8 000
E. *pulchella* / *globulus* / *viminalis* grassy shrubby dry sclerophyll forest	6 000	7 000	0	3 000	20 000	1 000	2 000	18 000	56 000
E. *risdonii* forest	0	30	0	0	10	100	0	0	200
E. *rodwayi* forest	10	0	30	0	500	30	30	200	900
E. *sieberi* forest on granite	0	300	0	2 000	1 000	200	90	8 000	11 000
E. *sieberi* on other substrates	0	2 000	0	300	8 000	40	30	17 000	27 000

Table 1.1.c.1 Area of native forest type protected by IUCN category [(a)]

RFA Forest Vegetation Community	IUCN Category								TOTAL
	Ia	II	II/Ib	III	IV	V	VI	Not Classified [(b)]	
E. *tenuiramis* on dolerite	0	2 000	0	400	2 000	80	300	1 000	7 000
E. *tenuiramis* on granite	0	2 000	0	0	0	0	1 000	60	3 000
E. *viminalis* and/or E. *globulus* coastal shrubby forest	0	200	100	0	60	0	100	20	400
E. viminalis / *ovata* / *amygdalina* / *obliqua* damp sclerophyll forest	0	300	0	70	8 000	90	2 000	6 000	17 000
Furneaux *E. nitida* forest	2 000	4 000	0	0	100	500	14 000	200	20 000
Furneaux E. *viminalis* forest	0	0	0	0	0	0	100	0	100
Grassy E. *globulus* forest	30	4 000	0	0	2 000	500	1 000	300	8 000
Grassy E. *viminalis* forest	0	500	0	90	11 000	300	600	3 000	16 000
Inland E. *amygdalina* forest	300	80	0	70	5 000	500	10	1 000	8 000
Inland E. *tenuiramis* forest	2 000	400	0	100	6 000	600	4 000	800	13 000
Shrubby E. *ovata* forest	20	60	0	0	600	50	70	300	1 000
Wet eucalypt forests									
E. *brookeriana* wet forest	0	0	0	0	1 000	20	20	700	2 000
E. *regnans* forest	0	2 000	5 000	400	6 000	3 000	1 000	15 000	32 000
King Island E. *globulus* / *brookeriana* / *viminalis* forest	60	90	0	0	300	10	100	300	900
Tall *E. delegatensis* forest	100	15 000	50 000	500	13 000	4 000	13 000	45 000	140 000

Table 1.1.c.1 Area of native forest type protected by IUCN category [(a)]

RFA Forest Vegetation Community	IUCN Category								TOTAL
	Ia	II	II/Ib	III	IV	V	VI	Not Classified [(b)]	
Tall *E. nitida* forest	0	500	50 000	40	1 000	500	16 000	4 000	72 000
Tall *E. obliqua* forest	100	13 000	33 000	2 000	24 000	13 000	24 000	78 000	189 000
Wet *E. viminalis* forest on basalt	200	20	0	10	500	100	10	200	900
Sub-alpine eucalypt forests									
E. coccifera dry forest	0	4 000	20 000	0	400	5 000	11 000	4 000	45 000
E. subcrenulata forest	0	700	9 000	0	90	200	300	100	10 000
Non-eucalypt forests									
Acacia melanoxylon forest on flats	70	300	20	0	2 000	20	10	1 000	3 000
Acacia melanoxylon forest on rises	0	0	30	100	700	100	3 000	2 000	6 000
Allocasuarina verticillata forest	0	500	0	30	200	20	40	10	800
Banksia serrata woodland	0	100	0	0	0	0	0	0	100
Callidendrous and thamnic rainforest on fertile sites	20	3 000	39 000	8 000	40 000	7 000	24 000	39 000	158 000
Callitris rhomboidea forest	100	100	0	40	60	0	50	100	500
Huon pine forest	0	500	6 000	10	0	90	1 000	100	8 000
King Billy pine forest	0	40	10 000	0	30	90	7 000	2 000	19 000
King Billy pine with deciduous beech	0	0	200	0	0	0	600	20	800
Leptospermum sp./ *Melaleuca squarrosa*	20	100	7 000	10	1 000	1 000	700	1 000	12 000

Table 1.1.c.1 Area of native forest type protected by IUCN category [(a)]									
RFA Forest Vegetation Community	**IUCN Category**								**TOTAL**
	Ia	**II**	**II/Ib**	**III**	**IV**	**V**	**VI**	**Not Classified** [(b)]	
swamp forest									
Melaleuca ericifolia forest	0	200	0	0	0	0	200	0	400
Notelaea ligustrina and/or *Pomaderris apetala* forest	0	70	100	0	10	0	20	10	200
Pencil pine forest	0	0	300	0	0	0	0	0	300
Pencil pine with deciduous beech	0	0	200	0	0	0	0	0	200
Silver wattle (*Acacia dealbata*) forest	100	800	1 000	300	5 000	400	2 000	13 000	22 000
Thamnic rainforest on less fertile sites	10	6 000	166 000	2 000	21 000	14 000	83 000	51 000	343 000
TOTAL	**12 000**	**122 000**	**523 000**	**26 000**	**253 000**	**67 000**	**320 000**	**455 000**	**1778 000**

(a) *Forest extent is as at the first quarter of 2015 and IUCN categories are as at 30 June 2016*
(b) *The areas listed having a 'Not Classified' IUCN category are other reserves within the CAR reserve system*

Table 1.1.c.2 Area of native forest type protected by reserve class [(a)]

Table 1.1.c.2 Area of native forest type protected by reserve class [(a)]							
RFA Forest Vegetation Community	**Public Land**				**Private Land**		**TOTAL (ha)**
	Dedicated formal reserve (ha)	**Other formal reserve *Min* [(b)] *(ha)***	**Informal reserve (ha)**	**Other public land (ha)**	**Private CAR reserves (ha)**	**Other private land (ha)**	
Dry eucalypt forests							
Coastal *E. amygdalina* forest	23 000	37 000	27 000	31 000	4 000	55 000	177 000
Dry *E. delegatensis* forest	43 000	39 000	47 000	60 000	10 000	82 000	281 000
Dry *E. nitida* forest	94 000	43 000	11 000	5 000	100	5 000	159 000
Dry *E. obliqua* forest	17 000	26 000	32 000	35 000	3 000	44 000	155 000
E. amygdalina on dolerite	4 000	18 000	15 000	9 000	9 000	114 000	169 000
E. amygdalina on sandstone	300	4 000	4 000	4 000	3 000	14 000	29 000
E. morrisbyi forest	20	0	0	0	0	0	20
E. pauciflora on dolerite	500	1 000	2 000	1 000	2 000	11 000	18 000
E. pauciflora on sediments	4 000	1 000	900	1 000	2 000	6 000	15 000
E. pulchella/globulus/viminalis grassy shrubby dry forest	15 000	12 000	15 000	8 000	14 000	84 000	147 000
E. risdonii forest	30	100	0	20	10	200	400
E. rodwayi forest	30	200	200	200	400	7 000	8 000
E. sieberi forest on granite	3 000	1 000	8 000	4 000	100	2 000	17 000
E. sieberi on other substrates	2 000	7 000	17 000	13 000	1 000	5 000	45 000

Table 1.1.c.2 Area of native forest type protected by reserve class [(a)]

RFA Forest Vegetation Community	Public Land				Private Land		TOTAL (ha)
	Dedicated formal reserve (ha)	Other formal reserve *Min* [(b)] *(ha)*	Informal reserve (ha)	Other public land (ha)	Private CAR reserves (ha)	Other private land (ha)	
E. tenuiramis on dolerite	2 000	3 000	1 000	800	70	600	8 000
E. tenuiramis on granite	2 000	1 000	60	40	0	200	3 000
E. viminalis and/or *E. globulus* coastal shrubby forest	200	0	20	30	200	700	1 000
E. viminalis/ovata/amygdalina/ obliqua damp forest	300	10 000	6 000	8 000	900	12 000	37 000
Furneaux *E. nitida* forest	9 000	11 000	200	500	200	9 000	29 000
Furneaux *E. viminalis* forest	0	100	0	0	0	20	100
Grassy *E. globulus* forest	4 000	2 000	200	500	1 000	6 000	14 000
Grassy *E. viminalis* forest	500	2 000	600	1 000	13 000	88 000	106 000
Inland *E. amygdalina* forest	1 000	1 000	800	1 000	4 000	14 000	22 000
Inland *E. tenuiramis* forest	3 000	5 000	700	900	5 000	39 000	53 000
Shrubby *E. ovata* forest	60	200	100	200	600	5 000	6 000

Table 1.1.c.2 Area of native forest type protected by reserve class [a]							
RFA Forest Vegetation Community	**Public Land**				**Private Land**		**TOTAL (ha)**
	Dedicated formal reserve (ha)	**Other formal reserve *Min* [b] *(ha)***	**Informal reserve (ha)**	**Other public land (ha)**	**Private CAR reserves (ha)**	**Other private land (ha)**	
Wet eucalypt forests							
E. brookeriana wet forest	0	1 000	500	1 000	200	1 000	4 000
E. regnans forest	6 000	11 000	14 000	30 000	100	4 000	66 000
King Island *E. globulus/ brookeriana/viminalis* forest	100	80	300	60	300	1 000	2 000
Tall *E. delegatensis* forest	64 000	27 000	42 000	96 000	7 000	32 000	268 000
Tall *E. nitida* forest	51 000	18 000	4 000	2 000	40	500	74 000
Tall *E. obliqua* forest	44 000	64 000	76 000	141 000	4 000	57 000	386 000
Wet *E. viminalis* forest on basalt	30	700	100	500	100	2 000	3 000
Sub-alpine eucalypt forests							
E. coccifera dry forest	24 000	16 000	4 000	3 000	400	6 000	55 000
E. subcrenulata forest	9 000	600	100	90	0	10	10 000
Non-eucalypt forests							
Acacia melanoxylon on flats	400	2 000	1 000	4 000	200	1 000	9 000
Acacia melanoxylon on rises	50	4 000	2 000	4 000	400	3 000	12 000
Allocasuarina verticillata forest	500	90	10	70	200	500	1 000
Banksia serrata woodland	100	0	0	0	0	40	200

Table 1.1.c.2 Area of native forest type protected by reserve class [(a)]

RFA Forest Vegetation Community	Public Land				Private Land		TOTAL (ha)
	Dedicated formal reserve (ha)	Other formal reserve *Min* [(b)] *(ha)*	Informal reserve (ha)	Other public land (ha)	Private CAR reserves (ha)	Other private land (ha)	
Callidendrous and thamnic rainforest on fertile sites	42 000	77 000	36 000	20 000	3 000	7 000	185 000
Callitris rhomboidea forest	300	70	100	0	10	300	800
Huon pine forest	6 000	1 000	100	1 000	10	0	9 000
King Billy pine forest	10 000	7 000	2 000	1 000	10	0	20 000
King Billy pine with deciduous beech	200	600	20	30	0	0	800
Leptospermum sp./Melaleuca squarrosa swamp forest	8 000	3 000	800	2 000	400	4 000	18 000
Melaleuca ericifolia forest	200	200	0	60	0	100	600
Notelaea ligustrina and/or *Pomaderris apetala* forest	200	40	0	20	0	30	300
Pencil pine forest	300	10	0	0	0	0	300
Pencil pine with deciduous beech	200	0	0	0	0	0	200
Silver wattle (*Acacia dealbata*) forest	2 000	6 000	12 000	13 000	1 000	14 000	49 000
Thamnic rainforest on less fertile sites	172 000	120 000	47 000	26 000	4 000	6 000	375 000
TOTAL	**669 000**	**583 000**	**430 000**	**531 000**	**96 000**	**744 000**	**3052 000**

(a) *Forest extent is as at the first quarter of 2015 and reserve classes are as at 30 June 2016*
(b) *Subject to the* Mineral Resources Development Act 1995.

Table 1.1.c.3 Change in reservation status of forest types [(a)]

Table 1.1.c.3 Change in reservation status of forest types [(a)]						
RFA Forest Vegetation Community	**Forest in 1996**		**Forest in 2016**			**Change in proportion reserved since RFA (1996) (percentage points)**
	Total area (ha)	**Percentage of forest then in reserves (%)**	**Total area (ha)**	**Area in CAR reserves (ha)**	**Percentage of existing forest now in reserves (%)**	
Dry eucalypt forests						
Coastal *E. amygdalina* dry forest	190 000	17.1	177 000	90 000	51.1	34.0
Dry *E. delegatensis* forest	290 000	25.8	281 000	138 000	49.2	23.4
Dry *E. nitida* forest	160 000	75.6	159 000	148 000	93.4	17.8
Dry *E. obliqua* forest	164 000	22.5	155 000	77 000	49.3	26.8
E. amygdalina on dolerite	178 000	7.7	169 000	46 000	27.4	19.7
E. amygdalina on sandstone	30 000	6.0	29 000	11 000	38.7	32.7
E. morrisbyi forest	20	0.0	20	20	93.8	93.8
E. pauciflora on dolerite	19 000	12.5	18 000	6 000	30.5	18.0
E. pauciflora on sediments	16 000	24.1	15 000	8 000	52.9	28.8
E. pulchella/globulus/viminalis grassy shrubby dry forest	151 000	9.2	147 000	56 000	37.8	28.6
E. risdonii forest	400	44.5	400	200	47.7	3.2
E. rodwayi forest	9 000	3.2	8 000	900	10.6	7.4
E. sieberi forest on granite	18 000	12.4	17 000	11 000	65.2	52.8
E. sieberi on other substrates	46 000	13.7	45 000	27 000	58.9	45.2

Table 1.1.c.3 Change in reservation status of forest types [(a)]

RFA Forest Vegetation Community	Forest in 1996		Forest in 2016			Change in proportion reserved since RFA (1996) (percentage points)
	Total area (ha)	Percentage of forest then in reserves (%)	Total area (ha)	Area in CAR reserves (ha)	Percentage of existing forest now in reserves (%)	
E. tenuiramis on dolerite	8 000	42.4	8 000	7 000	83.2	40.8
E. tenuiramis on granite	3 000	43.6	3 000	3 000	93.5	49.9
E. viminalis and/or *E. globulus* coastal shrubby forest	1 000	23.0	1 000	400	36.7	13.7
E. viminalis/ovata/amygdalina/ obliqua damp forest	41 000	16.0	37 000	17 000	45.5	29.5
Furneaux *E. nitida* forest	30 000	18.6	29 000	20 000	68.9	50.3
Furneaux *E. viminalis* forest	100	0.0	100	100	87.2	87.2
Grassy *E. globulus* forest	14 000	29.2	14 000	8 000	55.5	26.3
Grassy *E. viminalis* forest	113 000	1.2	106 000	16 000	15.0	13.8
Inland *E. amygdalina* forest	26 000	5.4	22 000	8 000	33.8	28.4
Inland *E. tenuiramis* forest	55 000	5.9	53 000	13 000	24.9	19.0
Shrubby *E. ovata* forest	7 000	3.7	6 000	1 000	17.0	13.3

Table 1.1.c.3 Change in reservation status of forest types [a]						
RFA Forest Vegetation Community	**Forest in 1996**		**Forest in 2016**			**Change in proportion reserved since RFA (1996) (percentage points)**
	Total area (ha)	**Percentage of forest then in reserves (%)**	**Total area (ha)**	**Area in CAR reserves (ha)**	**Percentage of existing forest now in reserves (%)**	
Wet eucalypt forests						
E. brookeriana wet forest	5 000	5.9	4 000	2 000	42.7	36.8
E. regnans forest	76 000	17.6	66 000	32 000	47.7	30.1
King Island *E. globulus/ brookeriana/viminalis* forest	2 000	5.2	2 000	900	36.6	31.4
Tall *E. delegatensis* forest	286 000	26.3	268 000	140 000	52.3	26.0
Tall *E. nitida* forest	74 000	86.1	74 000	72 000	97.3	11.2
Tall *E. obliqua* forest	426 000	17.9	386 000	189 000	48.8	30.9
Wet *E. viminalis* forest on basalt	4 000	7.6	3 000	900	30.2	22.6
Sub-alpine eucalypt forests						
E. coccifera dry forest	55 000	69.1	55 000	45 000	82.2	13.1
E. subcrenulata forest	10 000	83.2	10 000	10 000	99.1	15.9
Non-eucalypt forests						
Acacia melanoxylon on flats	9 000	10.7	9 000	3 000	37.0	26.3
Acacia melanoxylon on rises	13 000	9.9	12 000	6 000	49.4	39.5
Allocasuarina verticillata forest	1 000	36.9	1 000	800	58.7	21.8
Banksia serrata woodland	200	73.8	200	100	74.7	0.9

Table 1.1.c.3 Change in reservation status of forest types [(a)]						
RFA Forest Vegetation Community	**Forest in 1996**		**Forest in 2016**			**Change in proportion reserved since RFA (1996) (percentage points)**
	Total area (ha)	**Percentage of forest then in reserves (%)**	**Total area (ha)**	**Area in CAR reserves (ha)**	**Percentage of existing forest now in reserves (%)**	
Callidendrous and thamnic rainforest on fertile sites	192 000	45.1	185 000	158 000	85.7	40.6
Callitris rhomboidea forest	800	32.9	800	500	65.5	32.6
Huon Pine forest	9 000	77.4	9 000	8 000	85.4	8.0
King Billy pine forest	20 000	82.0	20 000	19 000	94.7	12.7
King Billy pine with deciduous beech	800	78.5	800	800	100.0	21.5
Leptospermum sp./Melaleuca squarrosa swamp forest	19 000	45.3	18 000	12 000	65.0	19.7
Melaleuca ericifolia forest	600	36.7	600	400	67.3	30.6
Notelaea ligustrina and/or *Pomaderris apetala* forest	300	65.9	300	200	82.6	16.7
Pencil pine forest	300	99.9	300	300	99.9	0.0
Pencil pine with deciduous beech	200	100.0	200	200	100.0	0.0
Silver wattle (*Acacia dealbata*) forest	54 000	18.0	49 000	22 000	44.8	26.8
Thamnic rainforest on less fertile sites	378 000	61.3	375 000	343 000	91.5	30.2
TOTAL	**3 207 000**	**30.5**	**3 052 000**	**1 778 000**	**58.2**	**27.7**

(a) *Forest extent is as at the first quarter of 2015 and reserve classes are as at 30 June 2016*

Table 1.1.c.4 Reservation status of native forest types by IBRA 4 biogeographic regions [(a)]

Table 1.1.c.4 Reservation status of native forest types by IBRA 4 biogeographic regions [(a)]

RFA Forest Vegetation Community	Furneaux Region			Woolnorth Region		
	Total area (ha)	Area reserved (ha)	Percentage reserved (%)	Total area (ha)	Area reserved (ha)	Percentage reserved (%)
Coastal *E. amygdalina* dry forest	0	0	n/a	23 000	10 000	44.9
Dry *E. delegatensis* forest	0	0	n/a	4 000	2 000	63.2
Dry *E. nitida* forest	0	0	n/a	14 000	8 000	58.0
Dry *E. obliqua* forest	0	0	n/a	27 000	14 000	51.8
E. amygdalina forest on dolerite	0	0	n/a	16 000	2 000	14.2
E. amygdalina forest on sandstone	0	0	n/a	300	100	31.9
E. morrisbyi forest	0	0	n/a	0	0	n/a
E. pauciflora on dolerite	0	0	n/a	0	0	n/a
E. pauciflora on sediments	0	0	n/a	0	0	n/a
E. pulchella/globulus/viminalis grassy shrubby dry forest	0	0	n/a	0	0	n/a
E. risdonii forest	0	0	n/a	0	0	n/a
E. rodwayi forest	0	0	n/a	100	100	94.5
E. sieberi forest on granite	0	0	n/a	0	0	n/a
E. sieberi on other substrates	0	0	n/a	0	0	n/a
E. tenuiramis on dolerite	0	0	n/a	0	0	n/a
E. tenuiramis on granite	0	0	n/a	0	0	n/a

Table 1.1.c.4 Reservation status of native forest types by IBRA 4 biogeographic regions [(a)]						
RFA Forest Vegetation Community	**Furneaux Region**			**Woolnorth Region**		
	Total area (ha)	**Area reserved (ha)**	**Percentage reserved (%)**	**Total area (ha)**	**Area reserved (ha)**	**Percentage reserved (%)**
E. viminalis and/or *E. globulus* coastal shrubby forest	0	0	n/a	10	0	0.0
E. viminalis/ovata/amygdalina/obliqua damp forest	0	0	n/a	27 000	13 000	46.5
Furneaux *E. nitida* forest	29 000	20 000	68.8	0	0	n/a
Furneaux *E. viminalis* forest	100	100	87.2	0	0	n/a
Grassy *E. globulus* forest	0	0	n/a	0	0	n/a
Grassy *E. viminalis* forest	0	0	n/a	3 000	200	8.3
Inland *E. amygdalina* forest	0	0	n/a	800	20	2.2
Inland *E. tenuiramis* forest	0	0	n/a	0	0	n/a
Shrubby *E. ovata* forest	0	0	n/a	2 000	300	11.6
E. brookeriana wet forest	0	0	n/a	4 000	2 000	43.0
E. regnans forest	0	0	n/a	2 000	1 000	53.8
King Island *E. globulus/brookeriana/ viminalis* forest	0	0	n/a	2 000	900	36.6
Tall *E. delegatensis* forest	0	0	n/a	13 000	7 000	54.8
Tall *E. nitida* forest	0	0	n/a	3 000	2 000	61.9
Tall *E. obliqua* forest	0	0	n/a	110 000	35 000	32.3
Wet *E. viminalis* forest on basalt	0	0	n/a	2 000	900	36.8
E. coccifera dry forest	0	0	n/a	30	20	57.5

Table 1.1.c.4 Reservation status of native forest types by IBRA 4 biogeographic regions [(a)]						
RFA Forest Vegetation Community	**Furneaux Region**			**Woolnorth Region**		
	Total area (ha)	**Area reserved (ha)**	**Percentage reserved (%)**	**Total area (ha)**	**Area reserved (ha)**	**Percentage reserved (%)**
E. subcrenulata forest	0	0	n/a	100	100	100.0
Acacia melanoxylon forest on flats	0	0	n/a	8 000	3 000	34.4
Acacia melanoxylon forest on rises	0	0	n/a	7 000	2 000	27.5
Allocasuarina verticillata forest	200	70	35.3	200	200	94.9
Banksia serrata woodland	0	0	n/a	200	100	74.6
Callidendrous and thamnic rainforest on fertile sites	0	0	n/a	26 000	18 000	70.6
Callitris rhomboidea forest	100	100	77.8	0	0	n/a
Huon pine forest	0	0	n/a	0	0	n/a
King Billy pine forest	0	0	n/a	10	10	100.0
King Billy pine with deciduous beech	0	0	n/a	0	0	n/a
Leptospermum sp./Melaleuca squarrosa swamp forest	300	0	0.6	7 000	2 000	23.0
Melaleuca ericifolia forest	10	10	98.5	200	200	96.5
Notelaea ligustrina and/or *Pomaderris apetala* forest	0	0	n/a	40	10	18.1
Pencil pine forest	0	0	n/a	0	0	n/a
Pencil pine with deciduous beech	0	0	n/a	0	0	n/a
Silver wattle (*Acacia dealbata*) forest	0	0	n/a	15 000	6 000	40.7
Thamnic rainforest on less fertile sites	0	0	n/a	24 000	14 000	56.5

Table 1.1.c.4 Reservation status of native forest types by IBRA 4 biogeographic regions [(a)]						
RFA Forest Vegetation Community	Furneaux Region			Woolnorth Region		
	Total area (ha)	Area reserved (ha)	Percentage reserved (%)	Total area (ha)	Area reserved (ha)	Percentage reserved (%)
TOTAL	30 000	21 000	68.1	341 000	144 000	42.2

(Table continued on next page)

Table 1.1.c.4 Reservation status of native forest types by IBRA 4 biogeographic regions [(a)] *(continued)*						
RFA Forest Vegetation Community	**Ben Lomond Region**			**Freycinet Region**		
	Total area (ha)	**Area reserved (ha)**	**Percentage reserved (%)**	**Total area (ha)**	**Area reserved (ha)**	**Percentage reserved (%)**
Coastal *E. amygdalina* dry forest	122 000	64 000	52.5	28 000	15 000	52.7
Dry *E. delegatensis* forest	29 000	17 000	57.2	66 000	25 000	38.6
Dry *E. nitida* forest	0	0	n/a	0	0	n/a
Dry *E. obliqua* forest	27 000	13 000	48.0	30 000	14 000	46.2
E. amygdalina forest on dolerite	41 000	8 000	18.3	69 000	30 000	42.8
E. amygdalina forest on sandstone	1 000	500	46.8	23 000	10 000	40.9
E. morrisbyi forest	0	0	n/a	0	0	n/a
E. pauciflora on dolerite	0	0	n/a	1 000	900	66.4
E. pauciflora on sediments	2 000	1 000	63.6	50	30	56.4
E. pulchella/globulus/viminalis grassy shrubby dry forest	0	0	n/a	108 000	47 000	43.7
E. risdonii forest	0	0	n/a	0	0	n/a
E. rodwayi forest	40	0	2.7	2 000	60	2.6
E. sieberi forest on granite	17 000	11 000	64.6	800	600	77.1
E. sieberi on other substrates	42 000	24 000	58.0	3 000	2 000	72.2
E. tenuiramis on dolerite	0	0	n/a	8 000	6 000	84.4
E. tenuiramis on granite	0	0	n/a	3 000	3 000	93.4
E. viminalis and/or *E. globulus* coastal shrubby forest	0	0	n/a	1 000	300	33.3

Table 1.1.c.4 Reservation status of native forest types by IBRA 4 biogeographic regions [(a)] *(continued)*						
RFA Forest Vegetation Community	**Ben Lomond Region**			**Freycinet Region**		
	Total area (ha)	**Area reserved (ha)**	**Percentage reserved (%)**	**Total area (ha)**	**Area reserved (ha)**	**Percentage reserved (%)**
E. viminalis/ovata/amygdalina/obliqua damp forest	2 000	800	45.6	0	0	n/a
Furneaux *E. nitida* forest	0	0	n/a	0	0	n/a
Furneaux *E. viminalis* forest	0	0	n/a	0	0	n/a
Grassy *E. globulus* forest	0	0	n/a	11 000	7 000	61.1
Grassy *E. viminalis* forest	18 000	4 000	19.6	20 000	2 000	10.5
Inland *E. amygdalina* forest	4 000	1 000	38.0	500	400	70.0
Inland *E. tenuiramis* forest	0	0	n/a	2 000	700	28.4
Shrubby *E. ovata* forest	400	70	18.5	700	100	17.8
E. brookeriana wet forest	0	0	n/a	20	0	8.9
E. regnans forest	22 000	13 000	60.7	3 000	2 000	52.9
King Island *E. globulus/brookeriana/ viminalis* forest	0	0	n/a	0	0	n/a
Tall *E. delegatensis* forest	44 000	18 000	41.8	21 000	10 000	49.5
Tall *E. nitida* forest	0	0	n/a	0	0	n/a
Tall *E. obliqua* forest	44 000	20 000	46.8	28 000	15 000	53.1
Wet *E. viminalis* forest on basalt	90	0	0.0	300	50	18.7
E. coccifera dry forest	30	30	100.0	80	10	10.2
E. subcrenulata forest	0	0	n/a	0	0	n/a

Table 1.1.c.4 Reservation status of native forest types by IBRA 4 biogeographic regions [(a)] *(continued)*						
RFA Forest Vegetation Community	**Ben Lomond Region**			**Freycinet Region**		
	Total area (ha)	**Area reserved (ha)**	**Percentage reserved (%)**	**Total area (ha)**	**Area reserved (ha)**	**Percentage reserved (%)**
Acacia melanoxylon forest on flats	200	200	82.9	0	0	n/a
Acacia melanoxylon forest on rises	30	0	4.3	0	0	n/a
Allocasuarina verticillata forest	300	200	59.8	500	300	74.2
Banksia serrata woodland	0	0	n/a	0	0	n/a
Callidendrous and thamnic rainforest on fertile sites	25 000	21 000	85.2	600	600	94.2
Callitris rhomboidea forest	0	0	n/a	700	400	62.6
Huon Pine forest	0	0	n/a	0	0	n/a
King Billy pine forest	0	0	n/a	0	0	n/a
King Billy pine with deciduous beech	0	0	n/a	0	0	n/a
Leptospermum sp./Melaleuca squarrosa swamp forest	40	30	71.7	80	40	55.9
Melaleuca ericifolia forest	400	200	51.2	0	0	n/a
Notelaea ligustrina and/or *Pomaderris apetala* forest	20	10	70.1	20	20	100.0
Pencil pine forest	0	0	n/a	0	0	n/a
Pencil pine with deciduous beech	0	0	n/a	0	0	n/a
Silver wattle (*Acacia dealbata*) forest	19 000	9 000	46.7	2 000	1 000	47.9
Thamnic rainforest on less fertile sites	0	0	n/a	0	0	n/a
TOTAL	**460 000**	**227 000**	**49.3**	**433 000**	**192 000**	**44.4**

Table 1.1.c.4 ***Continued***

Table 1.1.c.4 Reservation status of native forest types by IBRA 4 biogeographic regions [(a)] *(continued)*						
RFA Forest Vegetation Community	**Midlands Region**			**Central Highlands Region**		
	Total area (ha)	**Area reserved (ha)**	**Percentage reserved (%)**	**Total area (ha)**	**Area reserved (ha)**	**Percentage reserved (%)**
Coastal *E. amygdalina* dry forest	3 000	800	27.2	300	200	73.0
Dry *E. delegatensis* forest	10 000	3 000	29.9	159 000	78 000	49.1
Dry *E. nitida* forest	10	0	0.0	6 000	5 000	98.1
Dry *E. obliqua* forest	13 000	4 000	29.2	6 000	2 000	28.7
E. amygdalina forest on dolerite	37 000	6 000	15.5	5 000	1 000	23.8
E. amygdalina forest on sandstone	4 000	1 000	27.7	50	0	0.0
E. morrisbyi forest	20	20	93.8	0	0	n/a
E. pauciflora on dolerite	400	0	0.0	16 000	5 000	28.3
E. pauciflora on sediments	1 000	200	19.1	12 000	7 000	54.7
E. pulchella/globulus/viminalis grassy shrubby dry forest	28 000	6 000	20.4	2 000	400	20.2
E. risdonii forest	400	200	47.7	0	0	n/a
E. rodwayi forest	100	40	35.9	6 000	700	11.5
E. sieberi forest on granite	0	0	n/a	0	0	n/a
E. sieberi on other substrates	0	0	n/a	0	0	n/a
E. tenuiramis on dolerite	0	0	n/a	10	0	0.0
E. tenuiramis on granite	0	0	n/a	0	0	n/a

Table 1.1.c.4 Reservation status of native forest types by IBRA 4 biogeographic regions [(a)] *(continued)*						
RFA Forest Vegetation Community	**Midlands Region**			**Central Highlands Region**		
	Total area (ha)	**Area reserved (ha)**	**Percentage reserved (%)**	**Total area (ha)**	**Area reserved (ha)**	**Percentage reserved (%)**
E. viminalis and/or *E. globulus* coastal shrubby forest	70	0	5.6	0	0	n/a
E. viminalis/ovata/amygdalina/obliqua damp forest	7 000	3 000	39.0	800	600	66.7
Furneaux *E. nitida* forest	0	0	n/a	0	0	n/a
Furneaux *E. viminalis* forest	0	0	n/a	0	0	n/a
Grassy *E. globulus* forest	3 000	1 000	35.9	0	0	n/a
Grassy *E. viminalis* forest	55 000	9 000	17.1	9 000	400	5.0
Inland *E. amygdalina* forest	18 000	6 000	33.4	0	0	n/a
Inland *E. tenuiramis* forest	33 000	9 000	26.8	17 000	3 000	20.9
Shrubby *E. ovata* forest	2 000	500	21.3	70	50	69.1
E. brookeriana wet forest	0	0	n/a	10	10	100.0
E. regnans forest	1 000	300	29.8	8 000	2 000	31.4
King Island *E. globulus/brookeriana/ viminalis* forest	0	0	n/a	0	0	n/a
Tall *E. delegatensis* forest	4 000	2 000	53.2	141 000	67 000	47.6
Tall *E. nitida* forest	0	0	n/a	2 000	2 000	98.4
Tall *E. obliqua* forest	8 000	3 000	35.5	13 000	5 000	39.1
Wet *E. viminalis* forest on basalt	50	0	0.0	400	30	7.5
E. coccifera dry forest	0	0	100.0	50 000	40 000	80.7

Table 1.1.c.4 Reservation status of native forest types by IBRA 4 biogeographic regions [(a)] *(continued)*

RFA Forest Vegetation Community	Midlands Region			Central Highlands Region		
	Total area (ha)	Area reserved (ha)	Percentage reserved (%)	Total area (ha)	Area reserved (ha)	Percentage reserved (%)
E. subcrenulata forest	10	10	100.0	4 000	4 000	98.9
Acacia melanoxylon forest on flats	0	0	n/a	0	0	n/a
Acacia melanoxylon forest on rises	0	0	n/a	200	100	77.8
Allocasuarina verticillata forest	300	50	18.8	0	0	n/a
Banksia serrata woodland	0	0	n/a	0	0	n/a
Callidendrous and thamnic rainforest on fertile sites	100	100	90.2	22 000	17 000	73.8
Callitris rhomboidea forest	0	0	n/a	0	0	n/a
Huon pine forest	0	0	n/a	0	0	n/a
King Billy pine forest	0	0	n/a	4 000	4 000	99.9
King Billy pine with deciduous beech	0	0	n/a	200	200	100.0
Leptospermum sp./Melaleuca squarrosa swamp forest	0	0	n/a	400	200	67.1
Melaleuca ericifolia forest	0	0	n/a	0	0	n/a
Notelaea ligustrina and/or *Pomaderris apetala* forest	30	30	79.5	0	0	0.0
Pencil pine forest	0	0	n/a	300	300	99.9
Pencil pine with deciduous beech	0	0	n/a	200	200	100.0
Silver wattle (*Acacia dealbata*) forest	2 000	900	48.8	7 000	4 000	58.7
Thamnic rainforest on less fertile sites	100	80	55.2	54 000	48 000	90.0

Table 1.1.c.4 Reservation status of native forest types by IBRA 4 biogeographic regions [(a)] *(continued)*						
RFA Forest Vegetation Community	**Midlands Region**			**Central Highlands Region**		
	Total area (ha)	**Area reserved (ha)**	**Percentage reserved (%)**	**Total area (ha)**	**Area reserved (ha)**	**Percentage reserved (%)**
TOTAL	**230 000**	**55 000**	**24.0**	**543 000**	**297 000**	**54.7**

Table 1.1.c.4 ***Continued***

Table 1.1.c.4 Reservation status of native forest types by IBRA 4 biogeographic regions [(a)] *(continued)*						
RFA Forest Vegetation Community	**West & South West Region**			**D'Entrecasteaux Region**		
	Total area (ha)	**Area reserved (ha)**	**Percentage reserved (%)**	**Total area (ha)**	**Area reserved (ha)**	**Percentage reserved (%)**
Coastal *E. amygdalina* dry forest	0	0	n/a	60	0	0.0
Dry *E. delegatensis* forest	6 000	6 000	97.6	8 000	7 000	91.1
Dry *E. nitida* forest	137 000	132 000	96.5	3 000	3 000	99.6
Dry *E. obliqua* forest	24 000	19 000	77.3	29 000	12 000	41.0
E. amygdalina forest on dolerite	0	0	n/a	200	10	3.6
E. amygdalina forest on sandstone	0	0	n/a	800	200	20.2
E. morrisbyi forest	0	0	n/a	0	0	n/a
E. pauciflora on dolerite	0	0	n/a	0	0	n/a
E. pauciflora on sediments	0	0	n/a	0	0	n/a
E. pulchella/globulus/viminalis grassy shrubby dry forest	0	0	n/a	10 000	3 000	25.2
E. risdonii forest	0	0	n/a	0	0	n/a
E. rodwayi forest	0	0	n/a	0	0	n/a
E. sieberi forest on granite	0	0	n/a	0	0	n/a
E. sieberi on other substrates	0	0	n/a	0	0	n/a
E. tenuiramis on dolerite	0	0	n/a	800	600	72.8
E. tenuiramis on granite	0	0	n/a	0	0	n/a

Table 1.1.c.4 Reservation status of native forest types by IBRA 4 biogeographic regions [(a)] *(continued)*

RFA Forest Vegetation Community	West & South West Region			D'Entrecasteaux Region		
	Total area (ha)	Area reserved (ha)	Percentage reserved (%)	Total area (ha)	Area reserved (ha)	Percentage reserved (%)
E. viminalis and/or *E. globulus* coastal shrubby forest	100	100	97.1	0	0	n/a
E. viminalis/ovata/amygdalina/obliqua damp forest	0	0	n/a	0	0	n/a
Furneaux *E. nitida* forest	0	0	n/a	0	0	n/a
Furneaux *E. viminalis* forest	0	0	n/a	0	0	n/a
Grassy *E. globulus* forest	0	0	n/a	400	200	44.2
Grassy *E. viminalis* forest	0	0	n/a	200	60	30.4
Inland *E. amygdalina* forest	0	0	n/a	0	0	n/a
Inland *E. tenuiramis* forest	0	0	n/a	1 000	200	19.3
Shrubby *E. ovata* forest	0	0	n/a	200	40	15.5
E. brookeriana wet forest	70	20	34.4	0	0	n/a
E. regnans forest	11 000	5 000	42.2	19 000	8 000	41.8
King Island *E. globulus/brookeriana/ viminalis* forest	0	0	n/a	0	0	n/a
Tall *E. delegatensis* forest	21 000	20 000	96.4	24 000	15 000	61.4
Tall *E. nitida* forest	67 000	66 000	98.6	2 000	2 000	98.4
Tall *E. obliqua* forest	79 000	60 000	76.2	105 000	50 000	47.4
Wet *E. viminalis* forest on basalt	0	0	n/a	0	0	n/a
E. coccifera dry forest	600	600	100.0	4 000	4 000	100.0

Table 1.1.c.4 Reservation status of native forest types by IBRA 4 biogeographic regions [(a)] *(continued)*

RFA Forest Vegetation Community	West & South West Region			D'Entrecasteaux Region		
	Total area (ha)	Area reserved (ha)	Percentage reserved (%)	Total area (ha)	Area reserved (ha)	Percentage reserved (%)
E. subcrenulata forest	2 000	2 000	100.0	4 000	4 000	98.7
Acacia melanoxylon forest on flats	800	400	48.6	0	0	n/a
Acacia melanoxylon forest on rises	5 000	4 000	80.4	0	0	n/a
Allocasuarina verticillata forest	0	0	n/a	0	0	n/a
Banksia serrata woodland	0	0	n/a	0	0	n/a
Callidendrous and thamnic rainforest on fertile sites	104 000	95 000	91.4	7 000	7 000	96.0
Callitris rhomboidea forest	0	0	n/a	0	0	n/a
Huon pine forest	9 000	8 000	85.1	40	40	97.5
King Billy pine forest	14 000	13 000	92.4	3 000	3 000	100.0
King Billy pine with deciduous beech	700	600	96.1	10	10	100.0
Leptospermum sp./Melaleuca squarrosa swamp forest	9 000	9 000	92.9	1 000	1 000	97.7
Melaleuca ericifolia forest	0	0	n/a	0	0	n/a
Notelaea ligustrina and/or *Pomaderris apetala* forest	100	100	99.4	50	40	98.7
Pencil pine forest	0	0	n/a	10	10	100.0
Pencil pine with deciduous beech	0	0	n/a	0	0	n/a
Silver wattle (*Acacia dealbata*) forest	600	400	66.3	4 000	700	19.4
Thamnic rainforest on less fertile sites	274 000	258 000	94.4	23 000	22 000	97.4

Table 1.1.c.4 Reservation status of native forest types by IBRA 4 biogeographic regions [(a)] *(continued)*						
RFA Forest Vegetation Community	**West & South West Region**			**D'Entrecasteaux Region**		
	Total area (ha)	**Area reserved (ha)**	**Percentage reserved (%)**	**Total area (ha)**	**Area reserved (ha)**	**Percentage reserved (%)**
TOTAL	**765 000**	**699 000**	**91.3**	**250 000**	**143 000**	**57.0**

(a) *Forest extent is as at the first quarter of 2015 and reserves are as at 30 June 2016*

Table 1.1.c.5 Change in reservation status of native forest types relative to their estimated 1750 extent [(a)]

Table 1.1.c.5 Change in reservation status of native forest types relative to their estimated 1750 extent [(a)]

RFA Forest Vegetation Community	Estimated 1750 Extent (ha)	Reserved as at 1996		Reserved as at 2016		Change in proportion of 1750 Extent reserved (percentage points)
		Area reserved (ha)	Percentage of 1750 Extent (%)	Area reserved (ha)	Percentage of 1750 Extent (%)	
Dry eucalypt forests						
Coastal *E. amygdalina* dry forest	358 000	33 000	9.1	90 000	25.2	16.1
Dry *E. delegatensis* forest	318 000	75 000	23.5	138 000	43.6	20.1
Dry *E. nitida* forest	174 000	121 000	69.3	148 000	85.1	15.8
Dry *E. obliqua* forest	258 000	37 000	14.3	77 000	29.7	15.4
E. amygdalina on dolerite	248 000	14 000	5.5	46 000	18.7	13.2
E. amygdalina on sandstone	114 000	2 000	1.6	11 000	9.9	8.3
E. morrisbyi forest	300	0	0.0	20	7.0	7.0
E. pauciflora on dolerite	28 000	2 000	8.4	6 000	19.9	11.5
E. pauciflora on sediments	31 000	4 000	12.4	8 000	25.6	13.2
E. pulchella/globulus/viminalis grassy shrubby dry forest	219 000	14 000	6.4	56 000	25.4	19.0
E. risdonii forest	500	200	33.4	200	35.6	2.2
E. rodwayi forest	12 000	300	2.3	900	7.5	5.2
E. sieberi forest on granite	19 000	2 000	11.3	11 000	58.6	47.3
E. sieberi on other substrates	52 000	6 000	12.1	27 000	50.9	38.8

Table 1.1.c.5 Change in reservation status of native forest types relative to their estimated 1750 extent [(a)]

RFA Forest Vegetation Community	Estimated 1750 Extent (ha)	Reserved as at 1996		Reserved as at 2016		Change in proportion of 1750 Extent reserved (percentage points)
		Area reserved (ha)	Percentage of 1750 Extent (%)	Area reserved (ha)	Percentage of 1750 Extent (%)	
E. tenuiramis on dolerite	9 000	4 000	40.1	7 000	78.3	38.2
E. tenuiramis on granite	3 000	1 000	41.1	3 000	87.8	46.7
E. viminalis and/or *E. globulus* coastal shrubby forest	5 000	300	6.0	400	9.5	3.5
E. viminalis/ovata/amygdalina/ obliqua damp sclerophyll forest	89 000	7 000	7.3	17 000	18.8	11.5
Furneaux *E. nitida* forest	41 000	6 000	13.7	20 000	49.9	36.2
Furneaux *E. viminalis* forest	200	0	0.0	100	58.9	58.9
Grassy *E. globulus* forest	29 000	4 000	14.8	8 000	27.4	12.6
Grassy *E. viminalis* forest	243 000	1 000	0.6	16 000	6.5	5.9
Inland *E. amygdalina* forest	77 000	1 000	1.8	8 000	9.9	8.1
Inland *E. tenuiramis* forest	124 000	3 000	2.6	13 000	10.7	8.1
Shrubby *E. ovata* forest	232 000	300	0.1	1 000	0.4	0.3
Wet eucalypt forests						
E. brookeriana wet forest	14 000	300	2.0	2 000	12.8	10.8
E. regnans forest	100 000	13 000	13.4	32 000	31.6	18.2
King Island *E. globulus/ brookeriana/viminalis* forest	58 000	100	0.2	900	1.5	1.3

Table 1.1.c.5 Change in reservation status of native forest types relative to their estimated 1750 extent [(a)]

RFA Forest Vegetation Community	Estimated 1750 Extent (ha)	Reserved as at 1996		Reserved as at 2016		Change in proportion of 1750 Extent reserved (percentage points)
		Area reserved (ha)	Percentage of 1750 Extent (%)	Area reserved (ha)	Percentage of 1750 Extent (%)	
Tall *E. delegatensis* forest	317 000	75 000	23.7	140 000	44.2	20.5
Tall *E. nitida* forest	87 000	64 000	73.3	72 000	82.5	9.2
Tall *E. obliqua* forest	607 000	76 000	12.5	189 000	31.1	18.6
Wet *E. viminalis* forest on basalt	78 000	300	0.4	900	1.2	0.8
Sub-alpine eucalypt forests						
E. coccifera dry forest	59 000	38 000	63.7	45 000	75.8	12.1
E. subcrenulata forest	11 000	9 000	80.3	10 000	95.7	15.4
Non-eucalypt forests						
Acacia melanoxylon on flats	16 000	1 000	6.0	3 000	19.8	13.8
Acacia melanoxylon on rises	20 000	1 000	6.5	6 000	29.7	23.2
Allocasuarina verticillata forest	4 000	500	15.1	800	23.5	8.4
Banksia serrata woodland	200	100	58.4	100	58.1	-0.3
Callidendrous and thamnic rainforest on fertile sites	213 000	87 000	40.7	158 000	74.5	33.8
Callitris rhomboidea forest	1 000	300	23.6	500	46.8	23.2
Huon pine forest	11 000	7 000	62.8	8 000	69.5	6.7
King Billy pine forest	20 000	17 000	82.6	19 000	95.3	12.7

Table 1.1.c.5 Change in reservation status of native forest types relative to their estimated 1750 extent [(a)]

RFA Forest Vegetation Community	Estimated 1750 Extent (ha)	Reserved as at 1996		Reserved as at 2016		Change in proportion of 1750 Extent reserved (percentage points)
		Area reserved (ha)	Percentage of 1750 Extent (%)	Area reserved (ha)	Percentage of 1750 Extent (%)	
King Billy pine with deciduous beech	800	700	82.9	800	96.5	13.6
Leptospermum sp./Melaleuca squarrosa swamp forest	41 000	9 000	21.0	12 000	29.0	8.0
Melaleuca ericifolia forest	20 000	200	1.1	400	2.0	0.9
Notelaea ligustrina and/or *Pomaderris apetala* forest	300	200	63.0	200	76.3	13.3
Pencil pine forest	700	300	49.7	300	49.7	0.0
Pencil pine with deciduous beech	300	200	64.0	200	64.0	0.0
Silver wattle (*Acacia dealbata*) forest	59 000	10 000	16.5	22 000	37.1	20.6
Thamnic rainforest on less fertile sites	401 000	232 000	57.8	343 000	85.5	27.7
TOTAL	**4 822 000**	**978 000**	**20.3**	**1 778 000**	**36.9**	**16.6**

(a) *Forest extent is as at the first quarter of 2015 and reserves are as at 30 June 2016*

Table 1.1.e .1 Old-growth community[a] by forest type and tenure[b] (hectares)

Table 1.1.e .1 Old-growth community[a] by forest type and tenure[b] (hectares)

RFA Old-growth forest community	Conservation & Public Reserves [c]	Permanent Timber Production Zone (PTPZ) land [d]	Other Publicly Managed Land [e]	Private Freehold Land	TOTAL	Area change since 1996
Dry eucalypt forests						
Coastal *E. amygdalina* dry sclerophyll forest	24,000	1,000	3,000	11,000	**39,000**	**-3.4%**
Dry *E. delegatensis* forest	44,000	9,000	12,000	10,000	**75,000**	**-6.3%**
Dry *E. nitida* forest	95,000	2,000	7,000	3,000	**107,000**	**-0.3%**
Dry *E. obliqua* forest	22,000	6,000	10,000	7,000	**45,000**	**-4.9%**
E. amygdalina forest on dolerite	13,000	2,000	5,000	9,000	**29,000**	**-4.2%**
E. amygdalina forest on sandstone	2,000	800	3,000	2,000	**7,000**	**-0.8%**
E. pauciflora on Jurassic dolerite	700	300	500	300	**2,000**	**-3.0%**
E. pauciflora on sediments	3,000	200	200	400	**4,000**	**-2.0%**
E. risdonii forest	0	0	0	10	**10**	**0.0%**
E. rodwayi forest	100	30	0	500	**700**	**-8.6%**
E. sieberi forest on granite	500	200	100	90	**900**	**-1.8%**
E. sieberi on other substrates	500	400	400	400	**2,000**	**-2.0%**
E. tenuiramis on dolerite	4,000	400	700	100	**5,000**	**-1.6%**
E. tenuiramis on granite	3,000	0	40	100	**3,000**	**-0.1%**
E. viminalis and/or *E. globulus* coastal shrubby forest	100	0	0	700	**900**	**-0.4%**
Grassy *E. globulus* forest	4,000	40	80	800	**5,000**	**-0.5%**
Grassy *E. viminalis* forest	800	100	30	7,000	**8,000**	**-6.7%**
Inland *E. amygdalina* forest	400	40	300	2,000	**3,000**	**-2.1%**
Inland *E. tenuiramis* forest	2,000	300	10	6,000	**8,000**	**-1.7%**
Shrubby *E. ovata* forest	200	0	30	300	**500**	**-3.5%**
E. pulchella/ *E. globulus*/ *E. viminalis* grassy shrubby dry sclerophyll forest	20,000	2,000	10,000	29,000	**62,000**	**-3.2%**
E. viminalis/ *E. ovata*/ *E. amygdalina*/ *E. obliqua* damp sclerophyll forest	1,000	500	300	300	**2,000**	**-7.4%**

Table 1.1.e .1 Old-growth community[(a)] by forest type and tenure[(b)] (hectares)						
Wet eucalypt forests						
E. brookeriana wet forest	60	50	200	300	**500**	**-20.7%**
E. regnans forest	7,000	3,000	1,000	300	**11,000**	**-15.8%**
Tall *E. delegatensis* forest	62,000	19,000	7,000	4,000	**92,000**	**-12.0%**
Tall *E. nitida* forest	48,000	300	900	90	**49,000**	**-0.2%**
Tall *E. obliqua* forest	47,000	14,000	12,000	2,000	**76,000**	**-9.0%**
Wet *E. viminalis* forest on basalt	100	10	0	20	**100**	**-1.8%**
Sub-alpine eucalypt forests						
E. coccifera dry forest	28,000	800	2,000	2,000	**32,000**	**-0.8%**
E. subcrenulata forest	7,000	60	40	0	**7,000**	**-0.8%**
Non-eucalypt forests						
Allocasuarina verticillata forest	500	0	60	400	**1,000**	**-1.0%**
Banksia serrata woodland	100	0	0	40	**200**	**-0.1%**
Callidendrous and thamnic rainforest on fertile sites	111,000	19,000	24,000	4,000	**158,000**	**-1.3%**
Callitris rhomboidea forest	300	0	90	200	**600**	**-1.8%**
Huon Pine forest	7,000	300	30	10	**8,000**	**0.5%**
King Billy Pine forest	16,000	600	900	10	**17,000**	**0.0%**
King Billy Pine with deciduous beech	300	10	20	0	**400**	**0.0%**
Leptospermum sp./*Melaleuca squarrosa* swamp forest	9,000	500	200	200	**10,000**	**-1.9%**
Melaleuca ericifolia forest	200	0	60	50	**300**	**0.0%**
Notelaea ligustrina and/or *Pomaderris apetala* forest	200	20	0	20	**300**	**-2.1%**
Pencil Pine forest	300	0	0	0	**300**	**0.0%**
Pencil Pine with deciduous beech	200	0	0	0	**200**	**0.0%**
Thamnic rainforest on less fertile sites	278,000	20,000	31,000	5,000	**334,000**	**-0.5%**
Grand Total	**863,000**	**103,000**	**133,000**	**107,000**	**1,206,000**	**-3.2%**

(a) Old-growth forest extent as at 30th June 2016 on publicly-managed land, and 31st December 2015 on private land.

(b) Tenure as at 30th June, 2016.
(c) Nature Conservation Act and Crown Lands Act.
(d) Forest Management Act, 2013.
(e) Publicly-managed land includes land managed by Public Authorities.

Table 1.1.e.2 Old-growth (a) by forest type and reserve type [(b)] (hectares)

Table 1.1.e.2 Old-growth (a) by forest type and reserve type [(b)] (hectares)						
RFA old-growth forest community	**Reserve Type**					
	Public land				**Private land**	
	Dedicated formal reserve	**Other formal reserve** (c)	**Informal Reserve**	**Other publicly managed land** (d)	**Private CAR reserve**	**Other private land**
Dry eucalypt forest						
Coastal *E. amygdalina* dry sclerophyll forest	23 000	3 000	900	1 000	10 000	39 000
Dry *E. delegatensis* forest	44 000	16 000	5 000	800	9 000	75 000
Dry *E. nitida* forest	95 000	8 000	1 000	80	3 000	107 000
Dry *E. obliqua* forest	22 000	12 000	3 000	700	6 000	45 000
E. amygdalina forest on dolerite	13 000	7 000	500	1 000	7 000	29 000
E. amygdalina forest on sandstone	2 000	3 000	600	200	1 000	7 000
E. pauciflora on Jurassic dolerite	700	700	100	0	300	2 000
E. pauciflora on sediments	3 000	70	300	0	400	4 000
E. risdonii forest	0	0	0	0	10	10
E. rodwayi forest	100	10	20	30	500	700
E. sieberi forest on granite	500	300	30	10	80	900
E. sieberi on other substrates	500	600	200	30	400	2 000
E. tenuiramis on dolerite	4 000	900	200	0	100	5 000
E. tenuiramis on granite	3 000	60	40	0	100	3 000
E. viminalis and/or *E. globulus* coastal shrubby forest	100	20	10	40	700	900
Grassy *E. globulus* forest	4 000	100	20	200	600	5 000
Grassy *E. viminalis* forest	800	100	50	1 000	6 000	8 000
Inland *E. amygdalina* forest	400	200	200	400	2 000	3 000
Inland *E. tenuiramis* forest	2 000	200	80	1 000	4 000	8 000
Shrubby *E. ovata* forest	100	20	10	20	300	500
E. pulchella / *E. globulus* / *E. viminalis* grassy shrubby dry sclerophyll forest	20 000	11 000	1 000	5 000	24 000	62 000

Table 1.1.e.2 Old-growth (a) by forest type and reserve type [(b)] (hectares)						
RFA old-growth forest community	**Reserve Type**					
	Public land				**Private land**	
	Dedicated formal reserve	**Other formal reserve** [(c)]	**Informal Reserve**	**Other publicly managed land** [(d)]	**Private CAR reserve**	**Other private land**
E. viminalis / *E. ovata* / *E. amygdalina* / *E. obliqua* damp sclerophyll forest	1 000	600	200	30	200	2 000
Wet eucalypt forests						
E. brookeriana wet forest	50	200	50	70	200	500
E. regnans forest	7 000	2 000	2 000	10	300	11 000
Tall *E. delegatensis* forest	62 000	13 000	13 000	800	3 000	92 000
Tall *E. nitida* forest	48 000	1 000	200	10	80	49 000
Tall *E. obliqua* forest	47 000	17 000	10 000	500	2 000	76 000
Wet *E. viminalis* forest on basalt	100	0	10	0	20	100
Sub-alpine eucalypt forests						
E. coccifera dry forest	28 000	2 000	1 000	60	2 000	32 000
E. subcrenulata forest	7 000	100	10	0	0	7 000
Non-eucalypt forests						
Allocasuarina verticillata forest	500	10	50	200	200	1 000
Banksia serrata woodland	100	0	0	0	40	200
Callidendrous and thamnic rainforest on fertile sites	111 000	31 000	12 000	1 000	3 000	158 000
Callitris rhomboidea forest	300	90	0	10	200	600
Huon Pine forest	7 000	50	300	10	0	8 000
King Billy Pine forest	16 000	1 000	200	10	0	17 000
King Billy Pine with deciduous beech	300	20	10	0	0	400
Leptospermum sp./*Melaleuca squarrosa* swamp forest	9 000	200	500	40	200	10 000
Melaleuca ericifolia forest	200	0	60	0	50	300

Table 1.1.e.2 Old-growth (a) by forest type and reserve type [(b)] (hectares)						
RFA old-growth forest community	**Reserve Type**					
	Public land				**Private land**	
	Dedicated formal reserve	**Other formal reserve** (c)	**Informal Reserve**	**Other publicly managed land** (d)	**Private CAR reserve**	**Other private land**
Notelaea ligustrina and/or *Pomaderris apetala* forest	200	0	20	0	20	300
Pencil Pine forest	300	0	0	0	0	300
Pencil Pine with deciduous beech	200	0	0	0	0	200
Thamnic rainforest on less fertile sites	278 000	38 000	13 000	1 000	3 000	334 000
Grand Total	**862 000**	**169 000**	**67 000**	**17 000**	**90 000**	**1 206 000**

(a) Old-growth forest extent as at 30th June 2016 on publicly-managed land, and 31st December 2015 on private land.
(b) RFA reservation as at 30th June, 2016.
(c) Subject to mining.
(d) Publicly-managed land includes land managed by Public Authorities.

Table 1.1.e.3 Change in reservation [(a)] status of old-growth [(b)] by forest type

Table 1.1.e.3 Change in reservation [(a)] status of old-growth [(b)] by forest type				
RFA old-growth forest community	**Extent of old-growth** (hectares)		**Percentage of old-growth now in reserves**	**Increase in old-growth reserved since RFA (1996)** (percentage points)
	Total area	**Total area in CAR reserves**		
Dry eucalypt forest				
Coastal *E. amygdalina* dry sclerophyll forest	407 000	316 000	77.5%	40.8%
Dry *E. delegatensis* forest	39 000	28 000	72.3%	30.8%
Dry *E. nitida* forest	75 000	61 000	81.0%	16.3%
Dry *E. obliqua* forest	107 000	103 000	95.9%	38.0%
E. amygdalina forest on dolerite	45 000	35 000	78.7%	54.1%
E. amygdalina forest on sandstone	29 000	21 000	73.1%	59.1%
E. pauciflora on Jurassic dolerite	7 000	5 000	69.7%	27.0%
E. pauciflora on sediments	2 000	1 000	75.6%	19.0%
E. risdonii forest	4 000	3 000	82.2%	0.6%
E. rodwayi forest	10	0	8.0%	10.9%
E. sieberi forest on granite	700	200	26.9%	68.9%
E. sieberi on other substrates	900	800	87.4%	45.1%
E. tenuiramis on dolerite	2 000	1 000	64.1%	53.0%
E. tenuiramis on granite	5 000	5 000	92.9%	49.9%
E. viminalis and/or *E. globulus* coastal shrubby forest	3 000	3 000	93.9%	4.1%
Grassy *E. globulus* forest	900	200	18.5%	32.5%
Grassy *E. viminalis* forest	5 000	4 000	87.7%	21.7%
Inland *E. amygdalina* forest	8 000	2 000	27.9%	28.8%
Inland *E. tenuiramis* forest	3 000	900	33.9%	33.0%
Shrubby *E. ovata* forest	8 000	3 000	43.3%	16.7%
E. pulchella/ *E. globulus*/ *E. viminalis* grassy shrubby dry sclerophyll forest	500	200	41.0%	43.7%
E. viminalis/ *E. ovata*/ *E. amygdalina*/ *E. obliqua* damp sclerophyll forest	62 000	36 000	58.0%	54.8%
Wet eucalypt forests				
E. brookeriana wet forest	500	300	54.3%	48.7%

Table 1.1.e.3 Change in reservation [a] status of old-growth [b] by forest type				
RFA old-growth forest community	**Extent of old-growth** (hectares)		**Percentage of old-growth now in reserves**	**Increase in old-growth reserved since RFA (1996)** (percentage points)
	Total area	**Total area in CAR reserves**		
E. regnans forest	11 000	9000	84.2%	47.3%
Tall *E. delegatensis* forest	92 000	76 000	83.0%	34.3%
Tall *E. nitida* forest	49 000	49 000	99.5%	8.2%
Tall *E. obliqua* forest	76 000	64 000	84.6%	50.0%
Wet *E. viminalis* forest on basalt	100	100	72.9%	28.8%
Sub-alpine eucalypt forests				
E. coccifera dry forest	32 000	29 000	91.1%	12.4%
E. subcrenulata forest	7 000	7 000	99.9%	12.4%
Non-eucalypt forests				
Allocasuarina verticillata forest	1 000	700	71.0%	71.0%
Banksia serrata woodland	200	100	73.6%	-0.2%
Callidendrous and thamnic rainforest on fertile sites	158 000	143 000	90.4%	40.8%
Callitris rhomboidea forest	600	400	62.3%	24.0%
Huon Pine forest	8 000	7 000	96.6%	8.7%
King Billy Pine forest	17 000	17 000	98.6%	10.3%
King Billy Pine with deciduous beech	400	400	97.4%	5.7%
Leptospermum sp./*Melaleuca squarrosa* swamp forest	10 000	9 000	92.6%	16.1%
Melaleuca ericifolia forest	300	200	65.1%	55.6%
Notelaea ligustrina and/or *Pomaderris apetala* forest	300	200	85.2%	15.1%
Pencil Pine forest	300	300	99.9%	0.0%
Pencil Pine with deciduous beech	200	200	100.0%	0.0%
Thamnic rainforest on less fertile sites	334 000	318 000	95.0%	28.5%
Grand Total	**1 206 000**	**1 048 000**	**86.9%**	**32.2%**

(a) RFA reservation as at 30th June, 2016.

(b) Old-growth forest extent as at 30th June 2016 on publicly-managed land, and 31st December 2015 on private land.

APPENDIX 1.2.a: FOREST DWELLING SPECIES

Table 1.2.a.1 Forest Dwelling Vertebrate Fauna

Table 1.2.a.1 Forest Dwelling Vertebrate Fauna									
Class	**Species**	**Common name**	If sensitive are recovery or similar plans being implemented		widespread	Vulnerable (a)	Rare a)	Endangered a)	presumed
Fish									
	Galaxias brevipinnis	Climbing Galaxias			Y				
	Galaxias johnstoni	Clarence Galaxias	Y	Recovery plan				Y	
	Galaxias maculatus	Jollytail			Y				
	Galaxias truttaceus	Spotted Galaxias							
	Galaxias auratus	Golden Galaxias		Recovery plan			Y		
	Galaxias tanycephalus	Saddled Galaxias	Y	Recovery plan		Y			
	Galaxias fontanus	Swan Galaxias	Y	Recovery plan				Y	
	Paragalaxias mesotes	Arthurs Paragalaxias		Recovery plan				Y	
	Galaxiella pusilla	Dwarf Galaxias		Recovery plan			Y		
	Prototroctes maraena	Australian Grayling		Recovery plan				Y	

Table 1.2.a.1 Forest Dwelling Vertebrate Fauna									
Class	**Species**	**Common name**	If sensitive are recovery or similar plans being implemented		widespread	Vulnerable (a)	Rare a)	Endangered a)	presumed
	Gadopsis marmoratus	Blackfish			Y				
Amphibians									
	Litoria ewingi	Brown Tree Frog			Y				
	Litoria burrowsi	Tasmanian Tree Frog							
	Litoria raniformis	Green and Golden frog	Y	Recovery plan		Y			
	Crinia tasmaniensis	Tasmanian Froglet			Y				
	Geocrinia laevis	Tasmanian Smooth Frog			Y				
	Crinia signifera	Brown Froglet			Y				
	Pseudophryne semimarmorata	Southern Toadlet			Y				
	Limnodynastes peroni	Perons Marsh Frog						Y	
	Limnodynastes tasmaniensis	Spotted Grass Frog			Y				
Reptiles									
	Lampropholis delicata	Delicate Grass Skink			Y				
	Pseudemoia entrecasteauxii	Southern Grass Skink			Y				
	Pseudemoia pagenstecheri	Tussock Skink				Y			
	Pseudemoia rawlinsoni	Glossy Grass Skink					Y		

Table 1.2.a.1 Forest Dwelling Vertebrate Fauna									
Class	**Species**	**Common name**	If sensitive are recovery or similar plans being implemented		widespread	Vulnerable (a)	Rare a)	Endangered a)	presumed
	Niveoscincus metallicus	Metallic Skink			Y				
	Niveoscincus ocellatus	Ocellated Skink			Y				
	Niveoscincus pretiosus	Tasmanian Tree Skink			Y				
	Bassiana duperryi	Three-lined Skink			Y				
	Egernia whitei	White's Skink			Y				
	Cyclodomorphus casuarinae	She-oak Skink			Y				
	Tiliqua nigrolutea	Blotched Blue-tongue			Y				
	Tympanocryptis diemensis	Mountain Dragon			Y				
	Austrelaps superbus	Copperhead Snake			Y				
	Notechis ater	Tiger Snake			Y				
	Drysdalia coronoides	White-lipped Snake			Y				
Birds									
	Accipiter fasciatus	Brown Goshawk			Y				
	Accipiter cirrhocephalus	Collared Sparrowhawk			Y				
	Accipiter novaehollandiae	Grey Goshawk						Y	
	Haliaeetus leucogaster	White-bellied Sea Eagle	Y	Recovery plan		Y			

Table 1.2.a.1 Forest Dwelling Vertebrate Fauna									
Class	**Species**	**Common name**	If sensitive are recovery or similar plans being implemented		widespread	Vulnerable (a)	Rare a)	Endangered a)	presumed
	Aquila audax	Wedge-tailed Eagle	Y	Recovery plan				Y	
	Falco peregrinus	Peregrine Falcon			Y				
	Falco berigora	Brown Falcon			Y				
	Coturnix ypsilophorus	Brown Quail			Y				
	Turnix varia	Painted Button-quail			Y				
	Phaps chalcoptera	Common Bronzewing			Y				
	Phaps elegans	Brush Bronzewing			Y				
	Calyptorhynchus funereus	Yellow-tailed Black Cockatoo			Y				
	Cacatua galerita	Sulphur-crested Cockatoo			Y				
	Glossopsitta concinna	Musk Lorikeet			Y				
	Pezoporus wallicus	Ground Parrot			Y				
	Lathamus discolor	Swift Parrot	Y	Recovery plan				Y	
	Platycercus caledonicus	Green Rosella			Y				
	Platycercus caledonicus brownii	King Island Green Rosella				Y			
	Platycercus eximius	Eastern Rosella			Y				
	Neophema chrysostoma	Blue-winged Parrot			Y				

Table 1.2.a.1 Forest Dwelling Vertebrate Fauna									
Class	**Species**	**Common name**	If sensitive are recovery or similar plans being implemented		widespread	Vulnerable (*a*)	Rare *a*)	Endangered *a*)	presumed
	Neophema chrysogaster	Orange-bellied Parrot	Y	Recovery plan				Y	
	Cuculus pallidus	Pallid Cuckoo			Y				
	Cacomantis flabelliformis	Fan-tailed Cuckoo			Y				
	Chrysococcyx basalis	Horsefield's Bronze Cuckoo			Y				
	Chrysococcyx lucidus	Shining Bronze Cuckoo			Y				
	Ninox novaeseelandiae	Southern Boobook			Y				
	Tyto novaehollandiae	Masked Owl						Y	
	Podargus strigoides	Tawny Frogmouth			Y				
	Aaegotheles cristatus	Australian Owlet-nightjar			Y				
	Alcedo azurea	Azure Kingfisher						Y	
	Hirundo nigricans	Tree Martin			Y				
	Anthus novaeseelandiae	Richards Pipit			Y				
	Coracina novaehollandiae	Black Faced Cuckoo Shrike			Y				
	Zoothera lunulata	Bassian Thrush			Y				
	Petroica rodinogaster	Pink Robin			Y				
	Petroica phoenicea	Flame Robin			Y				

Table 1.2.a.1 Forest Dwelling Vertebrate Fauna									
Class	**Species**	**Common name**	If sensitive are recovery or similar plans being implemented		widespread	Vulnerable (a)	Rare a)	Endangered a)	presumed
	Petroica multicolor	Scarlet Robin			Y				
	Melanodryas vittata	Dusky Robin			Y				
	Pachycephala olivacea	Olive Whistler			Y				
	Pachycephala pectoralis	Golden Whistler			Y				
	Colluricincla harmonica	Grey Shrike Thrush			Y				
	Myiagra cyanoleuca	Satin Flycatcher			Y				
	Rhipidura fuliginosa	Grey Fantail			Y				
	Cinclosoma punctatum	Spotted Quail-thrush			Y				
	Malurus cyaneus	Superb Fairy-wren			Y				
	Sericornis frontalis	White-browed Scrubwren			Y				
	Acanthornis magnus	Scrubtit			Y				
	Acanthornis magnus greenianus	King Island Scrubtit						Y	
	Acanthiza pusilla	Brown Thornbill			Y				
	Acanthiza pusilla archibaldi	King Island thornbill						Y	
	Acanthiza ewingii	Tasmanian Thornbill			Y				
	Anthochaera paradoxa	Yellow Wattlebird			Y				
	Anthochaera chrysoptera	Little Wattlebird			Y				

Table 1.2.a.1 Forest Dwelling Vertebrate Fauna									
Class	**Species**	**Common name**	If sensitive are recovery or similar plans being implemented		widespread	Vulnerable (a)	Rare a)	Endangered a)	presumed
	Lichenostomus flavicollis	Yellow-throated Honeyeater			Y				
	Melithreptus validirostris	Strong-billed Honeyeater			Y				
	Melithreptus affinis	Black-headed Honeyeater			Y				
	Phylidonyris pyrrhoptera	Crescent Honeyeater			Y				
	Phylidonryis novaehollandiae	New Holland Honeyeater			Y				
	Acanthorhynchus tenuirostris	Eastern Spinebill			Y				
	Pardalotus punctatus	Spotted Pardalote			Y				
	Pardalotus quadragintus	Forty-spotted Pardalote		Recovery Plan				Y	
	Pardalotus striatus	Striated Pardalote			Y				
	Zosterops lateralis	Silvereye			Y				
	Stagonopleura bella	Beautiful Firetail			Y				
	Artamus cyanopterus	Dusky Woodswallow			Y				
	Cracticus torquatus	Grey Butcherbird			Y				
	Strepera fuliginosa	Black Currawong			Y				
	Strepera versicolor	Grey Currawong			Y				
	Corvus tasmanicus	Forest Raven			Y				

Table 1.2.a.1 Forest Dwelling Vertebrate Fauna									
Class	**Species**	**Common name**	If sensitive are recovery or similar plans being implemented		widespread	Vulnerable (*a*)	Rare *a*)	Endangered *a*)	presumed
Mammals									
	Tachyglossus aculeatus	Echidna			Y				
	Ornithorhynchus anatinus	Platypus			Y				
	Macropus giganteus	Forester kangaroo			Y				
	Macropus rufogriseus	Bennetts Wallaby			Y				
	Thylogale billardierii	Tasmanian Pademelon			Y				
	Bettongia gaimardi	Tasmanian Bettong			Y				
	Potorous tridactylus	Long-nosed Potoroo			Y				
	Trichosurus vulpecula	Common Brush-tail Possum			Y				
	Pseudocheirus peregrinus	Common Ringtail Possum			Y				
	Petaurus breviceps	Sugar Glider			Y				
	Cercartetus nanus	Eastern Pygmy-possum			Y				
	Cercartetus lepidus	Little Pygmy-possum			Y				
	Vombatus ursinus	Common Wombat			Y				
	Vombatus ursinus ursinus	Common Wombat (Bass Strait)				Y			
	Isoodon obesulus	Southern Brown Bandicoot			Y				
	Perameles gunnii	Eastern Barred-bandicoot	Y	Recovery		Y			

Table 1.2.a.1 Forest Dwelling Vertebrate Fauna									
Class	**Species**	**Common name**	If sensitive are recovery or similar plans being implemented		widespread	Vulnerable (a)	Rare a)	Endangered a)	presumed
				plan					
	Dasyurus maculatus	Spotted-tailed Quoll					Y		
	Dasyurus viverrinus	Eastern Quoll			Y				
	Sarcophilus harrisii	Tasmanian Devil				Y			
	Antechinus swainsonii	Dusky Antechinus			Y				
	Antechinus minimus	Swamp Antechinus			Y				
	Sminthopsis leucopus	White-footed Dunnart			Y				
	Rattus lutreolus	Swamp Rat			Y				
	Pseudomys higginsi	Long-tailed Mouse			Y				
	Pseudomys novaehollandiae	New Holland Mouse						Y	
	Vespadelus vulturnus	Small Forest Vespadelus			Y				
	Vespadelus regulus	King River Vespadelus			Y				
	Vespadelus darlingtoni	Large Forest Vespadelus			Y				
	Nyctophilus geoffroyi	Lesser Long-eared Bat			Y				
	Nyctophilus timoriensis sherrini	Greater Long-eared Bat			Y				
	Chalinolobus morio	Chocolate Wattled Bat			Y				
	Chalinolobus gouldii	Gould's Wattled Bat			Y				

Table 1.2.a.1 Forest Dwelling Vertebrate Fauna									
Class	**Species**	**Common name**	If sensitive are recovery or similar plans being implemented		widespread	Vulnerable (a)	Rare a)	Endangered a)	presumed
	Falsistrellus tasmaniensis	Tasmanian Pipistrelle			Y				

a) listing status may refer to either EPBC Act or TSPA

Table 1.2.a.2 Forest dwelling plant species

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Mimosaceae	*Acacia axillaris*	midlands wattle	v
Dicotyledon	Mimosaceae	*Acacia dealbata* subsp. *dealbata*	silver wattle	
Dicotyledon	Mimosaceae	*Acacia derwentiana*	derwent wattle	
Dicotyledon	Mimosaceae	*Acacia genistifolia*	spreading wattle	
Dicotyledon	Mimosaceae	*Acacia gunnii*	ploughshare wattle	
Dicotyledon	Mimosaceae	*Acacia implexa*	hickory wattle	
Dicotyledon	Mimosaceae	*Acacia leprosa* var. *graveolens*	varnish wattle	
Dicotyledon	Mimosaceae	*Acacia mearnsii*	black wattle	
Dicotyledon	Mimosaceae	*Acacia melanoxylon*	blackwood	
Dicotyledon	Mimosaceae	*Acacia mucronata* subsp. *dependens*	blunt caterpillar wattle	
Dicotyledon	Mimosaceae	*Acacia mucronata* subsp. *longifolia*	longleaf caterpillar wattle	
Dicotyledon	Mimosaceae	*Acacia mucronata* subsp. *mucronata*	erect caterpillar wattle	
Dicotyledon	Mimosaceae	*Acacia myrtifolia*	redstem wattle	
Dicotyledon	Mimosaceae	*Acacia pataczekii*	wallys wattle	r
Dicotyledon	Mimosaceae	*Acacia riceana*	arching wattle	
Dicotyledon	Mimosaceae	*Acacia siculiformis*	dagger wattle	r
Dicotyledon	Mimosaceae	*Acacia* sp. Sugarloaf	sugarloaf wattle	
Dicotyledon	Mimosaceae	*Acacia stricta*	hop wattle	
Dicotyledon	Mimosaceae	*Acacia suaveolens*	sweet wattle	
Dicotyledon	Mimosaceae	*Acacia terminalis*	sunshine wattle	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Mimosaceae	*Acacia ulicifolia*	juniper wattle	r
Dicotyledon	Mimosaceae	*Acacia uncifolia*	coast wirilda	r
Dicotyledon	Mimosaceae	*Acacia verticillata* subsp. *verticillata*	prickly moses	
Dicotyledon	Rosaceae	*Acaena echinata*	sheepsburr	
Dicotyledon	Rosaceae	*Acaena novae-zelandiae*	common buzzy	
Dicotyledon	Rosaceae	*Acaena ovina*	downy sheepsburr	
Dicotyledon	Rutaceae	*Acradenia frankliniae*	whitey wood	
Dicotyledon	Epacridaceae	*Acrothamnus hookeri*	mountain beardheath	
Dicotyledon	Epacridaceae	*Acrotriche serrulata*	ants delight	
Dicotyledon	Proteaceae	*Agastachys odorata*	fragrant candlebush	
Dicotyledon	Lamiaceae	*Ajuga australis*	australian bugle	
Dicotyledon	Asteraceae	*Allittia cardiocarpa*	swamp daisy	
Dicotyledon	Casuarinaceae	*Allocasuarina crassa*	cape pillar sheoak	r
Dicotyledon	Casuarinaceae	*Allocasuarina duncanii*	conical sheoak	r
Dicotyledon	Casuarinaceae	*Allocasuarina littoralis*	black sheoak	
Dicotyledon	Casuarinaceae	*Allocasuarina monilifera*	necklace sheoak	
Dicotyledon	Casuarinaceae	*Allocasuarina paludosa*	scrub sheoak	
Dicotyledon	Casuarinaceae	*Allocasuarina verticillata*	drooping sheoak	
Dicotyledon	Casuarinaceae	*Allocasuarina zephyrea*	western sheoak	
Dicotyledon	Fabaceae	*Almaleea subumbellata*	wiry bushpea	
Dicotyledon	Amaranthaceae	*Alternanthera denticulata*	lesser joyweed	e

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Euphorbiaceae	*Amperea xiphoclada* var. *xiphoclada*	broom spurge	
Dicotyledon	Cunoniaceae	*Anodopetalum biglandulosum*	horizontal	
Dicotyledon	Escalloniaceae	*Anopterus glandulosus*	tasmanian laurel	
Dicotyledon	Fabaceae	*Aotus ericoides*	golden pea	
Dicotyledon	Asteraceae	*Apalochlamys spectabilis*	sticky firebush	
Dicotyledon	Epacridaceae	*Archeria eriocarpa*	hairy rainforest-heath	
Dicotyledon	Epacridaceae	*Archeria hirtella*	smooth rainforest-heath	
Dicotyledon	Asteraceae	*Argentipallium dealbatum*	white everlasting	
Dicotyledon	Asteraceae	*Argentipallium obtusifolium*	blunt everlasting	
Dicotyledon	Elaeocarpaceae	*Aristotelia peduncularis*	heartberry	
Dicotyledon	Rubiaceae	*Asperula conferta*	common woodruff	
Dicotyledon	Rubiaceae	*Asperula minima*	mossy woodruff	r
Dicotyledon	Rubiaceae	*Asperula oblanceolata*		
Dicotyledon	Rubiaceae	*Asperula scoparia* subsp. *scoparia*	prickly woodruff	r
Dicotyledon	Rubiaceae	*Asperula subsimplex*	water woodruff	r
Dicotyledon	Malvaceae	*Asterotrichion discolor*	tasmanian currajong	
Dicotyledon	Epacridaceae	*Astroloma humifusum*	native cranberry	
Dicotyledon	Epacridaceae	*Astroloma pinifolium*	pine heath	
Dicotyledon	Monimiaceae	*Atherosperma moschatum* subsp. *moschatum*	sassafras	
Dicotyledon	Urticaceae	*Australina pusilla* subsp. *muelleri*	shade nettle	r

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Urticaceae	*Australina pusilla* subsp. *pusilla*	small shade nettle	
Dicotyledon	Boraginaceae	*Austrocynoglossum latifolium*	forest houndstongue	r
Dicotyledon	Brassicaceae	*Ballantinia antipoda*	southern shepherds purse	x
Dicotyledon	Proteaceae	*Banksia marginata*	silver banksia	
Dicotyledon	Proteaceae	*Banksia serrata*	saw banksia	r
Dicotyledon	Brassicaceae	*Barbarea australis*	riverbed wintercress	e
Dicotyledon	Cunoniaceae	*Bauera rubioides*	wiry bauera	
Dicotyledon	Asteraceae	*Bedfordia arborescens*	tree blanketleaf	v
Dicotyledon	Asteraceae	*Bedfordia linearis* subsp. *linearis*	slender blanketleaf	
Dicotyledon	Asteraceae	*Bedfordia linearis* subsp. *oblongifolia* var. *curvifolia*	curved blanketleaf	
Dicotyledon	Asteraceae	*Bedfordia linearis* subsp. *oblongifolia* var. *oblongifolia*	blunt blanketleaf	
Dicotyledon	Asteraceae	*Bedfordia linearis x salicina*		
Dicotyledon	Asteraceae	*Bedfordia salicina*	tasmanian blanketleaf	
Dicotyledon	Proteaceae	*Bellendena montana*	mountain rocket	
Dicotyledon	Euphorbiaceae	*Bertya tasmanica* subsp. *tasmanica*	tasmanian bertya	e
Dicotyledon	Euphorbiaceae	*Beyeria viscosa*	pinkwood	
Dicotyledon	Pittosporaceae	*Billardiera longiflora*	purple appleberry	
Dicotyledon	Pittosporaceae	*Billardiera macrantha*	highland appleberry	
Dicotyledon	Pittosporaceae	*Billardiera mutabilis*	green appleberry	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Pittosporaceae	*Billardiera nesophila*	coastal appleberry	
Dicotyledon	Pittosporaceae	*Billardiera viridiflora*	north-west applebery	
Dicotyledon	Rutaceae	*Boronia anemonifolia* subsp. *variabilis*	stinky boronia	
Dicotyledon	Rutaceae	*Boronia citriodora* subsp. *citriodora*	central lemon boronia	
Dicotyledon	Rutaceae	*Boronia citriodora* subsp. *paulwilsonii*	leggy lemon boronia	
Dicotyledon	Rutaceae	*Boronia gunnii*	river boronia	v
Dicotyledon	Rutaceae	*Boronia hemichiton*	mt arthur boronia	e
Dicotyledon	Rutaceae	*Boronia hippopala*	velvet boronia	v
Dicotyledon	Rutaceae	*Boronia nana* var. *hyssopifolia*	simple-leaf dwarf boronia	
Dicotyledon	Rutaceae	*Boronia parviflora*	swamp boronia	
Dicotyledon	Rutaceae	*Boronia pilosa* subsp. *pilosa*	hairy boronia	
Dicotyledon	Rutaceae	*Boronia pilosa* subsp. *tasmanensis*	tasman hairy boronia	
Dicotyledon	Rutaceae	*Boronia rhomboidea*	broadleaf boronia	
Dicotyledon	Fabaceae	*Bossiaea cinerea*	showy bossia	
Dicotyledon	Fabaceae	*Bossiaea cordifolia*	western showy bossiaea	
Dicotyledon	Fabaceae	*Bossiaea cordigera*	wiry bossia	
Dicotyledon	Fabaceae	*Bossiaea heterophylla*	variable bossiaea	
Dicotyledon	Fabaceae	*Bossiaea prostrata*	creeping bossia	
Dicotyledon	Fabaceae	*Bossiaea riparia*	leafless bossia	
Dicotyledon	Fabaceae	*Bossiaea tasmanica*	spiny bossiaea	r
Dicotyledon	Epacridaceae	*Brachyloma ciliatum*	fringed heath	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Epacridaceae	*Brachyloma depressum*	spreading heath	r
Dicotyledon	Asteraceae	*Brachyscome aculeata*	hill daisy	
Dicotyledon	Asteraceae	*Brachyscome perpusilla*	tiny daisy	r
Dicotyledon	Asteraceae	*Brachyscome radicata*	spreading daisy	r
Dicotyledon	Asteraceae	*Brachyscome rigidula*	cutleaf daisy	v
Dicotyledon	Brunoniaceae	*Brunonia australis*	blue pincushion	r
Dicotyledon	Pittosporaceae	*Bursaria spinosa* subsp. *spinosa*	prickly box	
Dicotyledon	Portulacaceae	*Calandrinia calyptrata*	pink purslane	
Dicotyledon	Portulacaceae	*Calandrinia eremaea*	small purslane	
Dicotyledon	Portulacaceae	*Calandrinia granulifera*	pygmy purslane	r
Dicotyledon	Convolvulaceae	*Calystegia marginata*	forest bindweed	e
Dicotyledon	Convolvulaceae	*Calystegia sepium*	swamp bindweed	r
Dicotyledon	Myrtaceae	*Calytrix tetragona*	common fringemyrtle	
Dicotyledon	Brassicaceae	*Cardamine astoniae*	spreading bittercress	
Dicotyledon	Brassicaceae	*Cardamine lilacina*	lilac bittercress	
Dicotyledon	Brassicaceae	*Cardamine paucijuga*	annual bittercress	
Dicotyledon	Asteraceae	*Cassinia aculeata* subsp. *aculeata*	common dollybush	
Dicotyledon	Asteraceae	*Cassinia rugata*	wrinkled dollybush	e
Dicotyledon	Asteraceae	*Cassinia trinerva*	veined dollybush	
Dicotyledon	Lauraceae	*Cassytha melantha*	large dodderlaurel	
Dicotyledon	Lauraceae	*Cassytha pedicellosa*	stalked dodderlaurel	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Lauraceae	*Cassytha pubescens*	downy dodderlaurel	
Dicotyledon	Proteaceae	*Cenarrhenes nitida*	native plum	
Dicotyledon	Apiaceae	*Centella cordifolia*	swampwort	
Dicotyledon	Asteraceae	*Centipeda cunninghamii*	erect sneezeweed	r
Dicotyledon	Asteraceae	*Centipeda elatinoides*	spreading sneezeweed	
Dicotyledon	Asteraceae	*Centropappus brunonis*	tasmanian daisytree	r
Dicotyledon	Asteraceae	*Chrysocephalum apiculatum*	common everlasting	
Dicotyledon	Asteraceae	*Chrysocephalum baxteri*	fringed everlasting	r
Dicotyledon	Asteraceae	*Chrysocephalum semipapposum*	clustered everlasting	
Dicotyledon	Ranunculaceae	*Clematis aristata*	southern clematis	
Dicotyledon	Ranunculaceae	*Clematis clitorioides*	pleasant clematis	
Dicotyledon	Ranunculaceae	*Clematis gentianoides*	ground clematis	
Dicotyledon	Ranunculaceae	*Clematis microphylla*	small-leaf clematis	
Dicotyledon	Caryophyllaceae	*Colobanthus affinis*	alpine cupflower	
Dicotyledon	Caryophyllaceae	*Colobanthus curtisiae*	grassland cupflower	r
Dicotyledon	Polygalaceae	*Comesperma defoliatum*	leafless milkwort	r
Dicotyledon	Polygalaceae	*Comesperma ericinum*	heath milkwort	
Dicotyledon	Polygalaceae	*Comesperma retusum*	mountain milkwort	
Dicotyledon	Polygalaceae	*Comesperma volubile*	blue lovecreeper	
Dicotyledon	Proteaceae	*Conospermum hookeri*	tasmanian smokebush	v
Dicotyledon	Convolvulaceae	*Convolvulus angustissimus* subsp.	blushing bindweed	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
		angustissimus		
Dicotyledon	Goodeniaceae	*Coopernookia barbata*	purple native-primrose	x
Dicotyledon	Rubiaceae	*Coprosma hirtella*	coffeeberry	
Dicotyledon	Rubiaceae	*Coprosma nitida*	mountain currant	
Dicotyledon	Rubiaceae	*Coprosma quadrifida*	native currant	
Dicotyledon	Asteraceae	*Coronidium scorpioides*	curling everlasting	
Dicotyledon	Rutaceae	*Correa lawrenceana* var. *ferruginea*	rusty correa	
Dicotyledon	Rutaceae	*Correa lawrenceana* var. *lawrenceana*	mountain correa	
Dicotyledon	Rutaceae	*Correa reflexa* var. *nummulariifolia*	roundleaf correa	
Dicotyledon	Rutaceae	*Correa reflexa* var. *reflexa*	common correa	
Dicotyledon	Asteraceae	*Cotula australis*	southern buttons	
Dicotyledon	Asteraceae	*Craspedia glauca*	common billybuttons	
Dicotyledon	Asteraceae	*Craspedia gracilis*	mountain billybuttons	
Dicotyledon	Asteraceae	*Craspedia paludicola*	swamp billybuttons	
Dicotyledon	Crassulaceae	*Crassula helmsii*	swamp stonecrop	
Dicotyledon	Crassulaceae	*Crassula sieberiana*	australian stonecrop	
Dicotyledon	Crassulaceae	*Crassula tetramera*	wiry stonecrop	
Dicotyledon	Rhamnaceae	*Cryptandra amara*	pretty pearlflower	e
Dicotyledon	Rhamnaceae	*Cryptandra exilis*	slender pearlflower	
Dicotyledon	Epacridaceae	*Cyathodes glauca*	purple cheeseberry	
Dicotyledon	Epacridaceae	*Cyathodes platystoma*	tall cheeseberry	r

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Asteraceae	*Cymbonotus preissianus*	southern bears-ears	
Dicotyledon	Boraginaceae	*Cynoglossum australe*	coast houndstongue	
Dicotyledon	Boraginaceae	*Cynoglossum suaveolens*	sweet houndstongue	
Dicotyledon	Solanaceae	*Cyphanthera tasmanica*	tasmanian rayflower	r
Dicotyledon	Goodeniaceae	*Dampiera stricta*	blue dampiera	
Dicotyledon	Apiaceae	*Daucus glochidiatus*	australian carrot	
Dicotyledon	Fabaceae	*Daviesia latifolia*	hop bitterpea	
Dicotyledon	Fabaceae	*Daviesia sejugata*	leafy spiky bitterpea	
Dicotyledon	Fabaceae	*Daviesia ulicifolia* subsp. *ruscifolia*	orange spiky bitterpea	
Dicotyledon	Fabaceae	*Daviesia ulicifolia* subsp. *ulicifolia*	yellow spiky bitterpea	
Dicotyledon	Fabaceae	*Desmodium gunnii*	southern ticktrefoil	v
Dicotyledon	Fabaceae	*Desmodium varians*	slender ticktrefoil	e
Dicotyledon	Convolvulaceae	*Dichondra repens*	kidneyweed	
Dicotyledon	Fabaceae	*Dillwynia cinerascens*	grey parrotpea	
Dicotyledon	Fabaceae	*Dillwynia glaberrima*	smooth parrotpea	
Dicotyledon	Fabaceae	*Dillwynia sericea*	showy parrotpea	
Dicotyledon	Rhamnaceae	*Discaria pubescens*	spiky anchorplant	e
Dicotyledon	Sapindaceae	*Dodonaea filiformis*	fineleaf hopbush	
Dicotyledon	Sapindaceae	*Dodonaea viscosa* subsp. *spatulata*	broadleaf hopbush	
Dicotyledon	Epacridaceae	*Dracophyllum milliganii*	curly mountainheath	
Dicotyledon	Droseraceae	*Drosera auriculata*	tall sundew	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Droseraceae	*Drosera hookeri*	grassland sundew	
Dicotyledon	Droseraceae	*Drosera macrantha*	climbing sundew	
Dicotyledon	Droseraceae	*Drosera peltata*	pale sundew	
Dicotyledon	Droseraceae	*Drosera pygmaea*	dwarf sundew	
Dicotyledon	Chenopodiaceae	*Einadia nutans* subsp. *nutans*	climbing saltbush	
Dicotyledon	Elaeocarpaceae	*Elaeocarpus reticulatus*	blueberry ash	r
Dicotyledon	Epacridaceae	*Epacris acuminata*	claspleaf heath	
Dicotyledon	Epacridaceae	*Epacris apsleyensis*	apsley heath	e
Dicotyledon	Epacridaceae	*Epacris barbata*	bearded heath	e
Dicotyledon	Epacridaceae	*Epacris cerasicollina*	dolerite heath	
Dicotyledon	Epacridaceae	*Epacris curtisiae*	north-west heath	r
Dicotyledon	Epacridaceae	*Epacris exserta*	south esk heath	e
Dicotyledon	Epacridaceae	*Epacris franklinii*	western riverheath	
Dicotyledon	Epacridaceae	*Epacris glabella*	smooth heath	e
Dicotyledon	Epacridaceae	*Epacris grandis*	tall heath	e
Dicotyledon	Epacridaceae	*Epacris graniticola*	granite heath	v
Dicotyledon	Epacridaceae	*Epacris gunnii*	coral heath	
Dicotyledon	Epacridaceae	*Epacris heteronema* var. *gigantea*	giant southwest heath	
Dicotyledon	Epacridaceae	*Epacris heteronema* var. *heteronema*	southwest heath	
Dicotyledon	Epacridaceae	*Epacris impressa*	common heath	
Dicotyledon	Epacridaceae	*Epacris lanuginosa*	swamp heath	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Epacridaceae	*Epacris limbata*	bordered heath	e
Dicotyledon	Epacridaceae	*Epacris marginata*	rigid heath	
Dicotyledon	Epacridaceae	*Epacris moscaliana*	seepage heath	r
Dicotyledon	Epacridaceae	*Epacris mucronulata*	southern river heath	
Dicotyledon	Epacridaceae	*Epacris obtusifolia*	bluntleaf heath	
Dicotyledon	Epacridaceae	*Epacris petrophila*	central snowheath	
Dicotyledon	Epacridaceae	*Epacris tasmanica*	eastern heath	
Dicotyledon	Epacridaceae	*Epacris virgata* (Beaconsfield)		v
Dicotyledon	Epacridaceae	*Epacris virgata* (Kettering)		v
Dicotyledon	Onagraceae	*Epilobium pallidiflorum*	showy willowherb	r
Dicotyledon	Onagraceae	*Epilobium perpusillum*	tiny willowherb	
Dicotyledon	Apiaceae	*Eryngium ovinum*	blue devil	v
Dicotyledon	Apiaceae	*Eryngium vesiculosum*	prickfoot	
Dicotyledon	Myrtaceae	*Eucalyptus amygdalina*	black peppermint	
Dicotyledon	Myrtaceae	*Eucalyptus archeri*	alpine cider gum	
Dicotyledon	Myrtaceae	*Eucalyptus barberi*	barbers gum	r
Dicotyledon	Myrtaceae	*Eucalyptus brookeriana*	brookers gum	
Dicotyledon	Myrtaceae	*Eucalyptus coccifera*	snow peppermint	
Dicotyledon	Myrtaceae	*Eucalyptus cordata* subsp. *cordata*	eastern tasmanian silver gum	
Dicotyledon	Myrtaceae	*Eucalyptus cordata* subsp. *quadrangulosa*	western tasmanian silver gum	
Dicotyledon	Myrtaceae	*Eucalyptus dalrympleana* subsp.	mountain white gum	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
		dalrympleana		
Dicotyledon	Myrtaceae	*Eucalyptus delegatensis* subsp. *tasmaniensis*	gumtopped stringybark	
Dicotyledon	Myrtaceae	*Eucalyptus globulus* subsp. *globulus*	tasmanian blue gum	
Dicotyledon	Myrtaceae	*Eucalyptus globulus* subsp. *pseudoglobulus*	gippsland blue gum	r
Dicotyledon	Myrtaceae	*Eucalyptus gunnii* subsp. *divaricata*	miena cider gum	e
Dicotyledon	Myrtaceae	*Eucalyptus gunnii* subsp. *gunnii*	cider gum	
Dicotyledon	Myrtaceae	*Eucalyptus johnstonii*	yellow gum	
Dicotyledon	Myrtaceae	*Eucalyptus morrisbyi*	morrisbys gum	e
Dicotyledon	Myrtaceae	*Eucalyptus nebulosa*	serpentine peppermint	
Dicotyledon	Myrtaceae	*Eucalyptus nitida*	western peppermint	
Dicotyledon	Myrtaceae	*Eucalyptus obliqua*	stringybark	
Dicotyledon	Myrtaceae	*Eucalyptus ovata* var. *ovata*	black gum	
Dicotyledon	Myrtaceae	*Eucalyptus pauciflora* subsp. *pauciflora*	cabbage gum	
Dicotyledon	Myrtaceae	*Eucalyptus perriniana*	spinning gum	r
Dicotyledon	Myrtaceae	*Eucalyptus pulchella*	white peppermint	
Dicotyledon	Myrtaceae	*Eucalyptus radiata* subsp. *radiata*	forth river peppermint	r
Dicotyledon	Myrtaceae	*Eucalyptus regnans*	giant ash	
Dicotyledon	Myrtaceae	*Eucalyptus risdonii*	risdon peppermint	r
Dicotyledon	Myrtaceae	*Eucalyptus rodwayi*	swamp peppermint	
Dicotyledon	Myrtaceae	*Eucalyptus rubida*	candlebark	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Myrtaceae	*Eucalyptus sieberi*	ironbark	
Dicotyledon	Myrtaceae	*Eucalyptus subcrenulata*	alpine yellow gum	
Dicotyledon	Myrtaceae	*Eucalyptus tenuiramis*	silver peppermint	
Dicotyledon	Myrtaceae	*Eucalyptus urnigera*	urn gum	
Dicotyledon	Myrtaceae	*Eucalyptus vernicosa*	varnished gum	
Dicotyledon	Myrtaceae	*Eucalyptus viminalis* subsp. *hentyensis*	henty white gum	
Dicotyledon	Myrtaceae	*Eucalyptus viminalis* subsp. *viminalis*	white gum	
Dicotyledon	Asteraceae	*Euchiton involucratus*	star cottonleaf	
Dicotyledon	Asteraceae	*Euchiton japonicus*	common cottonleaf	
Dicotyledon	Asteraceae	*Euchiton lateralis*		
Dicotyledon	Eucryphiaceae	*Eucryphia lucida*	leatherwood	
Dicotyledon	Eucryphiaceae	*Eucryphia milliganii* subsp. *milliganii*	dwarf leatherwood	
Dicotyledon	Eucryphiaceae	*Eucryphia milliganii* subsp. *pubescens*	hairy dwarf leatherwood	
Dicotyledon	Scrophulariaceae	*Euphrasia amplidens*		e
Dicotyledon	Scrophulariaceae	*Euphrasia collina* subsp. *deflexifolia*	eastern eyebright	r
Dicotyledon	Scrophulariaceae	*Euphrasia collina* subsp. Dukes Marshes	middle eyebright	
Dicotyledon	Scrophulariaceae	*Euphrasia collina* subsp. *tasmanica*	enigma eyebright	
Dicotyledon	Scrophulariaceae	*Euphrasia fragosa*	shy eyebright	e
Dicotyledon	Scrophulariaceae	*Euphrasia gibbsiae* subsp. *psilantherea*	swamp eyebright	e
Dicotyledon	Scrophulariaceae	*Euphrasia scabra*	yellow eyebright	e
Dicotyledon	Scrophulariaceae	*Euphrasia semipicta*	peninsula eyebright	e

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Scrophulariaceae	*Euphrasia striata*	shiny striped eyebright	
Dicotyledon	Myrtaceae	*Euryomyrtus parviflora*	creeping heathmyrtle	
Dicotyledon	Myrtaceae	*Euryomyrtus ramosissima*	rosy heathmyrtle	
Dicotyledon	Santalaceae	*Exocarpos cupressiformis*	common native-cherry	
Dicotyledon	Santalaceae	*Exocarpos strictus*	pearly native-cherry	
Dicotyledon	Rubiaceae	*Galium albescens*	downy bedstraw	
Dicotyledon	Rubiaceae	*Galium australe*	tangled bedstraw	
Dicotyledon	Rubiaceae	*Galium binifolium* subsp. *conforme*	lesser uneven bedstraw	
Dicotyledon	Rubiaceae	*Galium ciliare* subsp. *ciliare*	hairy bedstraw	
Dicotyledon	Rubiaceae	*Galium ciliare* subsp. *terminale*	multiflower hairy bedstraw	
Dicotyledon	Rubiaceae	*Galium densum*	shade bedstraw	
Dicotyledon	Rubiaceae	*Galium gaudichaudii* subsp. *parviflorum*	smallflower rough bedstraw	
Dicotyledon	Rubiaceae	*Galium leiocarpum*	smoothfruit bedstraw	
Dicotyledon	Ericaceae	*Gaultheria depressa*	creeping waxberry	
Dicotyledon	Ericaceae	*Gaultheria hispida*	copperleaf snowberry	
Dicotyledon	Geraniaceae	*Geranium potentilloides* var. *potentilloides*	mountain cranesbill	
Dicotyledon	Geraniaceae	*Geranium retrorsum*	grassland cranesbill	
Dicotyledon	Geraniaceae	*Geranium solanderi*	southern cranesbill	
Dicotyledon	Fabaceae	*Glycine clandestina*	twining glycine	
Dicotyledon	Fabaceae	*Glycine latrobeana*	clover glycine	v
Dicotyledon	Fabaceae	*Glycine microphylla*	small-leaf glycine	v

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Fabaceae	*Glycine tabacina*	variable glycine	
Dicotyledon	Fabaceae	*Gompholobium ecostatum*	dwarf wedgepea	e
Dicotyledon	Fabaceae	*Gompholobium huegelii*	common wedgepea	
Dicotyledon	Haloragaceae	*Gonocarpus humilis*	shade raspwort	
Dicotyledon	Haloragaceae	*Gonocarpus micranthus* subsp. *micranthus*	creeping raspwort	
Dicotyledon	Haloragaceae	*Gonocarpus serpyllifolius*	alpine raspwort	
Dicotyledon	Haloragaceae	*Gonocarpus tetragynus*	common raspwort	
Dicotyledon	Haloragaceae	*Gonocarpus teucrioides*	forest raspwort	
Dicotyledon	Goodeniaceae	*Goodenia elongata*	lanky native-primrose	
Dicotyledon	Goodeniaceae	*Goodenia humilis*	swamp native-primrose	
Dicotyledon	Goodeniaceae	*Goodenia lanata*	trailing native-primrose	
Dicotyledon	Goodeniaceae	*Goodenia ovata*	hop native-primrose	
Dicotyledon	Fabaceae	*Goodia lotifolia*	smooth goldentip	
Dicotyledon	Fabaceae	*Goodia pubescens*	silky goldentip	
Dicotyledon	Scrophulariaceae	*Gratiola nana*	matted brooklime	
Dicotyledon	Scrophulariaceae	*Gratiola peruviana*	southern brooklime	
Dicotyledon	Scrophulariaceae	*Gratiola pubescens*	hairy brooklime	v
Dicotyledon	Scrophulariaceae	*Gratiola pumilo*	dwarf brooklime	
Dicotyledon	Proteaceae	*Grevillea australis*	southern grevillea	
Dicotyledon	Malvaceae	*Gynatrix pulchella*	fragrant hempbush	r
Dicotyledon	Gyrostemonaceae	*Gyrostemon thesioides*	broom wheelfruit	r

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Proteaceae	*Hakea decurrens* subsp. *physocarpa*	bushy needlebush	
Dicotyledon	Proteaceae	*Hakea epiglottis* subsp. *epiglottis*	beaked needlebush	
Dicotyledon	Proteaceae	*Hakea epiglottis* subsp. *milliganii*	western beaked needlebush	
Dicotyledon	Proteaceae	*Hakea lissosperma*	mountain needlebush	
Dicotyledon	Proteaceae	*Hakea megadenia*	autumn needlebush	
Dicotyledon	Proteaceae	*Hakea microcarpa*	smallfruit needlebush	
Dicotyledon	Proteaceae	*Hakea nodosa*	yellow needlebush	
Dicotyledon	Proteaceae	*Hakea teretifolia* subsp. *hirsuta*	dagger needlebush	
Dicotyledon	Proteaceae	*Hakea ulicina*	furze needlebush	v
Dicotyledon	Haloragaceae	*Haloragis aspera*	rough raspwort	v
Dicotyledon	Haloragaceae	*Haloragis brownii*	swamp raspwort	
Dicotyledon	Haloragaceae	*Haloragis heterophylla*	variable raspwort	r
Dicotyledon	Haloragaceae	*Haloragis myriocarpa*	prickly raspwort	r
Dicotyledon	Fabaceae	*Hardenbergia violacea*	purple coralpea	e
Dicotyledon	Monimiaceae	*Hedycarya angustifolia*	australian mulberry	r
Dicotyledon	Asteraceae	*Helichrysum luteoalbum*	jersey cudweed	
Dicotyledon	Dilleniaceae	*Hibbertia acicularis*	prickly guineaflower	
Dicotyledon	Dilleniaceae	*Hibbertia appressa*	southern guineaflower	
Dicotyledon	Dilleniaceae	*Hibbertia calycina*	lesser guineaflower	v
Dicotyledon	Dilleniaceae	*Hibbertia empetrifolia* subsp. *empetrifolia*	scrambling guineaflower	
Dicotyledon	Dilleniaceae	*Hibbertia hirsuta*	hairy guineaflower	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Dilleniaceae	*Hibbertia hirticalyx*	bassian guineaflower	
Dicotyledon	Dilleniaceae	*Hibbertia procumbens*	spreading guineaflower	
Dicotyledon	Dilleniaceae	*Hibbertia prostrata*	prostrate guineaflower	
Dicotyledon	Dilleniaceae	*Hibbertia riparia*	erect guineaflower	
Dicotyledon	Dilleniaceae	*Hibbertia sericea* var. *sericea*	silky guineaflower	
Dicotyledon	Dilleniaceae	*Hibbertia serpyllifolia*	thyme guineaflower	
Dicotyledon	Dilleniaceae	*Hibbertia virgata*	twiggy guineaflower	r
Dicotyledon	Fabaceae	*Hovea corrickiae*	glossy purplepea	r
Dicotyledon	Fabaceae	*Hovea heterophylla*	winter purplepea	
Dicotyledon	Fabaceae	*Hovea magnibractea*	sheath purplepea	
Dicotyledon	Fabaceae	*Hovea montana*	mountain purplepea	r
Dicotyledon	Fabaceae	*Hovea tasmanica*	rockfield purplepea	r
Dicotyledon	Asteraceae	*Hyalosperma demissum*	moss sunray	e
Dicotyledon	Apiaceae	*Hydrocotyle callicarpa*	tiny pennywort	
Dicotyledon	Apiaceae	*Hydrocotyle comocarpa*	fringefruit pennywort	r
Dicotyledon	Apiaceae	*Hydrocotyle hirta*	hairy pennywort	
Dicotyledon	Apiaceae	*Hydrocotyle laxiflora*	stinking pennywort	e
Dicotyledon	Apiaceae	*Hydrocotyle muscosa*	mossy pennywort	
Dicotyledon	Apiaceae	*Hydrocotyle pterocarpa*	winged pennywort	
Dicotyledon	Apiaceae	*Hydrocotyle sibthorpioides*	shining pennywort	
Dicotyledon	Clusiaceae	*Hypericum gramineum*	small st johns-wort	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Clusiaceae	*Hypericum japonicum*	matted st johns-wort	
Dicotyledon	Clusiaceae	*Hypericum pusillum*	wavy st johns-wort	
Dicotyledon	Fabaceae	*Indigofera australis* subsp. *australis*	native indigo	
Dicotyledon	Proteaceae	*Isopogon ceratophyllus*	horny conebush	v
Dicotyledon	Campanulaceae	*Isotoma fluviatilis* subsp. *australis*	swamp stars	
Dicotyledon	Fabaceae	*Kennedia prostrata*	running postman	
Dicotyledon	Myrtaceae	*Kunzea ambigua*	white kunzea	
Dicotyledon	Asteraceae	*Lagenophora gracilis*	slender bottledaisy	
Dicotyledon	Asteraceae	*Lagenophora huegelii*	coarse bottledaisy	
Dicotyledon	Asteraceae	*Lagenophora stipitata*	blue bottledaisy	
Dicotyledon	Sterculiaceae	*Lasiopetalum macrophyllum*	shrubby velvetbush	
Dicotyledon	Sterculiaceae	*Lasiopetalum micranthum*	tasmanian velvetbush	r
Dicotyledon	Rutaceae	*Leionema bilobum* subsp. *truncatum*	tasmanian notched waxflower	
Dicotyledon	Brassicaceae	*Lepidium hyssopifolium*	soft peppercress	e
Dicotyledon	Brassicaceae	*Lepidium pseudotasmanicum*	shade peppercress	
Dicotyledon	Epacridaceae	*Leptecophylla divaricata*	spreading pinkberry	
Dicotyledon	Epacridaceae	*Leptecophylla juniperina* subsp. *juniperina*	common pinkberry	
Dicotyledon	Epacridaceae	*Leptecophylla juniperina* subsp. *oxycedrus*	coastal pinkberry	
Dicotyledon	Epacridaceae	*Leptecophylla juniperina* subsp. *parvifolia*	mountain pinkberry	
Dicotyledon	Epacridaceae	*Leptecophylla pendulosa*	drooping pinkberry	
Dicotyledon	Epacridaceae	*Leptecophylla pogonocalyx*	bearded pinkberry	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Santalaceae	*Leptomeria drupacea*	erect currantbush	
Dicotyledon	Asteraceae	*Leptorhynchos nitidulus*	shiny buttons	
Dicotyledon	Asteraceae	*Leptorhynchos squamatus* subsp. *alpinus*	alpine scaly buttons	
Dicotyledon	Asteraceae	*Leptorhynchos squamatus* subsp. *squamatus*	scaly buttons	
Dicotyledon	Myrtaceae	*Leptospermum glaucescens*	smoky teatree	
Dicotyledon	Myrtaceae	*Leptospermum grandiflorum*	autumn teatree	
Dicotyledon	Myrtaceae	*Leptospermum laevigatum*	coast teatree	
Dicotyledon	Myrtaceae	*Leptospermum lanigerum*	woolly teatree	
Dicotyledon	Myrtaceae	*Leptospermum nitidum*	shiny teatree	
Dicotyledon	Myrtaceae	*Leptospermum riparium*	river teatree	
Dicotyledon	Myrtaceae	*Leptospermum rupestre*	mountain teatree	
Dicotyledon	Myrtaceae	*Leptospermum scoparium*	common teatree	
Dicotyledon	Epacridaceae	*Leucopogon affinis*	lance beardheath	r
Dicotyledon	Epacridaceae	*Leucopogon australis*	spike beardheath	
Dicotyledon	Epacridaceae	*Leucopogon collinus*	white beardheath	
Dicotyledon	Epacridaceae	*Leucopogon ericoides*	pink beardheath	
Dicotyledon	Epacridaceae	*Leucopogon fraseri*	prickly beardheath	
Dicotyledon	Epacridaceae	*Leucopogon parviflorus*	coast beardheath	
Dicotyledon	Epacridaceae	*Leucopogon virgatus* var. *brevifolius*	shortleaf beardheath	r
Dicotyledon	Epacridaceae	*Leucopogon virgatus* var. *virgatus*	twiggy beardheath	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Stylidiaceae	*Levenhookia dubia*	hairy stylewort	x
Dicotyledon	Linaceae	*Linum marginale*	native flax	
Dicotyledon	Epacridaceae	*Lissanthe strigosa* subsp. *subulata*	peachberry heath	
Dicotyledon	Campanulaceae	*Lobelia anceps*	angled lobelia	
Dicotyledon	Campanulaceae	*Lobelia browniana*	toothed lobelia	
Dicotyledon	Campanulaceae	*Lobelia dentata*		r
Dicotyledon	Campanulaceae	*Lobelia gibbosa*	tall lobelia	
Dicotyledon	Campanulaceae	*Lobelia pedunculata*	matted pratia	
Dicotyledon	Campanulaceae	*Lobelia pratioides*	poison lobelia	v
Dicotyledon	Campanulaceae	*Lobelia rhombifolia*	tufted lobelia	r
Dicotyledon	Campanulaceae	*Lobelia simplicicaulis*	narrow lobelia	
Dicotyledon	Proteaceae	*Lomatia polymorpha*	mountain guitarplant	
Dicotyledon	Proteaceae	*Lomatia tasmanica*	kings lomatia	e
Dicotyledon	Proteaceae	*Lomatia tinctoria*	guitarplant	
Dicotyledon	Lamiaceae	*Lycopus australis*	australian gypsywort	e
Dicotyledon	Lythraceae	*Lythrum hyssopifolia*	small loosestrife	
Dicotyledon	Lythraceae	*Lythrum salicaria*	purple loosestrife	v
Dicotyledon	Scrophulariaceae	*Mazus pumilio*	swamp mazus	
Dicotyledon	Myrtaceae	*Melaleuca ericifolia*	coast paperbark	
Dicotyledon	Myrtaceae	*Melaleuca gibbosa*	slender honeymyrtle	
Dicotyledon	Myrtaceae	*Melaleuca pallida*	yellow bottlebrush	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Myrtaceae	*Melaleuca pustulata*	warty paperbark	r
Dicotyledon	Myrtaceae	*Melaleuca squamea*	swamp honeymyrtle	
Dicotyledon	Myrtaceae	*Melaleuca squarrosa*	scented paperbark	
Dicotyledon	Myrtaceae	*Melaleuca virens*	prickly bottlebrush	
Dicotyledon	Violaceae	*Melicytus angustifolius* subsp. *angustifolius*		
Dicotyledon	Violaceae	*Melicytus angustifolius* subsp. *divaricatus*		
Dicotyledon	Violaceae	*Melicytus dentatus*	spiky velvetbush	
Dicotyledon	Lamiaceae	*Mentha australis*	river mint	e
Dicotyledon	Lamiaceae	*Mentha diemenica* var. *diemenica*	slender mint	
Dicotyledon	Lamiaceae	*Mentha diemenica* var. *serpyllifolia*	thymeleaf mint	
Dicotyledon	Euphorbiaceae	*Micrantheum hexandrum*	river tridentbush	
Dicotyledon	Euphorbiaceae	*Micrantheum serpentinum*	western tridentbush	r
Dicotyledon	Asteraceae	*Microseris lanceolata*	yam daisy	
Dicotyledon	Asteraceae	*Millotia muelleri*	clustered bowflower	e
Dicotyledon	Asteraceae	*Millotia tenuifolia* var. *tenuifolia*	soft bowflower	
Dicotyledon	Fabaceae	*Mirbelia oxylobioides*	sandstone bushpea	v
Dicotyledon	Loganiaceae	*Mitrasacme pilosa* var. *pilosa*	hairy mitrewort	
Dicotyledon	Loganiaceae	*Mitrasacme pilosa* var. *stuartii*	stalked hairy mitrewort	
Dicotyledon	Epacridaceae	*Monotoca elliptica*	tree broomheath	
Dicotyledon	Epacridaceae	*Monotoca empetrifolia*	mat broomheath	
Dicotyledon	Epacridaceae	*Monotoca glauca*	goldey wood	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Epacridaceae	*Monotoca linifolia* subsp. *algida*	alpine nodding broomheath	
Dicotyledon	Epacridaceae	*Monotoca linifolia* subsp. *linifolia*	fourlobed broomheath	
Dicotyledon	Epacridaceae	*Monotoca scoparia*	prickly broomheath	
Dicotyledon	Epacridaceae	*Monotoca submutica* var. *autumnalis*	roundleaf broomheath	r
Dicotyledon	Epacridaceae	*Monotoca submutica* var. *submutica*	mountain broomheath	
Dicotyledon	Portulacaceae	*Montia australasica*	white purslane	
Dicotyledon	Polygonaceae	*Muehlenbeckia adpressa*	climbing lignum	
Dicotyledon	Polygonaceae	*Muehlenbeckia axillaris*	matted lignum	r
Dicotyledon	Polygonaceae	*Muehlenbeckia gunnii*	forest lignum	
Dicotyledon	Boraginaceae	*Myosotis australis*	southern forgetmenot	
Dicotyledon	Boraginaceae	*Myosotis exarrhena*	sweet forgetmenot	
Dicotyledon	Ranunculaceae	*Myosurus australis*	southern mousetail	e
Dicotyledon	Haloragaceae	*Myriophyllum integrifolium*	tiny watermilfoil	v
Dicotyledon	Haloragaceae	*Myriophyllum pedunculatum* subsp. *longibracteolatum*	spreading watermilfoil	
Dicotyledon	Haloragaceae	*Myriophyllum pedunculatum* subsp. *pedunculatum*	matted watermilfoil	
Dicotyledon	Rutaceae	*Nematolepis squamea* subsp. *retusa*	blunt satinwood	
Dicotyledon	Rutaceae	*Nematolepis squamea* subsp. *squamea*	satinwood	
Dicotyledon	Rubiaceae	*Nertera granadensis*	orange cushionbeads	
Dicotyledon	Oleaceae	*Notelaea ligustrina*	native olive	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Fagaceae	*Nothofagus cunninghamii*	myrtle beech	
Dicotyledon	Fagaceae	*Nothofagus gunnii*	deciduous beech	
Dicotyledon	Asteraceae	*Odixia achlaena*	golden everlastingbush	r
Dicotyledon	Asteraceae	*Odixia angusta*	roundhead everlastingbush	
Dicotyledon	Asteraceae	*Olearia algida*	alpine daisybush	
Dicotyledon	Asteraceae	*Olearia archeri*	leathery daisybush	
Dicotyledon	Asteraceae	*Olearia argophylla*	musk daisybush	
Dicotyledon	Asteraceae	*Olearia axillaris*	coast daisybush	
Dicotyledon	Asteraceae	*Olearia ciliata*	fringed daisybush	
Dicotyledon	Asteraceae	*Olearia ericoides*	heath daisybush	
Dicotyledon	Asteraceae	*Olearia erubescens*	moth daisybush	
Dicotyledon	Asteraceae	*Olearia floribunda*	flowery daisybush	
Dicotyledon	Asteraceae	*Olearia glandulosa*	swamp daisybush	
Dicotyledon	Asteraceae	*Olearia glutinosa*	sticky daisybush	
Dicotyledon	Asteraceae	*Olearia hookeri*	crimsontip daisybush	r
Dicotyledon	Asteraceae	*Olearia lirata*	forest daisybush	
Dicotyledon	Asteraceae	*Olearia myrsinoides*	silky daisybush	
Dicotyledon	Asteraceae	*Olearia obcordata*	heartleaf daisybush	
Dicotyledon	Asteraceae	*Olearia persoonioides*	geebung daisybush	
Dicotyledon	Asteraceae	*Olearia phlogopappa* subsp. *angustifolia*	narrowleaf dusty daisybush	
Dicotyledon	Asteraceae	*Olearia phlogopappa* subsp. *gunniana*		

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Asteraceae	*Olearia phlogopappa* subsp. *insularis*		
Dicotyledon	Asteraceae	*Olearia phlogopappa* subsp. *phlogopappa*	common dusty daisybush	
Dicotyledon	Asteraceae	*Olearia phlogopappa* subsp. *salicina*	willowleaf dusty daisybush	
Dicotyledon	Asteraceae	*Olearia phlogopappa* subsp. *subrepanda*	mountain dusty daisybush	
Dicotyledon	Asteraceae	*Olearia pinifolia*	prickly daisybush	
Dicotyledon	Asteraceae	*Olearia ramulosa*	twiggy daisybush	
Dicotyledon	Asteraceae	*Olearia stellulata*	sawleaf daisybush	
Dicotyledon	Asteraceae	*Olearia tasmanica*	tasmanian daisybush	
Dicotyledon	Asteraceae	*Olearia viscosa*	viscid daisybush	
Dicotyledon	Rubiaceae	*Opercularia ovata*	broadleaf stinkweed	
Dicotyledon	Rubiaceae	*Opercularia varia*	variable stinkweed	
Dicotyledon	Apiaceae	*Oreomyrrhis gunnii*	limestone caraway	
Dicotyledon	Proteaceae	*Orites acicularis*	yellow orites	
Dicotyledon	Proteaceae	*Orites diversifolius*	variable orites	
Dicotyledon	Proteaceae	*Orites revolutus*	revolute orites	
Dicotyledon	Oxalidaceae	*Oxalis exilis*	feeble woodsorrel	
Dicotyledon	Oxalidaceae	*Oxalis magellanica*	snowdrop woodsorrel	
Dicotyledon	Oxalidaceae	*Oxalis perennans*	grassland woodsorrel	
Dicotyledon	Fabaceae	*Oxylobium arborescens*	tall shaggypea	
Dicotyledon	Fabaceae	*Oxylobium ellipticum*	golden shaggypea	
Dicotyledon	Asteraceae	*Ozothamnus antennaria*	sticky everlastingbush	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Asteraceae	*Ozothamnus costatifructus*	eastcoast everlastingbush	
Dicotyledon	Asteraceae	*Ozothamnus ericifolius*	heath everlastingbush	
Dicotyledon	Asteraceae	*Ozothamnus ferrugineus*	tree everlastingbush	
Dicotyledon	Asteraceae	*Ozothamnus hookeri*	scaly everlastingbush	
Dicotyledon	Asteraceae	*Ozothamnus lycopodioides*	clubmoss everlastingbush	r
Dicotyledon	Asteraceae	*Ozothamnus obcordatus*	yellow everlastingbush	
Dicotyledon	Asteraceae	*Ozothamnus purpurascens*	columnar everlastingbush	
Dicotyledon	Asteraceae	*Ozothamnus reflexifolius*	reflexed everlastingbush	v
Dicotyledon	Asteraceae	*Ozothamnus reticulatus*	veined everlastingbush	
Dicotyledon	Asteraceae	*Ozothamnus rosmarinifolius*	swamp everlastingbush	
Dicotyledon	Asteraceae	*Ozothamnus scutellifolius*	buttonleaf everlastingbush	
Dicotyledon	Asteraceae	*Ozothamnus selaginoides*	table mountain everlastingbush	x
Dicotyledon	Asteraceae	*Ozothamnus* sp. St Pauls Dome		
Dicotyledon	Asteraceae	*Ozothamnus thyrsoideus*	angled everlastingbush	
Dicotyledon	Asteraceae	*Ozothamnus x expansifolius*	crowded everlastingbush	
Dicotyledon	Bignoniaceae	*Pandorea pandorana*	wonga vine	r
Dicotyledon	Urticaceae	*Parietaria debilis*	shade pellitory	r
Dicotyledon	Apocynaceae	*Parsonsia brownii*	twining silkpod	
Dicotyledon	Geraniaceae	*Pelargonium australe*	southern storksbill	
Dicotyledon	Epacridaceae	*Pentachondra ericifolia*	fine frillyheath	r
Dicotyledon	Epacridaceae	*Pentachondra involucrata*	forest frillyheath	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Polygonaceae	*Persicaria decipiens*	slenderwaterpepper	v
Dicotyledon	Polygonaceae	*Persicaria subsessilis*	bristly waterpepper	e
Dicotyledon	Proteaceae	*Persoonia gunnii*	gunn's geebung	
Dicotyledon	Proteaceae	*Persoonia juniperina*	prickly geebung	
Dicotyledon	Proteaceae	*Persoonia muelleri* subsp. *angustifolia*	narrowleaf geebung	r
Dicotyledon	Proteaceae	*Persoonia muelleri* subsp. *densifolia*	leafy geebung	
Dicotyledon	Proteaceae	*Persoonia muelleri* subsp. *muelleri*	highland geebung	
Dicotyledon	Rutaceae	*Phebalium daviesii*	davies waxflower	e
Dicotyledon	Rutaceae	*Philotheca verrucosa*	fairy waxflower	
Dicotyledon	Rutaceae	*Philotheca virgata*	twiggy waxflower	
Dicotyledon	Loganiaceae	*Phyllangium divergens*	wiry mitrewort	v
Dicotyledon	Euphorbiaceae	*Phyllanthus australis*	southern spurge	
Dicotyledon	Euphorbiaceae	*Phyllanthus gunnii*	shrubby spurge	
Dicotyledon	Asteraceae	*Picris angustifolia* subsp. *angustifolia*	lowland hawkweed	
Dicotyledon	Asteraceae	*Picris angustifolia* subsp. *merxmuelleri*	mountain hawkweed	
Dicotyledon	Thymelaeaceae	*Pimelea axiflora* subsp. *axiflora*	bootlace bush	e
Dicotyledon	Thymelaeaceae	*Pimelea cinerea*	grey riceflower	
Dicotyledon	Thymelaeaceae	*Pimelea curviflora* var. *gracilis*	slender curved riceflower	r
Dicotyledon	Thymelaeaceae	*Pimelea curviflora* var. *sericea*	silky curved riceflower	r
Dicotyledon	Thymelaeaceae	*Pimelea drupacea*	cherry riceflower	
Dicotyledon	Thymelaeaceae	*Pimelea filiformis*	trailing riceflower	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Thymelaeaceae	*Pimelea flava* subsp. *flava*	yellow riceflower	r
Dicotyledon	Thymelaeaceae	*Pimelea humilis*	dwarf riceflower	
Dicotyledon	Thymelaeaceae	*Pimelea ligustrina* subsp. *ligustrina*	tall riceflower	
Dicotyledon	Thymelaeaceae	*Pimelea linifolia*	slender riceflower	
Dicotyledon	Thymelaeaceae	*Pimelea nivea*	bushmans bootlace	
Dicotyledon	Thymelaeaceae	*Pimelea pauciflora*	poison riceflower	
Dicotyledon	Thymelaeaceae	*Pimelea* sp. Tunbridge	grassland riceflower	e
Dicotyledon	Pittosporaceae	*Pittosporum bicolor*	cheesewood	
Dicotyledon	Epacridaceae	*Planocarpa nitida*	black cheeseberry	r
Dicotyledon	Plantaginaceae	*Plantago debilis*	shade plantain	r
Dicotyledon	Plantaginaceae	*Plantago gaudichaudii*	narrow plantain	
Dicotyledon	Plantaginaceae	*Plantago varia*	variable plantain	
Dicotyledon	Fabaceae	*Platylobium obtusangulum*	common flatpea	
Dicotyledon	Fabaceae	*Platylobium parviflorum*	handsome flat-pea	
Dicotyledon	Fabaceae	*Platylobium triangulare*	arrow flatpea	
Dicotyledon	Asteraceae	*Podolepis jaceoides*		
Dicotyledon	Araliaceae	*Polyscias* sp. Douglas-Denison	ferny panax	e
Dicotyledon	Rhamnaceae	*Pomaderris apetala* subsp. *apetala*	common dogwood	
Dicotyledon	Rhamnaceae	*Pomaderris apetala* subsp. *maritima*	coastal dogwood	
Dicotyledon	Rhamnaceae	*Pomaderris aspera*	hazel dogwood	
Dicotyledon	Rhamnaceae	*Pomaderris elachophylla*	small-leaf dogwood	v

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Rhamnaceae	*Pomaderris elliptica* var. *diemenica*	tasmanian yellow dogwood	
Dicotyledon	Rhamnaceae	*Pomaderris elliptica* var. *elliptica*	yellow dogwood	
Dicotyledon	Rhamnaceae	*Pomaderris intermedia*	lemon dogwood	r
Dicotyledon	Rhamnaceae	*Pomaderris phylicifolia* subsp. *ericoides*	revolute narrowleaf dogwood	r
Dicotyledon	Rhamnaceae	*Pomaderris phylicifolia* subsp. *phylicifolia*	narrowleaf dogwood	r
Dicotyledon	Rhamnaceae	*Pomaderris pilifera* subsp. *pilifera*	hairy dogwood	
Dicotyledon	Rhamnaceae	*Pomaderris pilifera* subsp. *talpicutica*	moleskin dogwood	e
Dicotyledon	Rhamnaceae	*Pomaderris racemosa*	slender dogwood	
Dicotyledon	Euphorbiaceae	*Poranthera microphylla*	small poranthera	
Dicotyledon	Epacridaceae	*Prionotes cerinthoides*	climbing heath	
Dicotyledon	Lamiaceae	*Prostanthera lasianthos* var. *lasianthos*	christmas mintbush	
Dicotyledon	Lamiaceae	*Prostanthera rotundifolia*	roundleaf mintbush	v
Dicotyledon	Euphorbiaceae	*Pseudanthus ovalifolius*	roundleaf pseudanthus	
Dicotyledon	Araliaceae	*Pseudopanax gunnii*	forest fernbush	
Dicotyledon	Fabaceae	*Pultenaea daphnoides*	heartleaf bushpea	
Dicotyledon	Fabaceae	*Pultenaea dentata*	swamp bushpea	
Dicotyledon	Fabaceae	*Pultenaea fasciculata*	alpine bushpea	
Dicotyledon	Fabaceae	*Pultenaea gunnii* subsp. *gunnii*	golden bushpea	
Dicotyledon	Fabaceae	*Pultenaea humilis*	dwarf bushpea	v
Dicotyledon	Fabaceae	*Pultenaea juniperina*	prickly beauty	
Dicotyledon	Fabaceae	*Pultenaea mollis*	soft bushpea	v

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Fabaceae	*Pultenaea pedunculata*	matted bushpea	
Dicotyledon	Fabaceae	*Pultenaea prostrata*	silky bushpea	v
Dicotyledon	Fabaceae	*Pultenaea stricta*	rigid bushpea	
Dicotyledon	Fabaceae	*Pultenaea tenuifolia*	slender bushpea	
Dicotyledon	Ranunculaceae	*Ranunculus decurvus*	nodding buttercup	
Dicotyledon	Ranunculaceae	*Ranunculus lappaceus*	woodland buttercup	
Dicotyledon	Ranunculaceae	*Ranunculus pumilio* var. *pumilio*	ferny buttercup	r
Dicotyledon	Ranunculaceae	*Ranunculus sessiliflorus* var. *sessiliflorus*	rockplate buttercup	
Dicotyledon	Chenopodiaceae	*Rhagodia candolleana* subsp. *candolleana*	coastal saltbush	
Dicotyledon	Pittosporaceae	*Rhytidosporum inconspicuum*	alpine appleberry	e
Dicotyledon	Pittosporaceae	*Rhytidosporum procumbens*	starry appleberry	
Dicotyledon	Epacridaceae	*Richea dracophylla*	pineapple candleheath	
Dicotyledon	Epacridaceae	*Richea gunnii*	bog candleheath	
Dicotyledon	Epacridaceae	*Richea milliganii*	nodding candleheath	
Dicotyledon	Epacridaceae	*Richea pandanifolia* subsp. *pandanifolia*	pandani	
Dicotyledon	Epacridaceae	*Richea pandanifolia* subsp. *ramulosa*	branching pandani	
Dicotyledon	Epacridaceae	*Richea procera*	lax candleheath	
Dicotyledon	Epacridaceae	*Richea scoparia*	scoparia	
Dicotyledon	Epacridaceae	*Richea sprengelioides*	rigid candleheath	
Dicotyledon	Epacridaceae	*Richea x curtisiae*	hybrid candleheath	
Dicotyledon	Euphorbiaceae	*Ricinocarpos pinifolius*	wedding bush	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Brassicaceae	*Rorippa dictyosperma*	forest bittercress	
Dicotyledon	Brassicaceae	*Rorippa gigantea*	large yellowcress	
Dicotyledon	Rosaceae	*Rubus gunnianus*	alpine raspberry	
Dicotyledon	Rosaceae	*Rubus parvifolius*	native raspberry	
Dicotyledon	Polygonaceae	*Rumex dumosus*	wiry dock	
Dicotyledon	Caprifoliaceae	*Sambucus gaudichaudiana*	white elderberry	
Dicotyledon	Goodeniaceae	*Scaevola aemula*	fairy fanflower	e
Dicotyledon	Caryophyllaceae	*Scleranthus biflorus*	twinflower knawel	
Dicotyledon	Caryophyllaceae	*Scleranthus brockiei*	mountain knawel	r
Dicotyledon	Caryophyllaceae	*Scleranthus diander*	tufted knawel	v
Dicotyledon	Caryophyllaceae	*Scleranthus fasciculatus*	spreading knawel	v
Dicotyledon	Lamiaceae	*Scutellaria humilis*	dwarf skullcap	r
Dicotyledon	Asteraceae	*Senecio biserratus*	crosscut fireweed	
Dicotyledon	Asteraceae	*Senecio extensus*	subalpine fireweed	
Dicotyledon	Asteraceae	*Senecio georgianus*	grey fireweed	x
Dicotyledon	Asteraceae	*Senecio glomeratus* subsp. *glomeratus*	shortfruit purple fireweed	
Dicotyledon	Asteraceae	*Senecio glomeratus* subsp. *longifructus*	longfruit purple fireweed	
Dicotyledon	Asteraceae	*Senecio hispidissimus*	coarse fireweed	
Dicotyledon	Asteraceae	*Senecio hispidulus*	rough fireweed	
Dicotyledon	Asteraceae	*Senecio linearifolius* var. *arachnoideus*	cobweb fireweed groundsel	
Dicotyledon	Asteraceae	*Senecio linearifolius* var. *denticulatus*	toothed fireweed groundsel	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Asteraceae	*Senecio linearifolius* var. *latifolius*	broadleaf fireweed groundsel	
Dicotyledon	Asteraceae	*Senecio linearifolius* var. *linearifolius*	common fireweed groundsel	
Dicotyledon	Asteraceae	*Senecio macrocarpus*	largefruit fireweed	x
Dicotyledon	Asteraceae	*Senecio microbasis*	narrow fireweed	
Dicotyledon	Asteraceae	*Senecio minimus*	shrubby fireweed	
Dicotyledon	Asteraceae	*Senecio phelleus*	rock fireweed	
Dicotyledon	Asteraceae	*Senecio pinnatifolius* var. *lanceolatus*	lanceleaf coast groundsel	
Dicotyledon	Asteraceae	*Senecio prenanthoides*	common fireweed	
Dicotyledon	Asteraceae	*Senecio quadridentatus*	cotton fireweed	
Dicotyledon	Asteraceae	*Senecio squarrosus*	leafy fireweed	r
Dicotyledon	Asteraceae	*Senecio vagus* subsp. *vagus*	sawleaf groundsel	
Dicotyledon	Asteraceae	*Senecio velleioides*	forest groundsel	
Dicotyledon	Asteraceae	*Senecio x orarius*	coast groundsel	
Dicotyledon	Asteraceae	*Siloxerus multiflorus*	small wrinklewort	r
Dicotyledon	Solanaceae	*Solanum laciniatum*	kangaroo apple	
Dicotyledon	Solanaceae	*Solanum opacum*	greenberry nightshade	e
Dicotyledon	Asteraceae	*Solenogyne dominii*	smooth flat-herb	
Dicotyledon	Asteraceae	*Solenogyne gunnii*	hairy flat-herb	
Dicotyledon	Fabaceae	*Sphaerolobium minus*	eastern globepea	
Dicotyledon	Epacridaceae	*Sprengelia incarnata*	pink swampheath	
Dicotyledon	Rhamnaceae	*Spyridium eriocephalum* var. *eriocephalum*	heath dustymiller	e

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Rhamnaceae	*Spyridium gunnii*	forest dustymiller	
Dicotyledon	Rhamnaceae	*Spyridium lawrencei*	small-leaf dustymiller	v
Dicotyledon	Rhamnaceae	*Spyridium obcordatum*	creeping dustymiller	v
Dicotyledon	Rhamnaceae	*Spyridium obovatum* var. *obovatum*	smooth dustymiller	
Dicotyledon	Rhamnaceae	*Spyridium obovatum* var. *velutinum*	velvet dustymiller	
Dicotyledon	Rhamnaceae	*Spyridium parvifolium* var. *molle*	soft dustymiller	r
Dicotyledon	Rhamnaceae	*Spyridium parvifolium* var. *parvifolium*	coast dustymiller	r
Dicotyledon	Rhamnaceae	*Spyridium ulicinum*	scented dustymiller	
Dicotyledon	Rhamnaceae	*Spyridium ulicinum* (Molesworth Hills)		
Dicotyledon	Rhamnaceae	*Spyridium vexilliferum* var. *vexilliferum*	helicopter bush	r
Dicotyledon	Stackhousiaceae	*Stackhousia monogyna*	forest candles	
Dicotyledon	Stackhousiaceae	*Stackhousia subterranea*	grassland candles	e
Dicotyledon	Caryophyllaceae	*Stellaria angustifolia* subsp. *angustifolia*	swamp starwort	
Dicotyledon	Caryophyllaceae	*Stellaria angustifolia* subsp. *tenella*	delicate swamp starwort	
Dicotyledon	Caryophyllaceae	*Stellaria flaccida*	forest starwort	
Dicotyledon	Caryophyllaceae	*Stellaria multiflora* subsp. *multiflora*	rayless starwort	
Dicotyledon	Caryophyllaceae	*Stellaria multiflora* subsp. *nebulosa*	nebulous rayless starwort	r
Dicotyledon	Caryophyllaceae	*Stellaria pungens*	prickly starwort	
Dicotyledon	Rhamnaceae	*Stenanthemum pimeleoides*	propeller plant	v
Dicotyledon	Brassicaceae	*Stenopetalum lineare*	narrow threadpetal	e
Dicotyledon	Fabaceae	*Stonesiella selaginoides*	clubmoss bushpea	e

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Stylidiaceae	*Stylidium armeria* subsp. *armeria*	coastal triggerplant	
Dicotyledon	Stylidiaceae	*Stylidium beaugleholei*	fan triggerplant	r
Dicotyledon	Stylidiaceae	*Stylidium despectum*	small triggerplant	r
Dicotyledon	Stylidiaceae	*Stylidium graminifolium*	narrowleaf triggerplant	
Dicotyledon	Stylidiaceae	*Stylidium perpusillum*	tiny triggerplant	r
Dicotyledon	Epacridaceae	*Styphelia adscendens*	golden heath	
Dicotyledon	Asteraceae	*Taraxacum aristum*	mountain dandelion	r
Dicotyledon	Winteraceae	*Tasmannia lanceolata*	mountain pepper	
Dicotyledon	Proteaceae	*Telopea truncata*	tasmanian waratah	
Dicotyledon	Escalloniaceae	*Tetracarpaea tasmannica*	delicate laurel	
Dicotyledon	Tremandraceae	*Tetratheca ciliata*	northern pinkbells	r
Dicotyledon	Tremandraceae	*Tetratheca gunnii*	shy pinkbells	e
Dicotyledon	Tremandraceae	*Tetratheca labillardierei*	glandular pinkbells	
Dicotyledon	Tremandraceae	*Tetratheca pilosa* subsp. *latifolia*	broadleaf hairy pinkbells	
Dicotyledon	Tremandraceae	*Tetratheca pilosa* subsp. *pilosa*	hairy pinkbells	
Dicotyledon	Tremandraceae	*Tetratheca* sp. Flinders Is.	furneaux pinkbells	
Dicotyledon	Tremandraceae	*Tetratheca* sp. Freycinet Pen.	freycinet pinkbells	
Dicotyledon	Lamiaceae	*Teucrium corymbosum*	forest germander	r
Dicotyledon	Myrtaceae	*Thryptomene micrantha*	ribbed heathmyrtle	v
Dicotyledon	Apiaceae	*Trachymene composita* var. *composita*	smooth parsnip laceflower	
Dicotyledon	Apiaceae	*Trachymene composita* var. *robertsonii*	hairy parsnip laceflower	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Asteraceae	*Triptilodiscus pygmaeus*	dwarf sunray	v
Dicotyledon	Epacridaceae	*Trochocarpa cunninghamii*	straggling purpleberry	
Dicotyledon	Epacridaceae	*Trochocarpa disticha*	spreading purpleberry	
Dicotyledon	Epacridaceae	*Trochocarpa gunnii*	fragrant purpleberry	
Dicotyledon	Epacridaceae	*Trochocarpa thymifolia*	thymeleaf purpleberry	
Dicotyledon	Urticaceae	*Urtica incisa*	scrub nettle	
Dicotyledon	Goodeniaceae	*Velleia paradoxa*	spur velleia	v
Dicotyledon	Scrophulariaceae	*Veronica calycina*	hairy speedwell	
Dicotyledon	Scrophulariaceae	*Veronica continua*	eastcoast speedwellbush	
Dicotyledon	Scrophulariaceae	*Veronica derwentiana* subsp. *derwentiana*	derwent speedwell	
Dicotyledon	Scrophulariaceae	*Veronica formosa*	common speedwell bush	
Dicotyledon	Scrophulariaceae	*Veronica gracilis*	slender speedwell	
Dicotyledon	Scrophulariaceae	*Veronica notabilis*	forest speedwell	x
Dicotyledon	Scrophulariaceae	*Veronica plebeia*	trailing speedwell	r
Dicotyledon	Fabaceae	*Viminaria juncea*	golden spray	e
Dicotyledon	Violaceae	*Viola betonicifolia* subsp. *betonicifolia*	showy violet	
Dicotyledon	Violaceae	*Viola caleyana*	swamp violet	r
Dicotyledon	Violaceae	*Viola cleistogamoides*	shy violet	
Dicotyledon	Violaceae	*Viola fuscoviolacea*	dusky violet	
Dicotyledon	Violaceae	*Viola hederacea* subsp. *hederacea*	ivyleaf violet	
Dicotyledon	Violaceae	*Viola sieberiana*	tiny violet	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Dicotyledon	Asteraceae	*Vittadinia burbidgeae*	smooth new-holland-daisy	r
Dicotyledon	Asteraceae	*Vittadinia cuneata* var. *cuneata*	fuzzy new-holland-daisy	r
Dicotyledon	Asteraceae	*Vittadinia gracilis*	woolly new-holland-daisy	r
Dicotyledon	Asteraceae	*Vittadinia muelleri*	narrowleaf new-holland-daisy	r
Dicotyledon	Campanulaceae	*Wahlenbergia gracilenta*	annual bluebell	
Dicotyledon	Campanulaceae	*Wahlenbergia gracilis*	sprawling bluebell	
Dicotyledon	Campanulaceae	*Wahlenbergia gymnoclada*	naked bluebell	
Dicotyledon	Campanulaceae	*Wahlenbergia multicaulis*	bushy bluebell	
Dicotyledon	Campanulaceae	*Wahlenbergia stricta* subsp. *stricta*	tall bluebell	
Dicotyledon	Lamiaceae	*Westringia angustifolia*	narrowleaf westringia	r
Dicotyledon	Lamiaceae	*Westringia brevifolia*	native rosemary or shortleaf westringia	
Dicotyledon	Lamiaceae	*Westringia rubiifolia*	sticky westringia	
Dicotyledon	Apiaceae	*Xanthosia pilosa*	woolly crossherb	
Dicotyledon	Apiaceae	*Xanthosia ternifolia*	shrubby crossherb	
Dicotyledon	Asteraceae	*Xerochrysum bicolor*	eastcoast everlasting	r
Dicotyledon	Asteraceae	*Xerochrysum palustre*	swamp everlasting	v
Dicotyledon	Rutaceae	*Zieria arborescens* subsp. *arborescens*	stinkwood	
Dicotyledon	Rutaceae	*Zieria littoralis*	downy zieria	r
Dicotyledon	Rutaceae	*Zieria veronicea* subsp. *veronicea*	pink zieria	e
Dicotyledon	Zygophyllaceae	*Zygophyllum billardierei*	coast twinleaf	r

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Gymnosperm	Adiantaceae	*Adiantum aethiopicum*	common maidenhair	
Gymnosperm	Adiantaceae	*Anogramma leptophylla*	annual fern	v
Gymnosperm	Cupressaceae	*Athrotaxis cupressoides*	pencil pine	
Gymnosperm	Cupressaceae	*Athrotaxis selaginoides*	king billy pine	
Gymnosperm	Cupressaceae	*Athrotaxis x laxifolia*	hybrid pencil pine	
Gymnosperm	Cupressaceae	*Callitris oblonga* subsp. *oblonga*	south esk pine	v
Gymnosperm	Cupressaceae	*Callitris rhomboidea*	oyster bay pine	
Gymnosperm	Cupressaceae	*Diselma archeri*	dwarf pine	
Gymnosperm	Podocarpaceae	*Lagarostrobos franklinii*	huon pine	
Gymnosperm	Podocarpaceae	*Microcachrys tetragona*	creeping pine	
Gymnosperm	Podocarpaceae	*Pherosphaera hookeriana*	Mount Mawson pine	v
Gymnosperm	Podocarpaceae	*Phyllocladus aspleniifolius*	celerytop pine	
Gymnosperm	Podocarpaceae	*Podocarpus lawrencei*	mountain plumpine	
Monocotyledon	Orchidaceae	*Acianthus caudatus*	mayfly orchid	
Monocotyledon	Orchidaceae	*Acianthus pusillus*	small mosquito-orchid	
Monocotyledon	Poaceae	*Agrostis australiensis*	southern bent	r
Monocotyledon	Poaceae	*Agrostis diemenica*	flatleaf southern bent	r
Monocotyledon	Poaceae	*Agrostis parviflora*	smallflower bent	
Monocotyledon	Poaceae	*Amphibromus archeri*	pointed swampgrass	
Monocotyledon	Poaceae	*Amphibromus neesii*	southern swampgrass	r
Monocotyledon	Poaceae	*Amphibromus recurvatus*	dark swampgrass	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Monocotyledon	Poaceae	*Anthosachne scabra*	rough wheatgrass	
Monocotyledon	Centrolepidaceae	*Aphelia gracilis*	slender fanwort	r
Monocotyledon	Centrolepidaceae	*Aphelia pumilio*	dwarf fanwort	r
Monocotyledon	Liliaceae	*Arthropodium milleflorum*	pale vanilla-lily	
Monocotyledon	Liliaceae	*Arthropodium minus*	small vanilla-lily	
Monocotyledon	Liliaceae	*Arthropodium pendulum*	drooping vanilla-lily	
Monocotyledon	Liliaceae	*Arthropodium strictum*	chocolate lily	
Monocotyledon	Poaceae	*Australopyrum pectinatum*	prickly wheatgrass	
Monocotyledon	Poaceae	*Austrostipa aphylla*	leafless speargrass	
Monocotyledon	Poaceae	*Austrostipa bigeniculata*	doublejointed speargrass	r
Monocotyledon	Poaceae	*Austrostipa blackii*	crested speargrass	r
Monocotyledon	Poaceae	*Austrostipa mollis*	soft speargrass	
Monocotyledon	Poaceae	*Austrostipa pubinodis*	tall speargrass	
Monocotyledon	Poaceae	*Austrostipa rudis* subsp. *australis*	southern speargrass	
Monocotyledon	Poaceae	*Austrostipa semibarbata*	fibrous speargrass	
Monocotyledon	Poaceae	*Austrostipa stuposa*	corkscrew speargrass	
Monocotyledon	Restionaceae	*Baloskion tetraphyllum* subsp. *tetraphyllum*	tassel cordrush	
Monocotyledon	Cyperaceae	*Baumea acuta*	pale twigsedge	
Monocotyledon	Cyperaceae	*Baumea gunnii*	slender twigsedge	r
Monocotyledon	Cyperaceae	*Baumea tetragona*	square twigsedge	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Monocotyledon	Liliaceae	*Blandfordia punicea*	christmas bells	
Monocotyledon	Liliaceae	*Bulbine glauca*	bluish bulbinelily	
Monocotyledon	Liliaceae	*Bulbine semibarbata*	smallflower leeklily	
Monocotyledon	Liliaceae	*Burchardia umbellata*	milkmaids	
Monocotyledon	Orchidaceae	*Burnettia cuneata*	lizard orchid	
Monocotyledon	Liliaceae	*Caesia calliantha*	blue grasslily	r
Monocotyledon	Orchidaceae	*Caladenia alata*	fairy fingers	
Monocotyledon	Orchidaceae	*Caladenia angustata*	narrowleaf finger-orchid	
Monocotyledon	Orchidaceae	*Caladenia anthracina*	blacktip spider-orchid	e
Monocotyledon	Orchidaceae	*Caladenia atrata*	dark finger-orchid	
Monocotyledon	Orchidaceae	*Caladenia atrochila*	darkheart fingers	
Monocotyledon	Orchidaceae	*Caladenia australis*	southern spider-orchid	e
Monocotyledon	Orchidaceae	*Caladenia campbellii*	thickstem fairy fingers	e
Monocotyledon	Orchidaceae	*Caladenia carnea*	pink fingers	
Monocotyledon	Orchidaceae	*Caladenia caudata*	tailed spider-orchid	v
Monocotyledon	Orchidaceae	*Caladenia clavigera*	clubbed spider-orchid	
Monocotyledon	Orchidaceae	*Caladenia congesta*	blacktongue finger-orchid	e
Monocotyledon	Orchidaceae	*Caladenia cracens*	elegant finger-orchid	
Monocotyledon	Orchidaceae	*Caladenia dilatata*	greencomb spider-orchid	
Monocotyledon	Orchidaceae	*Caladenia echidnachila*	fawn spider-orchid	
Monocotyledon	Orchidaceae	*Caladenia filamentosa*	daddy longlegs	r

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Monocotyledon	Orchidaceae	*Caladenia fuscata*	dusky fingers	
Monocotyledon	Orchidaceae	*Caladenia gracilis*	musky finger-orchid	
Monocotyledon	Orchidaceae	*Caladenia helvina*	summer spider-orchid	
Monocotyledon	Orchidaceae	*Caladenia lindleyana*	lindleys spider-orchid	e
Monocotyledon	Orchidaceae	*Caladenia pallida*	rosy spider-orchid	e
Monocotyledon	Orchidaceae	*Caladenia patersonii*	patersons spider-orchid	v
Monocotyledon	Orchidaceae	*Caladenia pusilla*	tiny fingers	r
Monocotyledon	Orchidaceae	*Caladenia saggicola*	sagg spider-orchid	e
Monocotyledon	Orchidaceae	*Caladenia sylvicola*	forest fingers	e
Monocotyledon	Orchidaceae	*Caladenia tonellii*	robust fingers	e
Monocotyledon	Orchidaceae	*Caladenia transitoria*	green finger-orchid	
Monocotyledon	Orchidaceae	*Caladenia vulgaris*	summer fingers	
Monocotyledon	Orchidaceae	*Caleana major*	flying duck-orchid	
Monocotyledon	Orchidaceae	*Calochilus campestris*	copper beard-orchid	e
Monocotyledon	Orchidaceae	*Calochilus paludosus*	strap beard-orchid	
Monocotyledon	Orchidaceae	*Calochilus platychilus*	purple beard-orchid	
Monocotyledon	Restionaceae	*Calorophus elongatus*	long roperush	
Monocotyledon	Liliaceae	*Campynema lineare*	green mountainlily	
Monocotyledon	Cyperaceae	*Carex appressa*	tall sedge	
Monocotyledon	Cyperaceae	*Carex bichenoviana*	plains sedge	
Monocotyledon	Cyperaceae	*Carex breviculmis*	shortstem sedge	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Monocotyledon	Cyperaceae	*Carex cataractae*	lax yellowfruit sedge	
Monocotyledon	Cyperaceae	*Carex chlorantha*	greentop sedge	
Monocotyledon	Cyperaceae	*Carex fascicularis*	tassel sedge	
Monocotyledon	Cyperaceae	*Carex gaudichaudiana*	fen sedge	
Monocotyledon	Cyperaceae	*Carex gunniana*	mountain sedge	r
Monocotyledon	Cyperaceae	*Carex longebrachiata*	drooping sedge	r
Monocotyledon	Cyperaceae	*Carex* sp. Western Tasmania	western sedge	
Monocotyledon	Cyperaceae	*Carex tasmanica*	curly sedge	
Monocotyledon	Cyperaceae	*Caustis pentandra*	thick twistsedge	r
Monocotyledon	Centrolepidaceae	*Centrolepis aristata*	pointed bristlewort	
Monocotyledon	Centrolepidaceae	*Centrolepis fascicularis*	tufted bristlewort	
Monocotyledon	Centrolepidaceae	*Centrolepis glabra*	smooth bristlewort	
Monocotyledon	Centrolepidaceae	*Centrolepis monogyna*	common centrolepis	
Monocotyledon	Centrolepidaceae	*Centrolepis pedderensis*	pedder bristlewort	e
Monocotyledon	Centrolepidaceae	*Centrolepis polygyna*	wiry bristlewort	
Monocotyledon	Centrolepidaceae	*Centrolepis strigosa* subsp. *pulvinata*	bassian bristlewort	r
Monocotyledon	Centrolepidaceae	*Centrolepis strigosa* subsp. *strigosa*	hairy bristlewort	
Monocotyledon	Liliaceae	*Chamaescilla corymbosa* var. *corymbosa*	blue stars	
Monocotyledon	Orchidaceae	*Chiloglottis cornuta*	green bird-orchid	
Monocotyledon	Orchidaceae	*Chiloglottis grammata*	small bird-orchid	
Monocotyledon	Orchidaceae	*Chiloglottis gunnii*	tall bird-orchid	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Monocotyledon	Orchidaceae	*Chiloglottis reflexa*	autumn bird-orchid	
Monocotyledon	Orchidaceae	*Chiloglottis* sp. Wielangta	forest bird-orchid	
Monocotyledon	Orchidaceae	*Chiloglottis trapeziformis*	broadlip bird-orchid	e
Monocotyledon	Orchidaceae	*Chiloglottis triceratops*	three-horned bird-orchid	
Monocotyledon	Orchidaceae	*Chiloglottis valida*	large bird-orchid	
Monocotyledon	Cyperaceae	*Chorizandra enodis*	black bristlesedge	e
Monocotyledon	Orchidaceae	*Corunastylis archeri*	elfin midge-orchid	
Monocotyledon	Orchidaceae	*Corunastylis brachystachya*	shortspike midge-orchid	e
Monocotyledon	Orchidaceae	*Corunastylis despectans*	sharp midge-orchid	
Monocotyledon	Orchidaceae	*Corunastylis firthii*	firths midge-orchid	e
Monocotyledon	Orchidaceae	*Corunastylis morrisii*	bearded midge-orchid	e
Monocotyledon	Orchidaceae	*Corunastylis nuda*	tiny midge-orchid	r
Monocotyledon	Orchidaceae	*Corunastylis nudiscapa*	bare midge-orchid	e
Monocotyledon	Orchidaceae	*Corunastylis pumila*	green midge-orchid	
Monocotyledon	Orchidaceae	*Corunastylis tasmanica*	tasmanian midge-orchid	
Monocotyledon	Orchidaceae	*Corybas aconitiflorus*	spurred helmet-orchid	
Monocotyledon	Orchidaceae	*Corybas diemenicus*	stately helmet-orchid	
Monocotyledon	Orchidaceae	*Corybas fimbriatus*	fringed helmet-orchid	
Monocotyledon	Orchidaceae	*Corybas incurvus*	slaty helmet orchid	
Monocotyledon	Orchidaceae	*Corybas unguiculatus*	small helmet orchid	
Monocotyledon	Orchidaceae	*Cryptostylis leptochila*	small tongue-orchid	e

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Monocotyledon	Orchidaceae	*Cryptostylis subulata*	large tongue-orchid	
Monocotyledon	Juncaginaceae	*Cycnogeton alcockiae*	southern waterribbons	
Monocotyledon	Juncaginaceae	*Cycnogeton procerum*	greater waterribbons	
Monocotyledon	Juncaginaceae	*Cycnogeton rheophilum*	stream waterribbons	
Monocotyledon	Cyperaceae	*Cyperus gunnii*	flecked flatsedge	
Monocotyledon	Cyperaceae	*Cyperus lucidus*	leafy flatsedge	
Monocotyledon	Orchidaceae	*Cyrtostylis reniformis*	small gnat-orchid	
Monocotyledon	Orchidaceae	*Cyrtostylis robusta*	large gnat-orchid	r
Monocotyledon	Poaceae	*Deyeuxia apsleyensis*	apsley bentgrass	r
Monocotyledon	Poaceae	*Deyeuxia brachyathera*	short bentgrass	r
Monocotyledon	Poaceae	*Deyeuxia contracta*	compact bentgrass	
Monocotyledon	Poaceae	*Deyeuxia decipiens*	trickery bentgrass	r
Monocotyledon	Poaceae	*Deyeuxia frigida*	forest bentgrass	
Monocotyledon	Poaceae	*Deyeuxia minor*	small bentgrass	r
Monocotyledon	Poaceae	*Deyeuxia monticola*	mountain bentgrass	
Monocotyledon	Poaceae	*Deyeuxia quadriseta*	reed bentgrass	
Monocotyledon	Poaceae	*Deyeuxia rodwayi*	tasman bentgrass	
Monocotyledon	Poaceae	*Deyeuxia scaberula*	rough bentgrass	
Monocotyledon	Liliaceae	*Dianella brevicaulis*	shortstem flaxlily	
Monocotyledon	Liliaceae	*Dianella revoluta* var. *revoluta*	spreading flaxliliy	
Monocotyledon	Liliaceae	*Dianella tasmanica*	forest flaxlily	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Monocotyledon	Poaceae	*Dichelachne crinita*	longhair plumegrass	
Monocotyledon	Poaceae	*Dichelachne inaequiglumis*	loose plumegrass	
Monocotyledon	Poaceae	*Dichelachne micrantha*	shorthair plumegrass	
Monocotyledon	Poaceae	*Dichelachne montana*	mountain plumegrass	
Monocotyledon	Poaceae	*Dichelachne parva*	smallflower plumegrass	
Monocotyledon	Poaceae	*Dichelachne rara*	common plumegrass	
Monocotyledon	Poaceae	*Dichelachne sieberiana*	delicate plumegrass	
Monocotyledon	Iridaceae	*Diplarrena latifolia*	western flag-iris	
Monocotyledon	Iridaceae	*Diplarrena moraea*	white flag-iris	
Monocotyledon	Orchidaceae	*Dipodium roseum*	rosy hyacinth-orchid	
Monocotyledon	Orchidaceae	*Diuris chryseopsis*	common golden moths	
Monocotyledon	Orchidaceae	*Diuris palustris*	swamp doubletail	e
Monocotyledon	Orchidaceae	*Diuris pardina*	leopard orchid	
Monocotyledon	Orchidaceae	*Diuris sulphurea*	tiger orchid	
Monocotyledon	Orchidaceae	*Dockrillia striolata* subsp. *chrysantha*	yellow rock-orchid	
Monocotyledon	Orchidaceae	*Dockrillia striolata* subsp. *striolata*	streaked rock-orchid	
Monocotyledon	Liliaceae	*Drymophila cyanocarpa*	turquoise berry	
Monocotyledon	Poaceae	*Dryopoa dives*	giant mountaingrass	r
Monocotyledon	Poaceae	*Echinopogon ovatus*	hedgehog grass	
Monocotyledon	Cyperaceae	*Eleocharis acuta*	common spikesedge	
Monocotyledon	Cyperaceae	*Eleocharis gracilis*	slender spikesedge	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Monocotyledon	Cyperaceae	*Eleocharis pusilla*	small spikesedge	
Monocotyledon	Cyperaceae	*Eleocharis sphacelata*	tall spikesedge	
Monocotyledon	Restionaceae	*Empodisma minus*	spreading roperush	
Monocotyledon	Orchidaceae	*Eriochilus cucullatus*	autumn orchid	
Monocotyledon	Restionaceae	*Eurychorda complanata*	flat cordrush	
Monocotyledon	Poaceae	*Festuca plebeia*	tasmanian fescue	
Monocotyledon	Cyperaceae	*Ficinia nodosa*	knobby clubsedge	
Monocotyledon	Cyperaceae	*Gahnia grandis*	cutting grass	
Monocotyledon	Cyperaceae	*Gahnia microstachya*	slender sawsedge	
Monocotyledon	Cyperaceae	*Gahnia radula*	thatch sawsedge	
Monocotyledon	Cyperaceae	*Gahnia rodwayi*	dwarf sawsedge	
Monocotyledon	Cyperaceae	*Gahnia sieberiana*	redfruit sawsedge	
Monocotyledon	Centrolepidaceae	*Gaimardia fitzgeraldii*	woolly pincushion	
Monocotyledon	Centrolepidaceae	*Gaimardia setacea*	smooth pincushion	
Monocotyledon	Orchidaceae	*Gastrodia procera*	tall potato-orchid	
Monocotyledon	Orchidaceae	*Gastrodia sesamoides*	short potato-orchid	
Monocotyledon	Orchidaceae	*Gastrodia surcula*	cloning potato-orchid	
Monocotyledon	Orchidaceae	*Glossodia major*	waxlip orchid	
Monocotyledon	Poaceae	*Hierochloe rariflora*	cane holygrass	r
Monocotyledon	Poaceae	*Hookerochloa hookeriana*	swamp fescue	
Monocotyledon	Restionaceae	*Hypolaena fastigiata*	tassel roperush	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Monocotyledon	Cyperaceae	*Isolepis habra*	wispy clubsedge	r
Monocotyledon	Cyperaceae	*Isolepis limbata*	fringed clubsedge	
Monocotyledon	Cyperaceae	*Isolepis stellata*	star clubsedge	r
Monocotyledon	Cyperaceae	*Isolepis tasmanica*	tasmanian clubsedge	
Monocotyledon	Juncaceae	*Juncus amabilis*	gentle rush	r
Monocotyledon	Juncaceae	*Juncus bassianus*	forest rush	
Monocotyledon	Juncaceae	*Juncus bufonius*	toad rush	
Monocotyledon	Juncaceae	*Juncus filicaulis*	thread rush	
Monocotyledon	Juncaceae	*Juncus pauciflorus*	looseflower rush	
Monocotyledon	Juncaceae	*Juncus planifolius*	broadleaf rush	
Monocotyledon	Juncaceae	*Juncus prismatocarpus*	branching rush	r
Monocotyledon	Juncaceae	*Juncus vaginatus*	clustered rush	r
Monocotyledon	Poaceae	*Lachnagrostis aemula*	tumbling blowngrass	
Monocotyledon	Poaceae	*Lachnagrostis filiformis*	common blowngrass	
Monocotyledon	Poaceae	*Lachnagrostis punicea* subsp. *punicea*	bristle blowngrass	r
Monocotyledon	Poaceae	*Lachnagrostis rudis* subsp. *rudis*		
Monocotyledon	Cyperaceae	*Lepidosperma concavum*	sand swordsedge	
Monocotyledon	Cyperaceae	*Lepidosperma curtisiae*	little swordsedge	
Monocotyledon	Cyperaceae	*Lepidosperma elatius*	tall swordsedge	
Monocotyledon	Cyperaceae	*Lepidosperma ensiforme*	arching swordsedge	
Monocotyledon	Cyperaceae	*Lepidosperma filiforme*	common rapiersedge	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Monocotyledon	Cyperaceae	*Lepidosperma globosum*	stiff swordsedge	
Monocotyledon	Cyperaceae	*Lepidosperma gunnii*	narrow swordsedge	
Monocotyledon	Cyperaceae	*Lepidosperma inops*	fan sedge	
Monocotyledon	Cyperaceae	*Lepidosperma laterale*	variable swordsedge	
Monocotyledon	Cyperaceae	*Lepidosperma longitudinale*	pithy swordsedge	
Monocotyledon	Cyperaceae	*Lepidosperma oldfieldii*	dark sawsedge	
Monocotyledon	Cyperaceae	*Lepidosperma tortuosum*	twisting rapiersedge	r
Monocotyledon	Cyperaceae	*Lepidosperma viscidum*	sticky swordsedge	r
Monocotyledon	Restionaceae	*Leptocarpus tenax*	slender twinerush	
Monocotyledon	Iridaceae	*Libertia pulchella* var. *pulchella*	pretty grassflag	
Monocotyledon	Iridaceae	*Libertia pulchella* var. *pygmaea*	pygmy grassflag	
Monocotyledon	Xanthorrhoeaceae	*Lomandra longifolia*	sagg	
Monocotyledon	Xanthorrhoeaceae	*Lomandra nana*	dwarf mat-rush	
Monocotyledon	Poaceae	*Microlaena stipoides* var. *stipoides*	weeping grass	
Monocotyledon	Poaceae	*Microlaena tasmanica* var. *subalpina*	blue-green ricegrass	
Monocotyledon	Poaceae	*Microlaena tasmanica* var. *tasmanica*	tasmanian ricegrass	
Monocotyledon	Orchidaceae	*Microtis arenaria*	notched onion-orchid	
Monocotyledon	Orchidaceae	*Orthoceras strictum*	horned orchid	r
Monocotyledon	Orchidaceae	*Paracaleana minor*	small duck-orchid	
Monocotyledon	Iridaceae	*Patersonia occidentalis* var. *occidentalis*	long purpleflag	
Monocotyledon	Liliaceae	*Pauridia glabella* var. *glabella*	tiny yellowstar	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Monocotyledon	Liliaceae	*Pauridia vaginata* var. *brevistigmata*	sheathing yellowstar	
Monocotyledon	Liliaceae	*Pauridia vaginata* var. *vaginata*	sheathing yellowstar	
Monocotyledon	Poaceae	*Pentapogon quadrifidus* var. *parviflorus*	lesser five-awn speargrass	
Monocotyledon	Poaceae	*Pentapogon quadrifidus* var. *quadrifidus*	five-awned speargrass	
Monocotyledon	Orchidaceae	*Pheladenia deformis*	blue fairies	
Monocotyledon	Poaceae	*Poa clelandii*	purplesheath tussockgrass	
Monocotyledon	Poaceae	*Poa gunnii*	gunns snowgrass	
Monocotyledon	Poaceae	*Poa hookeri*	hookers tussockgrass	
Monocotyledon	Poaceae	*Poa labillardierei* var. *acris*	bluish silver tussockgrass	
Monocotyledon	Poaceae	*Poa labillardierei* var. *labillardierei*	silver tussockgrass	
Monocotyledon	Poaceae	*Poa mollis*	soft tussockgrass	r
Monocotyledon	Poaceae	*Poa rodwayi*	velvet tussockgrass	
Monocotyledon	Poaceae	*Poa sieberiana* var. *sieberiana*	grey tussockgrass	
Monocotyledon	Poaceae	*Poa tenera*	scrambling tussockgrass	
Monocotyledon	Orchidaceae	*Prasophyllum apoxychilum*	tapered leek-orchid	v
Monocotyledon	Orchidaceae	*Prasophyllum australe*	austral leek-orchid	
Monocotyledon	Orchidaceae	*Prasophyllum brevilabre*	shortlip leek-orchid	
Monocotyledon	Orchidaceae	*Prasophyllum flavum*	yellow leek-orchid	
Monocotyledon	Orchidaceae	*Prasophyllum incorrectum*	golfers leek-orchid	e
Monocotyledon	Orchidaceae	*Prasophyllum lindleyanum*	green leek-orchid	
Monocotyledon	Orchidaceae	*Prasophyllum milfordense*	milford leek-orchid	e

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Monocotyledon	Orchidaceae	*Prasophyllum perangustum*	knocklofty leek-orchid	e
Monocotyledon	Orchidaceae	*Prasophyllum robustum*	robust leek-orchid	e
Monocotyledon	Orchidaceae	*Prasophyllum* sp. Arthurs Lake	mountain leek-orchid	e
Monocotyledon	Orchidaceae	*Prasophyllum stellatum*	ben lomond leek-orchid	e
Monocotyledon	Orchidaceae	*Prasophyllum tadgellianum*	tadgells leek-orchid	r
Monocotyledon	Orchidaceae	*Prasophyllum truncatum*	truncate leek-orchid	
Monocotyledon	Orchidaceae	*Pterostylis alata*	striped greenhood	
Monocotyledon	Orchidaceae	*Pterostylis aphylla*	leafless greenhood	
Monocotyledon	Orchidaceae	*Pterostylis atrans*	darktip greenhood	
Monocotyledon	Orchidaceae	*Pterostylis atriola*	snug greenhood	r
Monocotyledon	Orchidaceae	*Pterostylis commutata*	midland greenhood	e
Monocotyledon	Orchidaceae	*Pterostylis concinna*	trim greenhood	
Monocotyledon	Orchidaceae	*Pterostylis curta*	blunt greenhood	
Monocotyledon	Orchidaceae	*Pterostylis decurva*	summer greenhood	
Monocotyledon	Orchidaceae	*Pterostylis dubia*	bluetongue greenhood	
Monocotyledon	Orchidaceae	*Pterostylis falcata*	sickle greenhood	e
Monocotyledon	Orchidaceae	*Pterostylis foliata*	slender greenhood	
Monocotyledon	Orchidaceae	*Pterostylis furcata*	forked greenhood	
Monocotyledon	Orchidaceae	*Pterostylis grandiflora*	superb greenhood	r
Monocotyledon	Orchidaceae	*Pterostylis lustra*	small sickle greenhood	e
Monocotyledon	Orchidaceae	*Pterostylis melagramma*	blackstripe greenhood	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Monocotyledon	Orchidaceae	*Pterostylis mutica*	midget greenhood	
Monocotyledon	Orchidaceae	*Pterostylis nana*	dwarf greenhood	
Monocotyledon	Orchidaceae	*Pterostylis nutans*	nodding greenhood	
Monocotyledon	Orchidaceae	*Pterostylis parviflora*	tiny greenhood	
Monocotyledon	Orchidaceae	*Pterostylis pedoglossa*	prawn greenhood	
Monocotyledon	Orchidaceae	*Pterostylis pedunculata*	maroonhood	
Monocotyledon	Orchidaceae	*Pterostylis plumosa*	bearded greenhood	
Monocotyledon	Orchidaceae	*Pterostylis sanguinea*	banded greenhood	r
Monocotyledon	Orchidaceae	*Pterostylis scabrida*	rough greenhood	
Monocotyledon	Orchidaceae	*Pterostylis squamata*	ruddy greenhood	v
Monocotyledon	Orchidaceae	*Pterostylis tasmanica*	small bearded greenhood	
Monocotyledon	Orchidaceae	*Pterostylis tunstallii*	tunstalls greenhood	e
Monocotyledon	Orchidaceae	*Pterostylis wapstrarum*	fleshy greenhood	e
Monocotyledon	Orchidaceae	*Pterostylis williamsonii*	brownlip greenhood	
Monocotyledon	Orchidaceae	*Pterostylis x ingens*	large pointed greenhood	
Monocotyledon	Orchidaceae	*Pterostylis x toveyana*	mentone greenhood	
Monocotyledon	Orchidaceae	*Pterostylis ziegeleri*	grassland greenhood	v
Monocotyledon	Poaceae	*Rytidosperma caespitosum*	common wallabygrass	
Monocotyledon	Poaceae	*Rytidosperma carphoides*	short wallabygrass	
Monocotyledon	Poaceae	*Rytidosperma geniculatum*	tasmanian wallabygrass	
Monocotyledon	Poaceae	*Rytidosperma gracile*	graceful wallabygrass	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Monocotyledon	Poaceae	*Rytidosperma indutum*	tall wallabygrass	r
Monocotyledon	Poaceae	*Rytidosperma laeve*	smooth wallabygrass	
Monocotyledon	Poaceae	*Rytidosperma penicillatum*	slender wallabygrass	
Monocotyledon	Poaceae	*Rytidosperma pilosum*	velvet wallabygrass	
Monocotyledon	Poaceae	*Rytidosperma racemosum* var. *racemosum*	stiped wallabygrass	
Monocotyledon	Poaceae	*Rytidosperma semiannulare*	marsh wallabygrass	
Monocotyledon	Poaceae	*Rytidosperma setaceum*	bristly wallbygrass	
Monocotyledon	Poaceae	*Rytidosperma tenuius*	purplish wallabygrass	
Monocotyledon	Orchidaceae	*Sarcochilus australis*	gunns tree-orchid	
Monocotyledon	Cyperaceae	*Schoenus apogon*	common bogsedge	
Monocotyledon	Cyperaceae	*Schoenus latelaminatus*	medusa bogsedge	e
Monocotyledon	Cyperaceae	*Schoenus lepidosperma* subsp. *lepidosperma*	slender bogsedge	
Monocotyledon	Cyperaceae	*Tetraria capillaris*	hair sedge	
Monocotyledon	Poaceae	*Tetrarrhena acuminata*	swamp ricegrass	
Monocotyledon	Poaceae	*Tetrarrhena distichophylla*	hairy ricegrass	
Monocotyledon	Poaceae	*Tetrarrhena juncea*	forest wiregrass	
Monocotyledon	Liliaceae	*Thelionema caespitosum*	tufted lily	
Monocotyledon	Orchidaceae	*Thelymitra arenaria*	forest sun-orchid	
Monocotyledon	Orchidaceae	*Thelymitra aristata*	great sun-orchid	
Monocotyledon	Orchidaceae	*Thelymitra atronitida*	blackhood sun-orchid	e

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Monocotyledon	Orchidaceae	*Thelymitra benthamiana*	blotched sun-orchid	e
Monocotyledon	Orchidaceae	*Thelymitra bracteata*	leafy sun-orchid	e
Monocotyledon	Orchidaceae	*Thelymitra brevifolia*	shortleaf sun-orchid	
Monocotyledon	Orchidaceae	*Thelymitra carnea*	tiny sun-orchid	
Monocotyledon	Orchidaceae	*Thelymitra exigua*	short sun-orchid	
Monocotyledon	Orchidaceae	*Thelymitra holmesii*	bluestar sun-orchid	r
Monocotyledon	Orchidaceae	*Thelymitra improcera*	coastal sun-orchid	e
Monocotyledon	Orchidaceae	*Thelymitra inflata*	inflated sun-orchid	
Monocotyledon	Orchidaceae	*Thelymitra ixioides*	spotted sun orchid	
Monocotyledon	Orchidaceae	*Thelymitra jonesii*	skyblue sun-orchid	e
Monocotyledon	Orchidaceae	*Thelymitra juncifolia*	large-spotted sun-orchid	
Monocotyledon	Orchidaceae	*Thelymitra malvina*	mauvetuft sun-orchid	e
Monocotyledon	Orchidaceae	*Thelymitra mucida*	plum sun-orchid	r
Monocotyledon	Orchidaceae	*Thelymitra nuda*	plain sun-orchid	
Monocotyledon	Orchidaceae	*Thelymitra pauciflora*	slender sun-orchid	
Monocotyledon	Orchidaceae	*Thelymitra peniculata*	trim sun-orchid	
Monocotyledon	Orchidaceae	*Thelymitra rubra*	pink sun-orchid	
Monocotyledon	Poaceae	*Themeda triandra*	kangaroo grass	
Monocotyledon	Burmanniaceae	*Thismia rodwayi*	fairy lanterns	r
Monocotyledon	Orchidaceae	*Thynninorchis huntiana*	elbow orchid	x
Monocotyledon	Orchidaceae	*Thynninorchis nothofagicola*	myrtle elbow orchid	e

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Monocotyledon	Liliaceae	*Thysanotus patersonii*	twining fringelily	
Monocotyledon	Orchidaceae	*Townsonia viridis*	beech orchid	
Monocotyledon	Liliaceae	*Tricoryne elatior*	yellow rushlily	v
Monocotyledon	Hydatellaceae	*Trithuria submersa*	submerged watertuft	r
Monocotyledon	Cyperaceae	*Uncinia elegans*	handsome hooksedge	r
Monocotyledon	Cyperaceae	*Uncinia nervosa*	moorland hooksedge	
Monocotyledon	Cyperaceae	*Uncinia riparia*	river hooksedge	
Monocotyledon	Cyperaceae	*Uncinia tenella*	delicate hooksedge	
Monocotyledon	Liliaceae	*Wurmbea biglandulosa* subsp. *biglandulosa*	glandular early nancy	
Monocotyledon	Liliaceae	*Wurmbea dioica* subsp. *dioica*	early nancy	
Monocotyledon	Liliaceae	*Wurmbea uniflora*	oneflower early nancy	
Monocotyledon	Xanthorrhoeaceae	*Xanthorrhoea arenaria*	sand grasstree	v
Monocotyledon	Xanthorrhoeaceae	*Xanthorrhoea australis*	southern grasstree	
Monocotyledon	Xanthorrhoeaceae	*Xanthorrhoea bracteata*	shiny grasstree	v
Pteridophyte	Aspleniaceae	*Asplenium appendiculatum* subsp. *appendiculatum*	narrow spleenwort	
Pteridophyte	Aspleniaceae	*Asplenium bulbiferum* subsp. *gracillimum*	mother spleenwort	
Pteridophyte	Aspleniaceae	*Asplenium flabellifolium*	necklace fern	
Pteridophyte	Aspleniaceae	*Asplenium flaccidum* subsp. *flaccidum*	weeping spleenwort	
Pteridophyte	Aspleniaceae	*Asplenium hookerianum*	maidenhair spleenwort	e

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Pteridophyte	Aspleniaceae	*Asplenium obtusatum* subsp. *northlandicum*	shore spleenwort	
Pteridophyte	Aspleniaceae	*Asplenium trichomanes* subsp. *quadrivalens*	limestone spleenwort	
Pteridophyte	Aspleniaceae	*Asplenium trichomanes* subsp. *trichomanes*	dolerite spleenwort	v
Pteridophyte	Blechnaceae	*Blechnum cartilagineum*	gristle fern	v
Pteridophyte	Blechnaceae	*Blechnum chambersii*	lance waterfern	
Pteridophyte	Blechnaceae	*Blechnum fluviatile*	ray waterfern	
Pteridophyte	Blechnaceae	*Blechnum minus*	soft waterfern	
Pteridophyte	Blechnaceae	*Blechnum neohollandicum*	prickly raspfern	e
Pteridophyte	Blechnaceae	*Blechnum nudum*	fishbone waterfern	
Pteridophyte	Blechnaceae	*Blechnum parrissii*	common raspfern	
Pteridophyte	Blechnaceae	*Blechnum patersonii* subsp. *patersonii*	strap waterfern	
Pteridophyte	Blechnaceae	*Blechnum pennamarina* subsp. *alpina*	alpine waterfern	
Pteridophyte	Blechnaceae	*Blechnum spinulosum*	small raspfern	e
Pteridophyte	Blechnaceae	*Blechnum vulcanicum*	wedge waterfern	
Pteridophyte	Blechnaceae	*Blechnum wattsii*	hard waterfern	
Pteridophyte	Ophioglossaceae	*Botrychium australe*	parsley fern	x
Pteridophyte	Ophioglossaceae	*Botrychium lunaria*	moonwort	
Pteridophyte	Dicksoniaceae	*Calochlaena dubia*	rainbow fern	
Pteridophyte	Adiantaceae	*Cheilanthes austrotenuifolia*	green rockfern	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Pteridophyte	Adiantaceae	*Cheilanthes distans*	bristly rockfern	e
Pteridophyte	Adiantaceae	*Cheilanthes sieberi* subsp. *sieberi*	narrow rockfern	
Pteridophyte	Cyatheaceae	*Cyathea australis* subsp. *australis*	rough treefern	
Pteridophyte	Cyatheaceae	*Cyathea cunninghamii*	slender treefern	e
Pteridophyte	Cyatheaceae	*Cyathea x marcescens*	skirted treefern	e
Pteridophyte	Athyriaceae	*Cystopteris tasmanica*	brittle bladderfern	
Pteridophyte	Dicksoniaceae	*Dicksonia antarctica*	soft treefern	
Pteridophyte	Athyriaceae	*Diplazium australe*	southern ladyfern	
Pteridophyte	Gleicheniaceae	*Gleichenia abscida*	dwarf coralfern	
Pteridophyte	Gleicheniaceae	*Gleichenia alpina*	alpine coralfern	
Pteridophyte	Gleicheniaceae	*Gleichenia dicarpa*	pouched coralfern	
Pteridophyte	Gleicheniaceae	*Gleichenia microphylla*	scrambling coralfern	
Pteridophyte	Dennstaedtiaceae	*Histiopteris incisa*	batswing fern	
Pteridophyte	Lycopodiaceae	*Huperzia australiana*	mother clubmoss	
Pteridophyte	Hymenophyllaceae	*Hymenophyllum applanatum*	skeleton filmyfern	
Pteridophyte	Hymenophyllaceae	*Hymenophyllum australe*	southern filmyfern	
Pteridophyte	Hymenophyllaceae	*Hymenophyllum cupressiforme*	common filmyfern	
Pteridophyte	Hymenophyllaceae	*Hymenophyllum flabellatum*	shiny filmyfern	
Pteridophyte	Hymenophyllaceae	*Hymenophyllum marginatum*	bordered filmyfern	
Pteridophyte	Hymenophyllaceae	*Hymenophyllum peltatum*	alpine filmyfern	
Pteridophyte	Hymenophyllaceae	*Hymenophyllum rarum*	narrow filmyfern	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Pteridophyte	Dennstaedtiaceae	*Hypolepis amaurorachis*	austral groundfern	
Pteridophyte	Dennstaedtiaceae	*Hypolepis distans*	scrambling groundfern	e
Pteridophyte	Dennstaedtiaceae	*Hypolepis glandulifera*	downy groundfern	
Pteridophyte	Dennstaedtiaceae	*Hypolepis muelleri*	harsh groundfern	r
Pteridophyte	Dennstaedtiaceae	*Hypolepis rugosula*	ruddy groundfern	
Pteridophyte	Isoetaceae	*Isoetes drummondii* subsp. *drummondii*	plain quillwort	r
Pteridophyte	Dryopteridaceae	*Lastreopsis acuminata*	shiny shieldfern	
Pteridophyte	Dryopteridaceae	*Lastreopsis hispida*	bristly shieldfern	
Pteridophyte	Lindsaeaceae	*Lindsaea linearis*	screw fern	
Pteridophyte	Lindsaeaceae	*Lindsaea trichomanoides*	oval wedgefern	
Pteridophyte	Lycopodiaceae	*Lycopodiella lateralis*	slenderclubmoss	
Pteridophyte	Lycopodiaceae	*Lycopodium deuterodensum*	conifer clubmoss	
Pteridophyte	Lycopodiaceae	*Lycopodium fastigiatum*	mountain clubmoss	
Pteridophyte	Polypodiaceae	*Microsorum pustulatum* subsp. *pustulatum*	kangaroo fern	
Pteridophyte	Grammitidaceae	*Notogrammitis angustifolia* subsp. *nothofageti*	beech fingerfern	
Pteridophyte	Grammitidaceae	*Notogrammitis billardierei*	common fingerfern	
Pteridophyte	Grammitidaceae	*Notogrammitis crassior*	alpine fingerfern	
Pteridophyte	Grammitidaceae	*Notogrammitis heterophylla*	gypsy fern	
Pteridophyte	Grammitidaceae	*Notogrammitis pseudociliata*	hairy fingerfern	
Pteridophyte	Ophioglossaceae	*Ophioglossum lusitanicum* subsp.	adders-tongue	

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
		coriaceum		
Pteridophyte	Adiantaceae	*Pellaea calidirupium*	hotrock fern	r
Pteridophyte	Adiantaceae	*Pellaea falcata*	sickle fern	
Pteridophyte	Lycopodiaceae	*Phlegmariurus varius*	long clubmoss	
Pteridophyte	Aspleniaceae	*Pleurosorus rutifolius*	blanket fern	
Pteridophyte	Thelypteridaceae	*Pneumatopteris pennigera*	lime fern	e
Pteridophyte	Hymenophyllaceae	*Polyphlebium venosum*	veined bristle-fern	
Pteridophyte	Dryopteridaceae	*Polystichum proliferum*	mother shieldfern	
Pteridophyte	Dennstaedtiaceae	*Pteridium esculentum* subsp. *esculentum*	bracken	
Pteridophyte	Pteridaceae	*Pteris comans*	netted brake	
Pteridophyte	Pteridaceae	*Pteris tremula*	tender brake	
Pteridophyte	Dryopteridaceae	*Rumohra adiantiformis*	leathery shieldfern	
Pteridophyte	Schizaeaceae	*Schizaea bifida*	forked combfern	
Pteridophyte	Schizaeaceae	*Schizaea fistulosa*	narrow forkfern	
Pteridophyte	Selaginellaceae	*Selaginella uliginosa*	swamp spikemoss	
Pteridophyte	Gleicheniaceae	*Sticherus lobatus*	spreading fanfern	
Pteridophyte	Gleicheniaceae	*Sticherus tener*	silky fanfern	
Pteridophyte	Gleicheniaceae	*Sticherus urceolatus*	umbrella fanfern	
Pteridophyte	Psilotaceae	*Tmesipteris elongata*	narrow forkfern	
Pteridophyte	Psilotaceae	*Tmesipteris obliqua*	common forkfern	
Pteridophyte	Psilotaceae	*Tmesipteris parva*	small forkfern	v

Table 1.2.a.2 Forest dwelling plant species				
Group	**Family**	**Scientific name 2016**	**Common name**	**TSPA status 2016**
Pteridophyte	Osmundaceae	*Todea barbara*	austral kingfern	

APPENDIX 1.2.b.1 RFA PRIORITY FLORA

VASCULAR FLORA

APPENDIX 1.2.b.1: RFA PRIORITY FLORA - VASCULAR FLORA			
SPECIES NAME	**COMMON NAME**	**TSP Act***	**EPBC Act***
Acacia axillaris	midlands wattle	v	VU
Acacia pataczekii	wallys wattle	r	
Acacia siculiformis	dagger wattle	r	
Acacia ulicifolia	juniper wattle	r	
Acacia uncifolia	coast wirilda	r	
Acrotriche cordata	coast groundberry	v	
Agrostis australiensis	southern bent	r	
Agrostis diemenica	flatleaf southern bent	r	
Allocasuarina crassa	cape pillar sheoak	r	
Allocasuarina duncanii	conical sheoak	r	
Alternanthera denticulata	lesser joyweed	e	
Amphibromus fluitans	floating swampgrass		VU
Amphibromus macrorhinus	longnosed swampgrass	e	
Amphibromus neesii	southern swampgrass	r	
Anogramma leptophylla	annual fern	v	
Aphelia gracilis	slender fanwort	r	
Aphelia pumilio	dwarf fanwort	r	
Argyrotegium fordianum	soft cottonleaf	r	
Argyrotegium nitidulum	shining cottonleaf	v	VU
Argyrotegium poliochlorum	greygreen cottonleaf	r	
Asperula minima	mossy woodruff	r	
Asperula scoparia subsp. *scoparia*	prickly woodruff	r	
Asperula subsimplex	water woodruff	r	
Asplenium hookerianum	maidenhair spleenwort	e	VU
Asplenium trichomanes subsp. *trichomanes*	dolerite spleenwort	v	
Atriplex suberecta	sprawling saltbush	v	
Australina pusilla subsp. *muelleri*	shade nettle	r	
Australopyrum velutinum	velvet wheatgrass	r	
Austrocynoglossum latifolium	forest houndstongue	r	
Austrostipa bigeniculata	doublejointed speargrass	r	

APPENDIX 1.2.b.1: RFA PRIORITY FLORA - VASCULAR FLORA			
SPECIES NAME	**COMMON NAME**	**TSP Act***	**EPBC Act***
Austrostipa blackii	crested speargrass	r	
Austrostipa scabra	rough speargrass	r	
Austrostipa scabra subsp. *falcata*	sickle speargrass	r	
Austrostipa scabra subsp. *scabra*	rough speargrass	r	
Ballantinia antipoda	southern shepherds purse	x	EN
Banksia integrifolia subsp. *integrifolia*	coast banksia	x	
Banksia serrata	saw banksia	r	
Barbarea australis	riverbed wintercress	e	EN
Baumea articulata	jointed twigsedge	r	
Baumea gunnii	slender twigsedge	r	
Bedfordia arborescens	tree blanketleaf	v	
Bertya tasmanica subsp. *tasmanica*	tasmanian bertya	e	EN
Blechnum cartilagineum	gristle fern	v	
Blechnum neohollandicum	prickly raspfern	e	
Blechnum spinulosum	small raspfern	e	
Bolboschoenus caldwellii	sea clubsedge	r	
Bolboschoenus medianus	marsh clubsedge	r	
Boronia gunnii	river boronia	v	VU
Boronia hemichiton	mt arthur boronia	e	VU
Boronia hippopala	velvet boronia	v	VU
Bossiaea tasmanica	spiny bossiaea	r	
Botrychium australe	parsley fern	x	
Brachyloma depressum	spreading heath	r	
Brachyscome perpusilla	tiny daisy	r	
Brachyscome radicata	spreading daisy	r	
Brachyscome rigidula	cutleaf daisy	v	
Brunonia australis	blue pincushion	r	
Caesia calliantha	blue grasslily	r	
Caladenia anthracina	blacktip spider-orchid	e	CR
Caladenia aurantiaca	orangetip fingers	e	
Caladenia australis	southern spider-orchid	e	
Caladenia brachyscapa	short spider-orchid	e	EX
Caladenia campbellii	thickstem fairy fingers	e	CR
Caladenia cardiochila	heartlip spider-orchid	x	
Caladenia caudata	tailed spider-orchid	v	VU

APPENDIX 1.2.b.1: RFA PRIORITY FLORA - VASCULAR FLORA			
SPECIES NAME	**COMMON NAME**	**TSP Act***	**EPBC Act***
Caladenia congesta	blacktongue finger-orchid	e	
Caladenia dienema	windswept spider-orchid	e	EN
Caladenia filamentosa	daddy longlegs	r	
Caladenia lindleyana	lindleys spider-orchid	e	CR
Caladenia pallida	rosy spider-orchid	e	CR
Caladenia patersonii	patersons spider-orchid	v	
Caladenia prolata	white fingers	e	
Caladenia pusilla	tiny fingers	r	
Caladenia saggicola	sagg spider-orchid	e	CR
Caladenia sylvicola	forest fingers	e	CR
Caladenia tonellii	robust fingers	e	CR
Calandrinia granulifera	pygmy purslane	r	
Callitriche sonderi	matted waterstarwort	r	
Callitriche umbonata	winged waterstarwort	r	
Callitris oblonga subsp. *oblonga*	south esk pine	v	EN
Calocephalus citreus	lemon beautyheads	r	
Calocephalus lacteus	milky beautyheads	r	
Calochilus campestris	copper beard-orchid	e	
Calystegia marginata	forest bindweed	e	
Calystegia sepium	swamp bindweed	r	
Calystegia soldanella	sea bindweed	r	
Carex capillacea	yellowleaf sedge	r	
Carex cephalotes	snow sedge	r	
Carex gunniana	mountain sedge	r	
Carex hypandra	dark fen sedge	r	
Carex longebrachiata	drooping sedge	r	
Cassinia rugata	wrinkled dollybush	e	VU
Caustis pentandra	thick twistsedge	r	
Centipeda cunninghamii	erect sneezeweed	r	
Centrolepis pedderensis	pedder bristlewort	e	EN
Centrolepis strigosa subsp. *pulvinata*	bassian bristlewort	r	
Centropappus brunonis	tasmanian daisytree	r	
Cheilanthes distans	bristly rockfern	e	
Chenopodium erosum	papery goosefoot	x	
Chiloglottis trapeziformis	broadlip bird-orchid	e	

APPENDIX 1.2.b.1: RFA PRIORITY FLORA - VASCULAR FLORA			
SPECIES NAME	**COMMON NAME**	**TSP Act***	**EPBC Act***
Chorizandra enodis	black bristlesedge	e	
Chrysocephalum baxteri	fringed everlasting	r	
Colobanthus curtisiae	grassland cupflower	r	VU
Colobanthus pulvinatus	cushion cupflower	r	
Comesperma defoliatum	leafless milkwort	r	
Conospermum hookeri	tasmanian smokebush	v	VU
Coopernookia barbata	purple native-primrose	x	
Corunastylis brachystachya	shortspike midge-orchid	e	EN
Corunastylis firthii	firths midge-orchid	e	CR
Corunastylis morrisii	bearded midge-orchid	e	
Corunastylis nuda	tiny midge-orchid	r	
Corunastylis nudiscapa	bare midge-orchid	e	
Corybas fordhamii	swamp pelican-orchid	e	
Cotula vulgaris var. *australasica*	slender buttons	r	
Craspedia preminghana	preminghana billybuttons	e	EN
Crassula moschata	musky stonecrop	r	
Cryptandra amara	pretty pearlflower	e	
Cryptostylis leptochila	small tongue-orchid	e	
Cullen microcephalum	dusky scurfpea	r	
Cuscuta tasmanica	golden dodder	r	
Cyathea cunninghamii	slender treefern	e	
Cyathea x marcescens	skirted treefern	e	
Cyathodes platystoma	tall cheeseberry	r	
Cyphanthera tasmanica	tasmanian rayflower	r	
Cyrtostylis robusta	large gnat-orchid	r	
Damasonium minus	starfruit	r	
Deschampsia gracillima	slender hairgrass	r	
Desmodium gunnii	southern ticktrefoil	v	
Desmodium varians	slender ticktrefoil	e	
Deyeuxia apsleyensis	apsley bentgrass	r	
Deyeuxia brachyathera	short bentgrass	r	
Deyeuxia decipiens	trickery bentgrass	r	
Deyeuxia lawrencei	lawrences bentgrass	x	EX
Deyeuxia minor	small bentgrass	r	
Dianella amoena	grassland flaxlily	r	EN

APPENDIX 1.2.b.1: RFA PRIORITY FLORA - VASCULAR FLORA			
SPECIES NAME	**COMMON NAME**	**TSP Act***	**EPBC Act***
Discaria pubescens	spiky anchorplant	e	
Diuris lanceolata	large golden moths	e	EN
Diuris palustris	swamp doubletail	e	
Drosera glanduligera	scarlet sundew	r	
Dryopoa dives	giant mountaingrass	r	
Elaeocarpus reticulatus	blueberry ash	r	
Epacris apsleyensis	apsley heath	e	EN
Epacris barbata	bearded heath	e	EN
Epacris curtisiae	north-west heath	r	
Epacris exserta	south esk heath	e	EN
Epacris glabella	smooth heath	e	EN
Epacris grandis	tall heath	e	EN
Epacris graniticola	granite heath	v	CR
Epacris limbata	bordered heath	e	CR
Epacris moscaliana	seepage heath	r	EN
Epacris stuartii	southport heath	e	CR
Epacris virgata (Beaconsfield)		v	EN
Epacris virgata (Kettering)		v	
Epilobium pallidiflorum	showy willowherb	r	
Epilobium willisii	carpet willowherb	r	
Eryngium ovinum	blue devil	v	
Eucalyptus barberi	barbers gum	r	
Eucalyptus globulus subsp. *pseudoglobulus*	gippsland blue gum	r	
Eucalyptus gunnii subsp. *divaricata*	miena cider gum	e	EN
Eucalyptus morrisbyi	morrisbys gum	e	EN
Eucalyptus perriniana	spinning gum	r	
Eucalyptus radiata subsp. *radiata*	forth river peppermint	r	
Eucalyptus risdonii	risdon peppermint	r	
Euphrasia amphisysepala	shiny cliff-eyebright	r	VU
Euphrasia amplidens		e	
Euphrasia collina subsp. *deflexifolia*	eastern eyebright	r	
Euphrasia collina subsp. *gunnii*	gunns eyebright	r	
Euphrasia collina subsp. North-west Tasmania	north-west eyebright	e	
Euphrasia collina subsp. *tetragona*	northcoast eyebright	e	

APPENDIX 1.2.b.1: RFA PRIORITY FLORA - VASCULAR FLORA			
SPECIES NAME	**COMMON NAME**	**TSP Act***	**EPBC Act***
Euphrasia fragosa	shy eyebright	e	CR
Euphrasia gibbsiae subsp. *psilantherea*	swamp eyebright	e	CR
Euphrasia gibbsiae subsp. *pulvinestris*	cushionplant eyebright	r	
Euphrasia gibbsiae subsp. *wellingtonensis*	mt wellington eyebright	r	
Euphrasia phragmostoma	hairy cliff-eyebright	v	VU
Euphrasia scabra	yellow eyebright	e	
Euphrasia semipicta	peninsula eyebright	e	EN
Euphrasia sp. Bivouac Bay	masked cliff-eyebright	e	EN
Eutaxia microphylla	spiny bushpea	r	
Frankenia pauciflora var. *gunnii*	southern seaheath	r	
Geococcus pusillus	earth cress	r	
Geum talbotianum	tasmanian snowrose	r	
Glossostigma elatinoides	small mudmat	r	
Glycine latrobeana	clover glycine	v	VU
Glycine microphylla	small-leaf glycine	v	
Gompholobium ecostatum	dwarf wedgepea	e	
Goodenia geniculata	bent native-primrose	e	
Gratiola pubescens	hairy brooklime	v	
Gynatrix pulchella	fragrant hempbush	r	
Gyrostemon thesioides	broom wheelfruit	r	
Hakea ulicina	furze needlebush	v	
Haloragis aspera	rough raspwort	v	
Haloragis heterophylla	variable raspwort	r	
Haloragis myriocarpa	prickly raspwort	r	
Hardenbergia violacea	purple coralpea	e	
Hedycarya angustifolia	australian mulberry	r	
Hibbertia basaltica	basalt guineaflower	e	EN
Hibbertia calycina	lesser guineaflower	v	
Hibbertia obtusifolia	grey guineaflower	x	
Hibbertia rufa	brown guineaflower	r	
Hibbertia virgata	twiggy guineaflower	r	
Hierochloe rariflora	cane holygrass	r	
Hovea corrickiae	glossy purplepea	r	
Hovea montana	mountain purplepea	r	
Hovea tasmanica	rockfield purplepea	r	

APPENDIX 1.2.b.1: RFA PRIORITY FLORA - VASCULAR FLORA			
SPECIES NAME	**COMMON NAME**	**TSP Act***	**EPBC Act***
Hyalosperma demissum	moss sunray	e	
Hydrocotyle comocarpa	fringefruit pennywort	r	
Hydrocotyle laxiflora	stinking pennywort	e	
Hydrorchis orbicularis	swamp onion-orchid	r	
Hypolepis distans	scrambling groundfern	e	EN
Hypolepis muelleri	harsh groundfern	r	
Isoetes drummondii subsp. *drummondii*	plain quillwort	r	
Isoetes elatior	tall quillwort	r	
Isoetes humilior	veiled quillwort	r	
Isoetes sp. Maxwell River	limestone quillwort	r	
Isoetopsis graminifolia	grass cushion	v	
Isolepis habra	wispy clubsedge	r	
Isolepis stellata	star clubsedge	r	
Isopogon ceratophyllus	horny conebush	v	
Juncus amabilis	gentle rush	r	
Juncus fockei	slender jointleaf rush	r	
Juncus prismatocarpus	branching rush	r	
Juncus vaginatus	clustered rush	r	
Lachnagrostis billardierei subsp. *tenuiseta*	small-awn blowngrass	r	
Lachnagrostis punicea subsp. *filifolia*	narrowleaf blowngrass	r	
Lachnagrostis punicea subsp. *punicea*	bristle blowngrass	r	
Lachnagrostis robusta	tall blowngrass	r	
Lasiopetalum baueri	slender velvetbush	r	
Lasiopetalum discolor	coast velvetbush	r	
Lasiopetalum micranthum	tasmanian velvetbush	r	
Lepidium flexicaule	springy peppercress	r	
Lepidium hyssopifolium	soft peppercress	e	EN
Lepidosperma forsythii	stout rapiersedge	r	
Lepidosperma tortuosum	twisting rapiersedge	r	
Lepidosperma viscidum	sticky swordsedge	r	
Lepilaena australis	australian watermat	x	
Lepilaena marina	sea watermat	r	
Lepilaena patentifolia	spreading watermat	r	
Lepilaena preissii	slender watermat	r	
Leptorhynchos elongatus	lanky buttons	e	

APPENDIX 1.2.b.1: RFA PRIORITY FLORA - VASCULAR FLORA			
SPECIES NAME	**COMMON NAME**	**TSP Act***	**EPBC Act***
Leucochrysum albicans var. *tricolor*	grassland paperdaisy	e	EN
Leucopogon affinis	lance beardheath	r	
Leucopogon esquamatus	swamp beardheath	r	
Leucopogon virgatus var. *brevifolius*	shortleaf beardheath	r	
Levenhookia dubia	hairy stylewort	x	
Limonium australe var. *australe*	yellow sea-lavender	r	
Limonium australe var. *baudinii*	tasmanian sea-lavender	v	VU
Liparophyllum exaltatum	erect marshflower	r	
Lobelia dentata		r	
Lobelia pratioides	poison lobelia	v	
Lobelia rhombifolia	tufted lobelia	r	
Lomatia tasmanica	kings lomatia	e	CR
Lotus australis	australian trefoil	r	
Luzula atrata	slender woodrush	r	
Lycopus australis	australian gypsywort	e	
Lythrum salicaria	purple loosestrife	v	
Melaleuca pustulata	warty paperbark	r	
Mentha australis	river mint	e	
Micrantheum serpentinum	western tridentbush	r	
Microtidium atratum	yellow onion-orchid	r	
Milligania johnstonii	shortleaf milligania	r	
Milligania longifolia	longleaf milligania	r	
Millotia muelleri	clustered bowflower	e	
Mirbelia oxylobioides	sandstone bushpea	v	
Monotoca submutica var. *autumnalis*	roundleaf broomheath	r	
Muehlenbeckia axillaris	matted lignum	r	
Myoporum parvifolium	creeping boobialla	v	
Myosurus australis	southern mousetail	e	
Myriophyllum glomeratum	clustered watermilfoil	x	
Myriophyllum integrifolium	tiny watermilfoil	v	
Myriophyllum muelleri	hooded watermilfoil	r	
Odixia achlaena	golden everlastingbush	r	
Olearia hookeri	crimsontip daisybush	r	
Orites milliganii	toothed orites	r	
Orthoceras strictum	horned orchid	r	

APPENDIX 1.2.b.1: RFA PRIORITY FLORA - VASCULAR FLORA			
SPECIES NAME	**COMMON NAME**	**TSP Act***	**EPBC Act***
Ozothamnus lycopodioides	clubmoss everlastingbush	r	
Ozothamnus reflexifolius	reflexed everlastingbush	v	VU
Ozothamnus selaginoides	table mountain everlastingbush	x	EX
Pandorea pandorana	wonga vine	r	
Parietaria debilis	shade pellitory	r	
Pellaea calidirupium	hotrock fern	r	
Pentachondra ericifolia	fine frillyheath	r	
Persicaria decipiens	slenderwaterpepper	v	
Persicaria subsessilis	bristly waterpepper	e	
Persoonia moscalii	creeping geebung	r	
Persoonia muelleri subsp. *angustifolia*	narrowleaf geebung	r	
Phebalium daviesii	davies waxflower	e	CR
Pherosphaera hookeriana	Mount Mawson pine	v	
Philotheca freyciana	freycinet waxflower	e	EN
Phyllangium distylis	tiny mitrewort	r	
Phyllangium divergens	wiry mitrewort	v	
Phylloglossum drummondii	pygmy clubmoss	r	
Pilularia novae-hollandiae	austral pillwort	r	
Pimelea axiflora subsp. *axiflora*	bootlace bush	e	
Pimelea curviflora var. *gracilis*	slender curved riceflower	r	
Pimelea curviflora var. *sericea*	silky curved riceflower	r	
Pimelea flava subsp. *flava*	yellow riceflower	r	
Pimelea milliganii	silver riceflower	r	
Pimelea sp. Tunbridge	grassland riceflower	e	
Planocarpa nitida	black cheeseberry	r	
Planocarpa sulcata	grooved cheeseberry	r	
Plantago debilis	shade plantain	r	
Plantago glacialis	small star plantain	r	
Pneumatopteris pennigera	lime fern	e	
Poa halmaturina	dune tussockgrass	r	
Poa mollis	soft tussockgrass	r	
Podotheca angustifolia	sticky longheads	x	
Polyscias sp. Douglas-Denison	ferny panax	e	
Pomaderris elachophylla	small-leaf dogwood	v	

APPENDIX 1.2.b.1: RFA PRIORITY FLORA - VASCULAR FLORA			
SPECIES NAME	**COMMON NAME**	**TSP Act***	**EPBC Act***
Pomaderris intermedia	lemon dogwood	r	
Pomaderris oraria subsp. *oraria*	bassian dogwood	r	
Pomaderris paniculosa subsp. *paralia*	shining dogwood	r	
Pomaderris phylicifolia subsp. *ericoides*	revolute narrowleaf dogwood	r	
Pomaderris phylicifolia subsp. *phylicifolia*	narrowleaf dogwood	r	
Pomaderris pilifera subsp. *talpicutica*	moleskin dogwood	e	VU
Poranthera petalifera	mountain poranthera	v	VU
Prasophyllum amoenum	dainty leek-orchid	v	EN
Prasophyllum apoxychilum	tapered leek-orchid	v	EN
Prasophyllum atratum	three hummock leek-orchid	e	CR
Prasophyllum castaneum	chestnut leek-orchid	e	CR
Prasophyllum crebriflorum	crowded leek-orchid	e	EN
Prasophyllum favonium	western leek-orchid	e	CR
Prasophyllum incorrectum	golfers leek-orchid	e	CR
Prasophyllum limnetes	marsh leek-orchid	e	CR
Prasophyllum milfordense	milford leek-orchid	e	CR
Prasophyllum olidum	pungent leek-orchid	e	CR
Prasophyllum perangustum	knocklofty leek-orchid	e	CR
Prasophyllum pulchellum	pretty leek-orchid	e	CR
Prasophyllum robustum	robust leek-orchid	e	CR
Prasophyllum secutum	northern leek-orchid	e	EN
Prasophyllum sp. Arthurs Lake	mountain leek-orchid	e	
Prasophyllum stellatum	ben lomond leek-orchid	e	CR
Prasophyllum tadgellianum	tadgells leek-orchid	r	
Prasophyllum taphanyx	graveside leek-orchid	e	CR
Prasophyllum tunbridgense	tunbridge leek-orchid	e	EN
Prostanthera cuneata	alpine mintbush	x	
Prostanthera rotundifolia	roundleaf mintbush	v	
Pterostylis atriola	snug greenhood	r	
Pterostylis commutata	midland greenhood	e	CR
Pterostylis cucullata subsp. *cucullata*	leafy greenhood	e	VU
Pterostylis falcata	sickle greenhood	e	
Pterostylis grandiflora	superb greenhood	r	
Pterostylis lustra	small sickle greenhood	e	

APPENDIX 1.2.b.1: RFA PRIORITY FLORA - VASCULAR FLORA			
SPECIES NAME	**COMMON NAME**	**TSP Act***	**EPBC Act***
Pterostylis pratensis	liawenee greenhood	v	VU
Pterostylis rubenachii	arthur river greenhood	e	EN
Pterostylis sanguinea	banded greenhood	r	
Pterostylis squamata	ruddy greenhood	v	
Pterostylis tunstallii	tunstalls greenhood	e	
Pterostylis wapstrarum	fleshy greenhood	e	CR
Pterostylis ziegeleri	grassland greenhood	v	VU
Puccinellia perlaxa	spreading saltmarshgrass	r	
Pultenaea humilis	dwarf bushpea	v	
Pultenaea mollis	soft bushpea	v	
Pultenaea prostrata	silky bushpea	v	
Pultenaea sericea	chaffy bushpea	v	
Ranunculus acaulis	dune buttercup	r	
Ranunculus collicola	lake augusta buttercup	r	
Ranunculus diminutus	brackish buttercup	e	
Ranunculus jugosus	twinned buttercup	r	
Ranunculus prasinus	midlands buttercup	e	EN
Ranunculus pumilio var. *pumilio*	ferny buttercup	r	
Rhodanthe anthemoides	chamomile sunray	r	
Rhytidosporum inconspicuum	alpine appleberry	e	
Rumex bidens	mud dock	v	
Ruppia megacarpa	largefruit seatassel	r	
Ruppia tuberosa	tuberous seatassel	r	
Rytidosperma indutum	tall wallabygrass	r	
Rytidosperma remotum	remote wallabygrass	r	
Sagina diemensis	tasmanian pearlwort	e	EN
Scaevola aemula	fairy fanflower	e	
Scaevola albida	pale fanflower	v	
Schenkia australis	spike centaury	r	
Schoenoplectus tabernaemontani	river clubsedge	r	
Schoenus brevifolius	zigzag bogsedge	r	
Schoenus latelaminatus	medusa bogsedge	e	
Scleranthus brockiei	mountain knawel	r	
Scleranthus diander	tufted knawel	v	
Scleranthus fasciculatus	spreading knawel	v	

APPENDIX 1.2.b.1: RFA PRIORITY FLORA - VASCULAR FLORA			
SPECIES NAME	**COMMON NAME**	**TSP Act***	**EPBC Act***
Scutellaria humilis	dwarf skullcap	r	
Senecio campylocarpus	bulging fireweed	v	
Senecio georgianus	grey fireweed	x	EX
Senecio macrocarpus	largefruit fireweed	x	VU
Senecio psilocarpus	swamp fireweed	e	VU
Senecio squarrosus	leafy fireweed	r	
Sicyos australis	star cucumber	r	
Siloxerus multiflorus	small wrinklewort	r	
Solanum opacum	greenberry nightshade	e	
Sowerbaea juncea	purple rushlily	v	
Spyridium eriocephalum var. *eriocephalum*	heath dustymiller	e	
Spyridium lawrencei	small-leaf dustymiller	v	EN
Spyridium obcordatum	creeping dustymiller	v	VU
Spyridium parvifolium var. *molle*	soft dustymiller	r	
Spyridium parvifolium var. *parvifolium*	coast dustymiller	r	
Spyridium vexilliferum var. *vexilliferum*	helicopter bush	r	
Stackhousia pulvinaris	alpine candles	v	
Stackhousia subterranea	grassland candles	e	
Stellaria multiflora subsp. *nebulosa*	nebulous rayless starwort	r	
Stenanthemum pimeleoides	propeller plant	v	VU
Stenopetalum lineare	narrow threadpetal	e	
Stonesiella selaginoides	clubmoss bushpea	e	EN
Stuckenia pectinata	fennel pondweed	r	
Stylidium beaugleholei	fan triggerplant	r	
Stylidium despectum	small triggerplant	r	
Stylidium perpusillum	tiny triggerplant	r	
Taraxacum aristum	mountain dandelion	r	
Taraxacum cygnorum	coast dandelion		VU
Tetratheca ciliata	northern pinkbells	r	
Tetratheca gunnii	shy pinkbells	e	CR
Teucrium corymbosum	forest germander	r	
Thelymitra antennifera	rabbit ears	e	
Thelymitra atronitida	blackhood sun-orchid	e	
Thelymitra benthamiana	blotched sun-orchid	e	
Thelymitra bracteata	leafy sun-orchid	e	

APPENDIX 1.2.b.1: RFA PRIORITY FLORA - VASCULAR FLORA			
SPECIES NAME	**COMMON NAME**	**TSP Act***	**EPBC Act***
Thelymitra holmesii	bluestar sun-orchid	r	
Thelymitra improcera	coastal sun-orchid	e	
Thelymitra jonesii	skyblue sun-orchid	e	EN
Thelymitra malvina	mauvetuft sun-orchid	e	
Thelymitra mucida	plum sun-orchid	r	
Thesium australe	southern toadflax	x	VU
Thismia rodwayi	fairy lanterns	r	
Thryptomene micrantha	ribbed heathmyrtle	v	
Thynninorchis huntiana	elbow orchid	x	
Thynninorchis nothofagicola	myrtle elbow orchid	e	CR
Tmesipteris parva	small forkfern	v	
Tricoryne elatior	yellow rushlily	v	
Tricostularia pauciflora	needle bogsedge	r	
Triglochin minutissima	tiny arrowgrass	r	
Triglochin mucronata	prickly arrowgrass	e	
Triptilodiscus pygmaeus	dwarf sunray	v	
Trithuria submersa	submerged watertuft	r	
Uncinia elegans	handsome hooksedge	r	
Utricularia australis	yellow bladderwort	r	
Utricularia tenella	pink bladderwort	r	
Utricularia violacea	violet bladderwort	r	
Vallisneria australis	river ribbons	r	
Velleia paradoxa	spur velleia	v	
Veronica ciliolata subsp. *fiordensis*	ben lomond cushionplant	v	VU
Veronica notabilis	forest speedwell	x	
Veronica novae-hollandiae	coast speedwell	v	
Veronica plebeia	trailing speedwell	r	
Viminaria juncea	golden spray	e	
Viola caleyana	swamp violet	r	
Viola cunninghamii	alpine violet	r	
Viola hederacea subsp. *curtisiae*	montane ivyleaf violet	r	
Vittadinia australasica var. *oricola*	coast new-holland-daisy	e	
Vittadinia burbidgeae	smooth new-holland-daisy	r	
Vittadinia cuneata var. *cuneata*	fuzzy new-holland-daisy	r	
Vittadinia gracilis	woolly new-holland-daisy	r	

APPENDIX 1.2.b.1: RFA PRIORITY FLORA - VASCULAR FLORA			
SPECIES NAME	**COMMON NAME**	**TSP Act***	**EPBC Act***
Vittadinia muelleri	narrowleaf new-holland-daisy	r	
Westringia angustifolia	narrowleaf westringia	r	
Wilsonia humilis	silky wilsonia	r	
Wilsonia rotundifolia	roundleaf wilsonia	r	
Wurmbea latifolia subsp. *vanessae*	broadleaf early nancy	e	
Xanthorrhoea arenaria	sand grasstree	v	VU
Xanthorrhoea bracteata	shiny grasstree	v	EN
Xerochrysum bicolor	eastcoast everlasting	r	
Xerochrysum palustre	swamp everlasting	v	VU
Zieria littoralis	downy zieria	r	
Zieria veronicea subsp. *veronicea*	pink zieria	e	
Zygophyllum billardierei	coast twinleaf	r	

***TSP Act codes**:

Extinct (x): Those species presumed extinct.
Endangered (e): Those species in danger of extinction because long term survival is unlikely while the factors causing them to be endangered continue operating.
Vulnerable (v): Those species likely to become endangered while the factors causing them to become vulnerable continue operating.
Rare (r): Those species with a small population in Tasmania that are at risk.

***EPBC Act codes**

Extinct (EX)
Critically Endangered (CR)
Endangered (EN)
Vulnerable (VU)

NON-VASCULAR FLORA

APPENDIX 1.2.b.1: RFA PRIORITY FLORA – NON-VASCULAR FLORA				
SPECIES NAME	**COMMON NAME**	**Group**	**TSP Act***	**EPBC Act***
Cystoseira trinodis	brown alga	Algae	r	
Ambuchanania leucobryoides	daisy pan moss	Bryophyte	r	
Bunodophoron notatum		Lichen	e	
Calycidium cuneatum		Lichen	r	
Calycidium polycarpum		Lichen	r	
Cetraria islandica subsp. *antarctica*		Lichen	r	
Erioderma sorediatum		Lichen	e	
Hypotrachyna immaculata		Lichen	r	
Hypotrachyna laevigata		Lichen	v	
Melanelia piliferella		Lichen	v	
Menegazzia minuta		Lichen	e	
Parmelina pallida		Lichen	e	
Parmelina whinrayi		Lichen	r	
Parmeliopsis ambigua		Lichen	r	
Parmeliopsis hyperopta		Lichen	r	
Parmotrema crinitum		Lichen	r	
Punctelia subflava		Lichen	x	
Roccellinastrum neglectum		Lichen	e	
Teloschistes flavicans	golden-hair lichen	Lichen	r	
Xanthoparmelia amphixantha		Lichen	e	
Xanthoparmelia graniticola		Lichen	r	
Xanthoparmelia jarmaniae		Lichen	v	
Xanthoparmelia mannumensis		Lichen	v	
Xanthoparmelia microphyllizans		Lichen	r	
Xanthoparmelia molliuscula		Lichen	e	
Xanthoparmelia oleosa		Lichen	r	
Xanthoparmelia subloxodella		Lichen	e	
Xanthoparmelia vicaria		Lichen	r	
Xanthoparmelia vicariella		Lichen	r	
Xanthoparmelia willisii		Lichen	e	
Pseudocephalozia paludicola	liverwort	Liverwort		VU

***TSP Act codes**:

Extinct (x): Those species presumed extinct.
Endangered (e): Those species in danger of extinction because long term survival is unlikely while the factors causing them to be endangered continue operating.
Vulnerable (v): Those species likely to become endangered while the factors causing them to become vulnerable continue operating.
Rare (r): Those species with a small population in Tasmania that are at risk.

***EPBC Act codes**

Extinct (EX)
Critically Endangered (CR)
Endangered (EN)
Vulnerable (VU)

Table 1.2.b.5 Proposed Priority Fauna Species

Table 1.2.b.5 Proposed Priority Fauna Species	
Species	**Common name**
Acanthiza pusilla archibaldi	Brown thornbill (King Island)
Acanthornis magnus greenianus	Scrubtit (King Island)
Accipiter novaehollandiae	Grey goshawk
Alcedo azurea diemensis	Azure kingfisher
Antipodia chaostola	Chaostola skipper
Aquila audax	Wedge-tailed eagle
Astacopsis gouldi	Giant freshwater crayfish
Austrochloritis victoriae	Southern hairy red snail
Beddomeia angulata	Hydrobiid snail (Rabid River)
Beddomeia averni	Hydrobiid snail (West Gawler)
Beddomeia bellii	Hydrobiid snail (Heazlewood River)
Beddomeia bowryensis	Hydrobiid snail (Bowry Creek)
Beddomeia briansmithi	Hydrobiid snail (Fern Creek)
Beddomeia camensis	Hydrobiid snail (Cam River)
Beddomeia capensis	Hydrobiid snail (Table Cape)
Beddomeia fallax	Hydrobiid snail (Heathcote Creek)
Beddomeia forthensis	Hydrobiid snail (Wilmot River)
Beddomeia franklandensis	Hydrobiid snail (Frankland River)
Beddomeia fromensis	Hydrobiid snail (Frome River)
Beddomeia fultoni	Hydrobiid snail (Farnhams Creek)
Beddomeia gibba	Hydrobiid snail (Salmon River Road)
Beddomeia hallae	Hydrobiid snail (Buttons Rivulet)
Beddomeia hermansi	Hydrobiid snail (Viking Creek)
Beddomeia hullii	Hydrobiid snail (Heazlewood River)
Beddomeia inflata	Hydrobiid snail (Heathcote Creek)
Beddomeia kershawi	Hydrobiid snail (Macquarie River)
Beddomeia kessneri	Hydrobiid snail (Dip Falls)
Beddomeia krybetes	Hydrobiid snail (Great Lake)
Beddomeia launcestonensis	Hydrobiid snail (Cataract Gorge)

Table 1.2.b.5 Proposed Priority Fauna Species	
Species	**Common name**
Beddomeia lodderae	Hydrobiid snail (Upper Castra Rivulet)
Beddomeia mesibovi	Hydrobiid snail (Arthur River)
Beddomeia minima	Hydrobiid snail (Scottsdale)
Beddomeia petterdi	Hydrobiid snail (Blyth River)
Beddomeia phasianella	Hydrobiid snail (Keddies Creek)
Beddomeia protuberata	Hydrobiid snail (Emu River)
Beddomeia ronaldi	Hydrobiid snail (St. Patricks River)
Beddomeia salmonis	Hydrobiid snail (Salmon River)
Beddomeia tasmanica	Hydrobiid snail (Terrys Creek)
Beddomeia topsiae	Hydrobiid snail (Williamson Creek)
Beddomeia trochiformis	Hydrobiid snail (Bowry Creek)
Beddomeia tumida	Hydrobiid snail (St. Pauls River)
Beddomeia turnerae	Hydrobiid snail (Minnow River)
Beddomeia waterhouseae	Hydrobiid snail (Clayton's Rivulet)
Beddomeia wilmotensis	Hydrobiid snail (Wilmot river)
Beddomeia wiseae	Hydrobiid snail (Blizzards Creek)
Beddomeia zeehanensis	Hydrobiid snail (Little Henty River)
Castiarina insculpta	Miena jewel beetle
Catadromus lacordairei	Catadromus carabid beetle
Charopidae "Skemps"	“Skemps” snail
Dasyurus maculatus maculatus	Spotted tailed quoll
"Discocharopa" vigens	Land snail
Enchymus sp. nov.	Weldborough forest weevil
Ecnomina vega	Caddisfly
Engaeus granulatus	Central north burrowing crayfish
Engaeus martigener	Furneaux burrowing crayfish
Engaeus orramakunna	Mt. Arthur burrowing crayfish
Engaeus spinicaudatus	Scottsdale burrowing crayfish
Engaeus yabbimunna	Burrowing crayfish (Burnie)
Galaxias auratus	Golden galaxias

Table 1.2.b.5 Proposed Priority Fauna Species	
Species	**Common name**
Galaxias fontanus	Swan galaxias
Galaxias johnstoni	Clarence galaxias
Galaxias parvus	Swamp galaxias
Galaxias tanycephalus	Saddled galaxias
Galaxiella pusilla	Dwarf galaxias
Glacidorbis pawpela	Hydrobiid snail (Great Lake)
Goedetrechus mendumae	Cave beetle (Ida Bay)
Goedetrechus parallelus	Cave beetle (Junee-Florentine)
Haliaeetus leucogaster	White-bellied sea-eagle
Helicarion rubicundus	Burgundy snail
Hickmanoxyomma cavaticum	Cave harvestman
Hickmanoxyomma gibbergunyar	Cave harvestman
Hoplogonus bornemisszai	Bornemisszas stag beetle
Hoplogonus simsoni	Simsons stag beetle
Hoplogonus vanderschoori	Vanderschoors stag beetle
Hydrobiosella sagitta	Caddisfly
Hydroptila scamandra	Caddisfly
Idacarabus cordicollis	Cave beetle (Hastings Cave)
Idacarabus troglodytes	Cave beetle (Precipitous Bluff)
Lathamus discolor	Swift parrot
Limnodynastes peroni	Perons marsh frog
Lissotes latidens	Broad-toothed stag beetle
Lissotes menalcas	Mt Mangana stag beetle
Litoria raniformis	Green and gold frog
Mesacanthotelson setosus	Isopod (Great Lake)
Mesacanthotelson tasmaniae	Isopod (Great Lake)
Micropathus kiernani	Cave cricket
Migas plomleyi	Spider (Cataract Gorge)
Miselaoma weldi	Stanley Snail
Neophema chrysogaster	Orange-bellied parrot

Table 1.2.b.5 Proposed Priority Fauna Species	
Species	**Common name**
Oecetis gilva	Caddisfly
Olgania excavata	Cave spider (Bubs Hill Cave)
Onchotelson brevicaudatus	Isopod (Great Lake & Shannon Lagoon)
Onchotelson spatulatus	Isopod (Great Lake)
Oreisplanus munionga larana	Marrawah skipper
Oreixenica ptunarra	Ptunarra brown butterfly
Orphninotrichia maculata	Caddisfly
Orthotrichia adornata	Caddisfly
Oxyethira mienica	Caddisfly
Paragalaxias dissimilis	Shannon paragalaxias
Paragalaxias eleotroides	Great Lake paragalaxias
Paragalaxias mesotes	Arthurs paragalaxias
Pardalotus quadragintus	Forty-spotted pardalote
Pasmaditta jungermanniae	“Cataract Gorge” snail
Perameles gunni	Eastern barred bandicoot
Phrantela annamurrayae	Hydrobiid snail (Heazlewood River)
Phrantela conica	Hydrobiid snail (Little Henty River)
Phrantela marginata	Hydrobiid snail (Heazlewood River)
Phrantela pupiformis	Hydrobiid snail (Tyenna River)
Platycercus caledonicus brownii	King Island green rosella
Plesiothele fentoni	Lake Fenton trapdoor spider
Prototroctes maraena	Australian grayling
Pseudalmenus chlorinda myrsilus	Tasmanian hairstreak butterfly
Pseudemoia pagenstecheri	Tussock skink
Pseudemoia rawlinsoni	Glossy grass skink
Pseudomys novaehollandiae	New Holland mouse
Pseudotyrannochthonius typhlus	Cave pseudoscorpion (Mole Creek)
Ramiheithrus kocinus	Caddisfly
Roblinella agnewi	Silky snail
Sarcophilus harrisii	Tasmanian devil

Table 1.2.b.5 Proposed Priority Fauna Species	
Species	**Common name**
Schayera baiulus	Schayers grasshopper
Stenopsychodes lineata	Caddisfly
Tasimia drepana	Caddisfly
Tasmanipatus anophthalmus	Blind velvet worm
Tasmanipatus barretti	Giant velvet worm
Tasmanotrechus cockerilli	Cave beetle (Mole Creek)
Tasmaphena lamproides	Keeled snail
Tasniphargus tyleri	Amphipod (Great Lake)
Tyto novaehollandiae castanops	Tasmanian masked owl
Uramphisopus pearsoni	Isopod (Great Lake)

APPENDIX 1.3.a: RISK OF GENETIC LOSS

Table 1.3.a.1Assessment of the potential risk to threatened and priority Tasmanian forest-associated flora species from loss of genetic diversity or isolation

Species are those which are listed on Schedules of the Tasmanian Threatened Species Protection Act, or have been listed or proposed for listing as RFA priority species. Note that the list excludes orchid species (as they are generally rapid speciators) as well as extinct species. In the absence of known levels of morphological or genetic variation across the range of the species or evidence of range declines, the assessment is largely based on extent of occurrence (the lower the extent the higher the risk) and presence of geographic outliers of limited extent.

Table 1.3.a.1Assessment of the potential risk to threatened and priority Tasmanian forest-associated flora species from loss of genetic diversity or isolation

Species	**Common name**	**Group**	**Forest dwelling**	**TSP Act**	**EPBC Act**	**1.3.a risk category**
Acacia axillaris	midlands wattle	Dicotyledon	yes	v	VU	high
Acacia pataczekii	wallys wattle	Dicotyledon	yes	r		high
Acacia siculiformis	dagger wattle	Dicotyledon	yes	r		moderate
Acacia ulicifolia	juniper wattle	Dicotyledon	yes	r		moderate
Acacia uncifolia	coast wirilda	Dicotyledon	yes	r		moderate
Acrotriche cordata	coast groundberry	Dicotyledon		v		moderate
Agrostis australiensis	southern bent	Monocotyledon	yes	r		high
Agrostis diemenica	flatleaf southern bent	Monocotyledon	yes	r		high
Allocasuarina crassa	cape pillar sheoak	Dicotyledon	yes	r		moderate
Allocasuarina duncanii	conical sheoak	Dicotyledon	yes	r		moderate
Alternanthera denticulata	lesser joyweed	Dicotyledon	yes	e		moderate
Amphibromus macrorhinus	longnosed swampgrass	Monocotyledon		e		moderate
Amphibromus neesii	southern swampgrass	Monocotyledon	yes	r		moderate
Anogramma leptophylla	annual fern	Pteridophyte	yes	v		high
Aphelia gracilis	slender fanwort	Monocotyledon	yes	r		moderate
Aphelia pumilio	dwarf fanwort	Monocotyledon	yes	r		moderate
Argyrotegium fordianum	soft cottonleaf	Dicotyledon		r		high
Argyrotegium nitidulum	shining cottonleaf	Dicotyledon		v	VU	high
Argyrotegium poliochlorum	greygreen cottonleaf	Dicotyledon		r		high
Asperula minima	mossy woodruff	Dicotyledon	yes	r		high
Asperula scoparia subsp. *scoparia*	prickly woodruff	Dicotyledon	yes	r		low
Asperula subsimplex	water woodruff	Dicotyledon	yes	r		moderate
Asplenium hookerianum	maidenhair spleenwort	Pteridophyte	yes	e	VU	high
Asplenium trichomanes subsp. *trichomanes*	dolerite spleenwort	Pteridophyte	yes	v		high
Atriplex suberecta	sprawling saltbush	Dicotyledon		v		high
Australina pusilla subsp. *muelleri*	shade nettle	Dicotyledon	yes	r		high
Australopyrum velutinum	velvet wheatgrass	Monocotyledon		r		high
Austrocynoglossum latifolium	forest houndstongue	Dicotyledon	yes	r		high
Austrostipa bigeniculata	doublejointed speargrass	Monocotyledon	yes	r		high
Austrostipa blackii	crested speargrass	Monocotyledon	yes	r		high
Austrostipa scabra	rough speargrass	Monocotyledon		r		moderate

Table 1.3.a.1Assessment of the potential risk to threatened and priority Tasmanian forest-associated flora species from loss of genetic diversity or isolation

Species	**Common name**	**Group**	**Forest dwelling**	**TSP Act**	**EPBC Act**	**1.3.a risk category**
Banksia serrata	saw banksia	Dicotyledon	yes	r		high
Barbarea australis	riverbed wintercress	Dicotyledon	yes	e	EN	moderate
Baumea articulata	jointed twigsedge	Monocotyledon		r		high
Baumea gunnii	slender twigsedge	Monocotyledon	yes	r		moderate
Bedfordia arborescens	tree blanketleaf	Dicotyledon	yes	v		high
Bertya tasmanica subsp. *tasmanica*	tasmanian bertya	Dicotyledon	yes	e	EN	high
Blechnum cartilagineum	gristle fern	Pteridophyte	yes	v		high
Blechnum neohollandicum	prickly raspfern	Pteridophyte	yes	e		high
Blechnum spinulosum	small raspfern	Pteridophyte	yes	e		high
Bolboschoenus caldwellii	sea clubsedge	Monocotyledon		r		high
Bolboschoenus medianus	marsh clubsedge	Monocotyledon		r		high
Boronia gunnii	river boronia	Dicotyledon	yes	v	VU	high
Boronia hemichiton	mt arthur boronia	Dicotyledon	yes	e	VU	high
Boronia hippopala	velvet boronia	Dicotyledon	yes	v	VU	high
Bossiaea tasmanica	spiny bossiaea	Dicotyledon	yes	r		high
Brachyloma depressum	spreading heath	Dicotyledon	yes	r		high
Brachyscome perpusilla	tiny daisy	Dicotyledon	yes	r		high
Brachyscome radicata	spreading daisy	Dicotyledon	yes	r		high
Brachyscome rigidula	cutleaf daisy	Dicotyledon	yes	v		moderate
Brunonia australis	blue pincushion	Dicotyledon	yes	r		low
Caesia calliantha	blue grasslily	Monocotyledon	yes	r		moderate
Calandrinia granulifera	pygmy purslane	Dicotyledon	yes	r		high
Callitriche sonderi	matted waterstarwort	Dicotyledon		r		high
Callitriche umbonata	winged waterstarwort	Dicotyledon		r		high
Callitris oblonga subsp. *oblonga*	south esk pine	Gymnosperm	yes	v	EN	high
Calocephalus citreus	lemon beautyheads	Dicotyledon		r		moderate
Calocephalus lacteus	milky beautyheads	Dicotyledon		r		moderate
Calystegia marginata	forest bindweed	Dicotyledon	yes	e		high
Calystegia sepium	swamp bindweed	Dicotyledon	yes	r		high
Calystegia soldanella	sea bindweed	Dicotyledon		r		high
Carex capillacea	yellowleaf sedge	Monocotyledon		r		high
Carex cephalotes	snow sedge	Monocotyledon		r		high
Carex gunniana	mountain sedge	Monocotyledon	yes	r		low
Carex hypandra	dark fen sedge	Monocotyledon		r		high
Carex longebrachiata	drooping sedge	Monocotyledon	yes	r		low
Cassinia rugata	wrinkled dollybush	Dicotyledon	yes	e	VU	high
Caustis pentandra	thick twistsedge	Monocotyledon	yes	r		moderate
Centipeda cunninghamii	erect sneezeweed	Dicotyledon	yes	r		high
Centrolepis pedderensis	pedder bristlewort	Monocotyledon	yes	e	EN	high
Centrolepis strigosa subsp. *pulvinata*	bassian bristlewort	Monocotyledon	yes	r		high

Table 1.3.a.1Assessment of the potential risk to threatened and priority Tasmanian forest-associated flora species from loss of genetic diversity or isolation

Species	**Common name**	**Group**	**Forest dwelling**	**TSP Act**	**EPBC Act**	**1.3.a risk category**
Centropappus brunonis	tasmanian daisytree	Dicotyledon	yes	r		high
Cheilanthes distans	bristly rockfern	Pteridophyte	yes	e		high
Chorizandra enodis	black bristlesedge	Monocotyledon	yes	e		high
Chrysocephalum baxteri	fringed everlasting	Dicotyledon	yes	r		high
Colobanthus curtisiae	grassland cupflower	Dicotyledon	yes	r	VU	low
Colobanthus pulvinatus	cushion cupflower	Dicotyledon		r		high
Comesperma defoliatum	leafless milkwort	Dicotyledon	yes	r		high
Conospermum hookeri	tasmanian smokebush	Dicotyledon	yes	v	VU	high
Cotula vulgaris var. *australasica*	slender buttons	Dicotyledon		r		high
Craspedia preminghana	preminghana billybuttons	Dicotyledon		e	EN	high
Crassula moschata	musky stonecrop	Dicotyledon		r		high
Cryptandra amara	pretty pearlflower	Dicotyledon	yes	e		moderate
Cullen microcephalum	dusky scurfpea	Dicotyledon		r		moderate
Cuscuta tasmanica	golden dodder	Dicotyledon		r		high
Cyathea cunninghamii	slender treefern	Pteridophyte	yes	e		high
Cyathea x *marcescens*	skirted treefern	Pteridophyte	yes	e		high
Cyathodes platystoma	tall cheeseberry	Dicotyledon	yes	r		moderate
Cyphanthera tasmanica	tasmanian rayflower	Dicotyledon	yes	r		low
Damasonium minus	starfruit	Monocotyledon		r		high
Deschampsia gracillima	slender hairgrass	Monocotyledon		r		high
Desmodium gunnii	southern ticktrefoil	Dicotyledon	yes	v		moderate
Desmodium varians	slender ticktrefoil	Dicotyledon	yes	e		high
Deyeuxia apsleyensis	apsley bentgrass	Monocotyledon	yes	r		high
Deyeuxia brachyathera	short bentgrass	Monocotyledon	yes	r		high
Deyeuxia decipiens	trickery bentgrass	Monocotyledon	yes	r		high
Deyeuxia minor	small bentgrass	Monocotyledon	yes	r		high
Dianella amoena	grassland flaxlily	Monocotyledon		r	EN	low
Discaria pubescens	spiky anchorplant	Dicotyledon	yes	e		high
Drosera glanduligera	scarlet sundew	Dicotyledon		r		high
Dryopoa dives	giant mountaingrass	Monocotyledon	yes	r		high
Elaeocarpus reticulatus	blueberry ash	Dicotyledon	yes	r		low
Epacris apsleyensis	apsley heath	Dicotyledon	yes	e	EN	high
Epacris barbata	bearded heath	Dicotyledon	yes	e	EN	moderate
Epacris curtisiae	north-west heath	Dicotyledon	yes	r		low
Epacris exserta	south esk heath	Dicotyledon	yes	e	EN	high
Epacris glabella	smooth heath	Dicotyledon	yes	e	EN	high
Epacris grandis	tall heath	Dicotyledon	yes	e	EN	high
Epacris graniticola	granite heath	Dicotyledon	yes	v	CR	high
Epacris limbata	bordered heath	Dicotyledon	yes	e	CR	high
Epacris moscaliana	seepage heath	Dicotyledon	yes	r	EN	moderate
Epacris stuartii	southport heath	Dicotyledon		e	CR	high

Table 1.3.a.1Assessment of the potential risk to threatened and priority Tasmanian forest-associated flora species from loss of genetic diversity or isolation						
Species	**Common name**	**Group**	**Forest dwelling**	**TSP Act**	**EPBC Act**	**1.3.a risk category**
Epacris virgata (Beaconsfield)		Dicotyledon	yes	v	EN	high
Epacris virgata (Kettering)		Dicotyledon	yes	v		low
Epilobium pallidiflorum	showy willowherb	Dicotyledon	yes	r		moderate
Epilobium willisii	carpet willowherb	Dicotyledon		r		moderate
Eryngium ovinum	blue devil	Dicotyledon	yes	v		high
Eucalyptus barberi	barbers gum	Dicotyledon	yes	r		moderate
Eucalyptus globulus subsp. *pseudoglobulus*	gippsland blue gum	Dicotyledon	yes	r		high
Eucalyptus gunnii subsp. *divaricata*	miena cider gum	Dicotyledon	yes	e	EN	high
Eucalyptus morrisbyi	morrisbys gum	Dicotyledon	yes	e	EN	high
Eucalyptus perriniana	spinning gum	Dicotyledon	yes	r		high
Eucalyptus radiata subsp. *radiata*	forth river peppermint	Dicotyledon	yes	r		high
Eucalyptus risdonii	risdon peppermint	Dicotyledon	yes	r		high
Euphrasia amphisysepala	shiny cliff-eyebright	Dicotyledon		r	VU	high
Euphrasia amplidens		Dicotyledon	yes	e		high
Euphrasia collina subsp. *deflexifolia*	eastern eyebright	Dicotyledon	yes	r		high
Euphrasia collina subsp. *North-west Tasmania*	north-west eyebright	Dicotyledon		e		high
Euphrasia collina subsp. *tetragona*	northcoast eyebright	Dicotyledon		e		high
Euphrasia fragosa	shy eyebright	Dicotyledon	yes	e	CR	high
Euphrasia gibbsiae subsp. *psilantherea*	swamp eyebright	Dicotyledon	yes	e	CR	high
Euphrasia gibbsiae subsp. *pulvinestris*	cushionplant eyebright	Dicotyledon		r		high
Euphrasia gibbsiae subsp. *wellingtonensis*	mt wellington eyebright	Dicotyledon		r		high
Euphrasia phragmostoma	hairy cliff-eyebright	Dicotyledon		v	VU	high
Euphrasia scabra	yellow eyebright	Dicotyledon	yes	e		high
Euphrasia semipicta	peninsula eyebright	Dicotyledon	yes	e	EN	high
Euphrasia sp. Bivouac Bay	masked cliff-eyebright	Dicotyledon		e	EN	high
Eutaxia microphylla	spiny bushpea	Dicotyledon		r		high
Frankenia pauciflora var. *gunnii*	southern seaheath	Dicotyledon		r		high
Geococcus pusillus	earth cress	Dicotyledon		r		high
Geum talbotianum	tasmanian snowrose	Dicotyledon		r		moderate
Glossostigma elatinoides	small mudmat	Dicotyledon		r		high
Glycine latrobeana	clover glycine	Dicotyledon	yes	v	VU	moderate
Glycine microphylla	small-leaf glycine	Dicotyledon	yes	v		moderate
Gompholobium ecostatum	dwarf wedgepea	Dicotyledon	yes	e		high
Goodenia geniculata	bent native-primrose	Dicotyledon		e		high
Gratiola pubescens	hairy brooklime	Dicotyledon	yes	v		moderate
Gynatrix pulchella	fragrant hempbush	Dicotyledon	yes	r		moderate

Table 1.3.a.1Assessment of the potential risk to threatened and priority Tasmanian forest-associated flora species from loss of genetic diversity or isolation

Species	**Common name**	**Group**	**Forest dwelling**	**TSP Act**	**EPBC Act**	**1.3.a risk category**
Gyrostemon thesioides	broom wheelfruit	Dicotyledon	yes	r		moderate
Hakea ulicina	furze needlebush	Dicotyledon	yes	v		low
Haloragis aspera	rough raspwort	Dicotyledon	yes	v		high
Haloragis heterophylla	variable raspwort	Dicotyledon	yes	r		low
Haloragis myriocarpa	prickly raspwort	Dicotyledon	yes	r		high
Hardenbergia violacea	purple coralpea	Dicotyledon	yes	e		high
Hedycarya angustifolia	australian mulberry	Dicotyledon	yes	r		low
Hibbertia basaltica	basalt guineaflower	Dicotyledon		e	EN	high
Hibbertia calycina	lesser guineaflower	Dicotyledon	yes	v		moderate
Hibbertia rufa	brown guineaflower	Dicotyledon		r		moderate
Hibbertia virgata	twiggy guineaflower	Dicotyledon	yes	r		high
Hierochloe rariflora	cane holygrass	Monocotyledon	yes	r		low
Hovea corrickiae	glossy purplepea	Dicotyledon	yes	r		moderate
Hovea montana	mountain purplepea	Dicotyledon	yes	r		low
Hovea tasmanica	rockfield purplepea	Dicotyledon	yes	r		low
Hyalosperma demissum	moss sunray	Dicotyledon	yes	e		moderate
Hydrocotyle comocarpa	fringefruit pennywort	Dicotyledon	yes	r		moderate
Hydrocotyle laxiflora	stinking pennywort	Dicotyledon	yes	e		high
Hypolepis distans	scrambling groundfern	Pteridophyte	yes	e	EN	moderate
Hypolepis muelleri	harsh groundfern	Pteridophyte	yes	r		moderate
Isoetes drummondii subsp. *drummondii*	plain quillwort	Pteridophyte	yes	r		high
Isoetes elatior	tall quillwort	Pteridophyte		r		high
Isoetes humilior	veiled quillwort	Pteridophyte		r		moderate
Isoetes sp. Maxwell River	limestone quillwort	Pteridophyte		r		moderate
Isoetopsis graminifolia	grass cushion	Dicotyledon		v		high
Isolepis habra	wispy clubsedge	Monocotyledon	yes	r		high
Isolepis stellata	star clubsedge	Monocotyledon	yes	r		high
Isopogon ceratophyllus	horny conebush	Dicotyledon	yes	v		low
Juncus amabilis	gentle rush	Monocotyledon	yes	r		moderate
Juncus fockei	slender jointleaf rush	Monocotyledon		r		high
Juncus prismatocarpus	branching rush	Monocotyledon	yes	r		high
Juncus vaginatus	clustered rush	Monocotyledon	yes	r		high
Lachnagrostis billardierei subsp. *tenuiseta*	small-awn blowngrass	Monocotyledon		r		high
Lachnagrostis punicea subsp. *filifolia*	narrowleaf blowngrass	Monocotyledon		r		high
Lachnagrostis punicea subsp. *punicea*	bristle blowngrass	Monocotyledon	yes	r		high
Lachnagrostis robusta	tall blowngrass	Monocotyledon		r		high
Lasiopetalum baueri	slender velvetbush	Dicotyledon		r		moderate
Lasiopetalum discolor	coast velvetbush	Dicotyledon		r		high
Lasiopetalum micranthum	tasmanian velvetbush	Dicotyledon	yes	r		low

Table 1.3.a.1Assessment of the potential risk to threatened and priority Tasmanian forest-associated flora species from loss of genetic diversity or isolation

Species	**Common name**	**Group**	**Forest dwelling**	**TSP Act**	**EPBC Act**	**1.3.a risk category**
Lepidium flexicaule	springy peppercress	Dicotyledon		r		high
Lepidium hyssopifolium	soft peppercress	Dicotyledon	yes	e	EN	high
Lepidosperma forsythii	stout rapiersedge	Monocotyledon		r		moderate
Lepidosperma tortuosum	twisting rapiersedge	Monocotyledon	yes	r		high
Lepidosperma viscidum	sticky swordsedge	Monocotyledon	yes	r		high
Lepilaena marina	sea watermat	Monocotyledon		r		high
Lepilaena patentifolia	spreading watermat	Monocotyledon		r		high
Lepilaena preissii	slender watermat	Monocotyledon		r		high
Leptorhynchos elongatus	lanky buttons	Dicotyledon		e		high
Leucochrysum albicans var. *tricolor*	grassland paperdaisy	Dicotyledon		e	EN	high
Leucopogon affinis	lance beardheath	Dicotyledon	yes	r		high
Leucopogon esquamatus	swamp beardheath	Dicotyledon		r		low
Leucopogon virgatus var. *brevifolius*	shortleaf beardheath	Dicotyledon	yes	r		high
Limonium australe var. *australe*	yellow sea-lavender	Dicotyledon		r		moderate
Limonium australe var. *baudinii*	tasmanian sea-lavender	Dicotyledon		v	VU	high
Liparophyllum exaltatum	erect marshflower	Dicotyledon		r		high
Lobelia dentata		Dicotyledon	yes	r		high
Lobelia pratioides	poison lobelia	Dicotyledon	yes	v		moderate
Lobelia rhombifolia	tufted lobelia	Dicotyledon	yes	r		high
Lomatia tasmanica	kings lomatia	Dicotyledon	yes	e	CR	high
Lotus australis	australian trefoil	Dicotyledon		r		moderate
Luzula atrata	slender woodrush	Monocotyledon		r		high
Lycopus australis	australian gypsywort	Dicotyledon	yes	e		high
Lythrum salicaria	purple loosestrife	Dicotyledon	yes	v		moderate
Melaleuca pustulata	warty paperbark	Dicotyledon	yes	r		moderate
Mentha australis	river mint	Dicotyledon	yes	e		high
Micrantheum serpentinum	western tridentbush	Dicotyledon	yes	r		moderate
Milligania johnstonii	shortleaf milligania	Monocotyledon		r		high
Milligania longifolia	longleaf milligania	Monocotyledon		r		high
Millotia muelleri	clustered bowflower	Dicotyledon	yes	e		high
Mirbelia oxylobioides	sandstone bushpea	Dicotyledon	yes	v		high
Monotoca submutica var. *autumnalis*	roundleaf broomheath	Dicotyledon	yes	r		moderate
Muehlenbeckia axillaris	matted lignum	Dicotyledon	yes	r		moderate
Myoporum parvifolium	creeping boobialla	Dicotyledon		v		high
Myosurus australis	southern mousetail	Dicotyledon	yes	e		high
Myriophyllum integrifolium	tiny watermilfoil	Dicotyledon	yes	v		high
Myriophyllum muelleri	hooded watermilfoil	Dicotyledon		r		high
Odixia achlaena	golden everlastingbush	Dicotyledon	yes	r		moderate
Olearia hookeri	crimsontip daisybush	Dicotyledon	yes	r		high

Table 1.3.a.1Assessment of the potential risk to threatened and priority Tasmanian forest-associated flora species from loss of genetic diversity or isolation

Species	**Common name**	**Group**	**Forest dwelling**	**TSP Act**	**EPBC Act**	**1.3.a risk category**
Orites milliganii	toothed orites	Dicotyledon		r		low
Ozothamnus lycopodioides	clubmoss everlastingbush	Dicotyledon	yes	r		moderate
Ozothamnus reflexifolius	reflexed everlastingbush	Dicotyledon	yes	v	VU	high
Pandorea pandorana	wonga vine	Dicotyledon	yes	r		high
Parietaria debilis	shade pellitory	Dicotyledon	yes	r		moderate
Pellaea calidirupium	hotrock fern	Pteridophyte	yes	r		moderate
Pentachondra ericifolia	fine frillyheath	Dicotyledon	yes	r		moderate
Persicaria decipiens	slenderwaterpepper	Dicotyledon	yes	v		moderate
Persicaria subsessilis	bristly waterpepper	Dicotyledon	yes	e		high
Persoonia moscalii	creeping geebung	Dicotyledon		r		moderate
Persoonia muelleri subsp. *angustifolia*	narrowleaf geebung	Dicotyledon	yes	r		moderate
Phebalium daviesii	davies waxflower	Dicotyledon	yes	e	CR	high
Pherosphaera hookeriana	Mount Mawson pine	Gymnosperm	yes	v		moderate
Philotheca freyciana	freycinet waxflower	Dicotyledon		e	EN	high
Phyllangium distylis	tiny mitrewort	Dicotyledon		r		moderate
Phyllangium divergens	wiry mitrewort	Dicotyledon	yes	v		moderate
Phylloglossum drummondii	pygmy clubmoss	Pteridophyte		r		moderate
Pilularia novae-hollandiae	austral pillwort	Pteridophyte		r		moderate
Pimelea axiflora subsp. *axiflora*	bootlace bush	Dicotyledon	yes	e		moderate
Pimelea curviflora var. *gracilis*	slender curved riceflower	Dicotyledon	yes	r		moderate
Pimelea curviflora var. *sericea*	silky curved riceflower	Dicotyledon	yes	r		high
Pimelea flava subsp. *flava*	yellow riceflower	Dicotyledon	yes	r		high
Pimelea milliganii	silver riceflower	Dicotyledon		r		moderate
Pimelea sp. Tunbridge	grassland riceflower	Dicotyledon	yes	e		high
Planocarpa nitida	black cheeseberry	Dicotyledon	yes	r		moderate
Planocarpa sulcata	grooved cheeseberry	Dicotyledon		r		low
Plantago debilis	shade plantain	Dicotyledon	yes	r		low
Plantago glacialis	small star plantain	Dicotyledon		r		high
Pneumatopteris pennigera	lime fern	Pteridophyte	yes	e		high
Poa halmaturina	dune tussockgrass	Monocotyledon		r		high
Poa mollis	soft tussockgrass	Monocotyledon	yes	r		moderate
Polyscias sp. Douglas-Denison	ferny panax	Dicotyledon	yes	e		high
Pomaderris elachophylla	small-leaf dogwood	Dicotyledon	yes	v		moderate
Pomaderris intermedia	lemon dogwood	Dicotyledon	yes	r		moderate
Pomaderris oraria subsp. *oraria*	bassian dogwood	Dicotyledon		r		moderate
Pomaderris paniculosa subsp. *paralia*	shining dogwood	Dicotyledon		r		moderate
Pomaderris phylicifolia subsp. *ericoides*	revolute narrowleaf dogwood	Dicotyledon	yes	r		high
Pomaderris phylicifolia subsp. *phylicifolia*	narrowleaf dogwood	Dicotyledon	yes	r		moderate

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Species	**Common name**	**Group**	**Forest dwelling**	**TSP Act**	**EPBC Act**	**1.3.a risk category**
Pomaderris pilifera subsp. *talpicutica*	moleskin dogwood	Dicotyledon	yes	e	VU	high
Poranthera petalifera	mountain poranthera	Dicotyledon		v	VU	high
Prostanthera rotundifolia	roundleaf mintbush	Dicotyledon	yes	v		moderate
Puccinellia perlaxa	spreading saltmarshgrass	Monocotyledon		r		high
Pultenaea humilis	dwarf bushpea	Dicotyledon	yes	v		high
Pultenaea mollis	soft bushpea	Dicotyledon	yes	v		moderate
Pultenaea prostrata	silky bushpea	Dicotyledon	yes	v		high
Pultenaea sericea	chaffy bushpea	Dicotyledon		v		high
Ranunculus acaulis	dune buttercup	Dicotyledon		r		low
Ranunculus collicola	lake augusta buttercup	Dicotyledon		r		high
Ranunculus diminutus	brackish buttercup	Dicotyledon		e		high
Ranunculus jugosus	twinned buttercup	Dicotyledon		r		moderate
Ranunculus prasinus	midlands buttercup	Dicotyledon		e	EN	high
Ranunculus pumilio var. *pumilio*	ferny buttercup	Dicotyledon	yes	r		moderate
Rhodanthe anthemoides	chamomile sunray	Dicotyledon		r		high
Rhytidosporum inconspicuum	alpine appleberry	Dicotyledon	yes	e		high
Rumex bidens	mud dock	Dicotyledon		v		high
Ruppia megacarpa	largefruit seatassel	Monocotyledon		r		moderate
Ruppia tuberosa	tuberous seatassel	Monocotyledon		r		high
Rytidosperma indutum	tall wallabygrass	Monocotyledon	yes	r		moderate
Rytidosperma remotum	remote wallabygrass	Monocotyledon		r		high
Sagina diemensis	tasmanian pearlwort	Dicotyledon		e	EN	high
Scaevola aemula	fairy fanflower	Dicotyledon	yes	e		high
Scaevola albida	pale fanflower	Dicotyledon		v		high
Schenkia australis	spike centaury	Dicotyledon		r		moderate
Schoenoplectus tabernaemontani	river clubsedge	Monocotyledon		r		high
Schoenus brevifolius	zigzag bogsedge	Monocotyledon		r		high
Schoenus latelaminatus	medusa bogsedge	Monocotyledon	yes	e		moderate
Scleranthus brockiei	mountain knawel	Dicotyledon	yes	r		low
Scleranthus diander	tufted knawel	Dicotyledon	yes	v		moderate
Scleranthus fasciculatus	spreading knawel	Dicotyledon	yes	v		low
Scutellaria humilis	dwarf skullcap	Dicotyledon	yes	r		high
Senecio campylocarpus	bulging fireweed	Dicotyledon		v		high
Senecio psilocarpus	swamp fireweed	Dicotyledon		e	VU	high
Senecio squarrosus	leafy fireweed	Dicotyledon	yes	r		moderate
Sicyos australis	star cucumber	Dicotyledon		r		high
Siloxerus multiflorus	small wrinklewort	Dicotyledon	yes	r		high
Solanum opacum	greenberry nightshade	Dicotyledon	yes	e		high
Sowerbaea juncea	purple rushlily	Monocotyledon		v		moderate

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Species	**Common name**	**Group**	**Forest dwelling**	**TSP Act**	**EPBC Act**	**1.3.a risk category**
Spyridium eriocephalum var. *eriocephalum*	heath dustymiller	Dicotyledon	yes	e		high
Spyridium lawrencei	small-leaf dustymiller	Dicotyledon	yes	v	EN	moderate
Spyridium obcordatum	creeping dustymiller	Dicotyledon	yes	v	VU	moderate
Spyridium parvifolium var. *molle*	soft dustymiller	Dicotyledon	yes	r		high
Spyridium parvifolium var. *parvifolium*	coast dustymiller	Dicotyledon	yes	r		moderate
Spyridium vexilliferum var. *vexilliferum*	helicopter bush	Dicotyledon	yes	r		moderate
Stackhousia pulvinaris	alpine candles	Dicotyledon		v		moderate
Stackhousia subterranea	grassland candles	Dicotyledon	yes	e		high
Stellaria multiflora subsp. *nebulosa*	nebulous rayless starwort	Dicotyledon	yes	r		high
Stenanthemum pimeleoides	propeller plant	Dicotyledon	yes	v	VU	moderate
Stenopetalum lineare	narrow threadpetal	Dicotyledon	yes	e		high
Stonesiella selaginoides	clubmoss bushpea	Dicotyledon	yes	e	EN	high
Stuckenia pectinata	fennel pondweed	Monocotyledon		r		high
Stylidium beaugleholei	fan triggerplant	Dicotyledon	yes	r		moderate
Stylidium despectum	small triggerplant	Dicotyledon	yes	r		moderate
Stylidium perpusillum	tiny triggerplant	Dicotyledon	yes	r		high
Taraxacum aristum	mountain dandelion	Dicotyledon	yes	r		high
Taraxacum cygnorum	coast dandelion	Dicotyledon			VU	high
Tetratheca ciliata	northern pinkbells	Dicotyledon	yes	r		high
Tetratheca gunnii	shy pinkbells	Dicotyledon	yes	e	CR	high
Teucrium corymbosum	forest germander	Dicotyledon	yes	r		low
Thismia rodwayi	fairy lanterns	Monocotyledon	yes	r		moderate
Thryptomene micrantha	ribbed heathmyrtle	Dicotyledon	yes	v		moderate
Tmesipteris parva	small forkfern	Pteridophyte	yes	v		high
Tricoryne elatior	yellow rushlily	Monocotyledon	yes	v		high
Tricostularia pauciflora	needle bogsedge	Monocotyledon		r		high
Triglochin minutissima	tiny arrowgrass	Monocotyledon		r		moderate
Triglochin mucronata	prickly arrowgrass	Monocotyledon		e		high
Triptilodiscus pygmaeus	dwarf sunray	Dicotyledon	yes	v		moderate
Trithuria submersa	submerged watertuft	Monocotyledon	yes	r		high
Uncinia elegans	handsome hooksedge	Monocotyledon	yes	r		moderate
Utricularia australis	yellow bladderwort	Dicotyledon		r		high
Utricularia tenella	pink bladderwort	Dicotyledon		r		moderate
Utricularia violacea	violet bladderwort	Dicotyledon		r		high
Vallisneria australis	river ribbons	Monocotyledon		r		moderate
Velleia paradoxa	spur velleia	Dicotyledon	yes	v		moderate
Veronica ciliolata subsp. *fiordensis*	ben lomond cushionplant	Dicotyledon		v	VU	high
Veronica novae-hollandiae	coast speedwell	Dicotyledon		v		moderate

Table 1.3.a.1Assessment of the potential risk to threatened and priority Tasmanian forest-associated flora species from loss of genetic diversity or isolation

Species	**Common name**	**Group**	**Forest dwelling**	**TSP Act**	**EPBC Act**	**1.3.a risk category**
Veronica plebeia	trailing speedwell	Dicotyledon	yes	r		moderate
Viminaria juncea	golden spray	Dicotyledon	yes	e		high
Viola caleyana	swamp violet	Dicotyledon	yes	r		high
Viola cunninghamii	alpine violet	Dicotyledon		r		moderate
Viola hederacea subsp. *curtisiae*	montane ivyleaf violet	Dicotyledon		r		high
Vittadinia australasica var. *oricola*	coast new-holland-daisy	Dicotyledon		e		high
Vittadinia burbidgeae	smooth new-holland-daisy	Dicotyledon	yes	r		moderate
Vittadinia cuneata var. *cuneata*	fuzzy new-holland-daisy	Dicotyledon	yes	r		moderate
Vittadinia gracilis	woolly new-holland-daisy	Dicotyledon	yes	r		moderate
Vittadinia muelleri	narrowleaf new-holland-daisy	Dicotyledon	yes	r		moderate
Westringia angustifolia	narrowleaf westringia	Dicotyledon	yes	r		moderate
Wilsonia humilis	silky wilsonia	Dicotyledon		r		high
Wilsonia rotundifolia	roundleaf wilsonia	Dicotyledon		r		moderate
Wurmbea latifolia subsp. *vanessae*	broadleaf early nancy	Monocotyledon		e		high
Xanthorrhoea arenaria	sand grasstree	Monocotyledon	yes	v	VU	moderate
Xanthorrhoea bracteata	shiny grasstree	Monocotyledon	yes	v	EN	moderate
Xerochrysum bicolor	eastcoast everlasting	Dicotyledon	yes	r		moderate
Xerochrysum palustre	swamp everlasting	Dicotyledon	yes	v	VU	high
Zieria littoralis	downy zieria	Dicotyledon	yes	r		moderate
Zieria veronicea subsp. *veronicea*	pink zieria	Dicotyledon	yes	e		high
Zygophyllum billardierei	coast twinleaf	Dicotyledon	yes	r		low

Table 1.3.a.2 Assessment of the risk to Tasmanian threatened vertebrate fauna from loss of genetic diversity or isolation

The table also indicates whether a Recovery Plan has been developed for species, and the status of species on the Tasmanian Threatened Species Protection Act.

Abbreviations used to represent status: x = extinct; e = endangered; v = vulnerable; r = rare

Table 1.3.a.2 Assessment of the risk to Tasmanian threatened vertebrate fauna from loss of genetic diversity or isolation				
Species assessed as potentially having a HIGH risk of genetic loss or isolation				
Fish	*Galaxias auratus*	golden galaxias	Recovery plan	r
Fish	*Galaxias fontanus*	Swan galaxias	Recovery plan	e
Amphibian	*Limnodynastes peroni*	Perons Marsh frog		e
Bird	*Neophema chrysogaster*	orange-bellied parrot	Recovery plan	e
Bird	*Pardalotus quadragintus*	forty-spotted pardalote	Recovery Plan	e
Bird	*Acanthornis magnus greenianus*	King Island scrubtit	Recovery plan	e
Bird	*Acanthiza pusilla archibaldi*	King Island thornbill	Recovery plan	e
Fish	*Galaxiella pusilla*	dwarf galaxias	Recovery plan	r
Bird	*Lathamus discolor*	swift parrot	Recovery plan	e
Mammal	*Sarcophilus harrisii*	Tasmanian devil		e
Mammal	*Pseudomys novaehollandiae*	New Holland mouse		e
Species assessed as potentially having a MODERATE risk of genetic loss or isolation				
Fish	*Galaxias johnstoni*	Clarence galaxias	Recovery plan	e
Fish	*Galaxias tanycephalus*	saddled galaxias	Recovery plan	v
Bird	*Platycercus caledonicus brownii*	King Island green rosella	Recovery plan	v
Bird	*Alcedo azurea*	azure kingfisher		e
Amphibian	*Litoria raniformis*	green and golden frog	Recovery plan	v
Species assessed as potentially having a LOW risk of genetic loss or isolation				
Fish	*Prototroctes maraena*	Australian grayling	Recovery plan	v
Fish	*Galaxias parvus*	Swamp galaxias	Recovery plan	
Fish	*Paragalaxias mesotes*	Arthurs paragalaxias	Recovery plan	
Fish	*Paragalaxias electroides*	Great lake paragalaxias	Recovery plan	
Fish	*Paragalaxias dissimilis*	Shannon paragalaxias	Recovery plan	
Bird	*Haliaeetus leucogaster*	white-bellied sea eagle	Recovery plan	v
Bird	*Aquila audax*	wedge-tailed eagle	Recovery plan	e
Bird	*Accipiter novaehollandiae*	grey goshawk		e
Bird	*Tyto novaehollandiae*	masked owl		e
Bird	*Alcedo azurea*	azure kingfisher		e
Mammal	*Dasyurus maculatus*	spotted-tailed quoll		r

Table 1.3.a.2 Assessment of the risk to Tasmanian threatened vertebrate fauna from loss of genetic diversity or isolation				
Species assessed as having an UNKNOWN risk of genetic loss or isolation				
Mammal	*Antechinus vandycki*	Tasman Peninsula dusky antechinus		
Reptile	*Pseudemoia rawlinsoni*	glossy grass skink		r
Reptile	*Pseudemoia pagenstecheri*	tussock skink		v

APPENDIX 3.1.a: PEST AND DISEASE SITUATION IN PLANTATIONS ON STATE FOREST (until 2013) and Permanent Timber Production Zone land (2014 onwards)

APPENDIX 3.1.a: Table 1(a) Insect pests in *Pinus radiata* plantations

	2011-12	2012-13		2013-14	2014-15	2015-16
Sirex wood wasp *(Sirex noctilio)*	Static trapping detected *Sirex* in 3/4 plantations. Nematodes introduced into two plantations.	Static trapping detected *Sirex* in 1/4 plantations; *Ibalia leucospoides* was present in three of these. Nematodes introduced into two plantations.		Static trapping detected *Sirex* in 4/4 plantations; *Ibalia leucospoides* was present in two of these.	Static trapping detected *Sirex* in 4/4 plantations; *Ibalia leucospoides* was present in two of these.	Static trapping dete 4/5 plantations. No *leucospoides* were year in any of the b the first year where been absent. Nem introduced into two
Five-spined bark beetle *(Ips grandicollis)*	Not known to be present	Not known to be present		Not known to be present	Not known to be present (*Sirex* traps screened)	Not known to be pr traps screened)
Other wood and bark beetles	None detected	None detected		None detected	None detected (*Sirex* traps screened)	Scattered mortality caused by black pi beetle, *Hylastes at* (*Sirex* traps screen
Monterey pine aphid *(Essigella californica)*	No activity observed on Permanent Timber Production Zone land.	No activity observed on Permanent Timber Production Zone land.		No activity observed on Permanent Timber Production Zone land.	No activity observed on Permanent Timber Production Zone land.	No activity observe Permanent Timber Zone land.
Pine aphid *Eulachnus thunbergii*	Not known to be present	Not known to be present		Not known to be present	Not known to be present	Not known to be pr
Pine aphid *(Pineus pini)*	Widespread but not damaging. Mainly affects roadside wildlings.	Status unchanged		Status unchanged	Status unchanged	Status unchanged.
Defoliating insects	No outbreaks reported	No outbreaks reported		No outbreaks reported	No outbreaks reported	No outbreaks repo

APPENDIX 3.1.b: Table 1(a) Diseases in *Pinus radiata* plantations

	2011-12	**2012-13**		**2013-14**	**2014-15**	**2015-16**
Red–band needle blight (*Dothistroma septosporum)*	725 ha reported as having significant disease expression causing defoliation and poor crown density.	205 ha reported as having sisnificant disease expression causing defoliation and poor crown density.		No significant areas of disease expression reported.	Status unchanged.	Status unchanged.
Spring needle cast (including *Cyclaneusma minus*)	Significant disease expression across 419 ha.	Significant disease expression across 424 ha.		Prevalent in high, wet plantations but little severe disease expression reported.	Status unchanged.	Status unchanged.
Crown wilt *(Diplodia pini)*	Minimal disease expression observed.	Patchy top death reported for 336 ha in the north-east.		Patchy top death reported for 126 ha in the central north and north-east.	Only localised limited, localised disease expression observed.	Patchy top death reported for 321 ha the central north a north-east.
Root and collar rots	None reported.	None reported.		None reported.	None reported.	None reported.

APPENDIX 3.1.a: Table 1(c) Environmental and site-related problems in *Pinus radiata* plantations

	2011-12	2012-13	2013-14	2014-15	2015-16
Lightning	None reported.	None reported.	Discrete patch of mortality (~12 trees).	Discrete patch of mortality (~20 trees).	None detected.
Wind	Localised windthrow in north-west (13 ha).	Mutliple areas of localised damage across north of state (18 ha).	Localised areas of damage in north-east (25 ha) and substantial windthrow in two recently thinned coupes in central north (60 ha).	Localised patches of windthrow in north-east (16 ha).	Localised patches of windthrow across the north of the state (33 ha).
Nutrient disorders (excluding N and P limitation which are widespread)	Localised symptoms of boron deficiency across ~17 ha in the north-east.	No problems reported (previous symptoms abated following thinning).	No problems reported.	No problems reported.	No problems reported.
Drought/water deficit/desiccation	No problems reported.	Transplant failure due to desiccation of seedlings across 268 ha in the north-east.	Transplant failure due to desiccation of seedlings across 331 ha in the north-east.	Copious resin bleeding caused by extended dry conditions across 367 ha on the north-east coast.	Desiccation of infills resulted in variable stocking across 198 ha in the north-east.

APPENDIX 3.1.a: Table 1(d) Vertebrate Pest Browsers in *Pinus radiata* plantations

	2011-12	**2012-13**	**2013-14**	**2014-15**	**2015-16**
Wallaby bark stripping of young trees	Affected 1034 ha, 75 ha of which had significant ringbarking mortality.	Affected 1214 ha, 29 ha of which had significant ringbarking mortality.	Affected 1157 ha.	Affected 1249 ha, 90 ha of which had significant ringbarking mortality.	Affected 937 ha,127 ha of which had significant ringbarking mortality.
Possum bark stripping of mid rotation/older trees	Top death scattered through 42 ha primarily in two blocks in the north-west.	Top death scattered through 44 ha in two blocks in the north-west.	Damage limited to 24 ha in a single block in the north-west.	Dead tops scattered through 29 ha primarily in the north-west.	Dead tops scattered through 70 ha in the central north and north-west.
Shoot browsing of seedlings/young trees	Affected 17 ha of which 10 ha had poor stocking.	Affected 116 ha of which 33 ha had reduced stocking.	Affected 164 ha of which 61 ha had reduced stocking.	Affected 212 ha.	Affected 68 ha.

APPENDIX 3.1.a: Table 2(a) Insect pests in *Eucalyptus* plantations

	2011-12	2012-13	2013-14	2014-15	2015-16
Leaf beetles *(Paropsisterna* spp.)	3,525 of the 19,333 ha monitored had above-threshold populations of which 2,361 ha was sprayed. 2,743 and 233 ha suffered moderate and severe defoliation, respectively.	6,137 of the 14,530 ha monitored had above-threshold populations of which 4,741 ha were sprayed. 4,059 and 809 ha suffered moderate and severe defoliation, respectively.	1,543 ha of the 13,454 ha monitored had above-threshold populations of which 887 ha were sprayed. 3,073 and 410 ha suffered moderate and severe defoliation, respectively.	695 of the 11,288 ha monitored had above-threshold populations of which 409 ha were sprayed. 1,305 and 272 ha suffered moderate and severe defoliation, respectively.	779 of the 9,291 ha monitored had above-threshold populations of which 558 ha were sprayed. 1,153 suffered moderate defoliation.
Eucalypt weevil *(Gonipterus platensis* formerly. *G. scutellatus)*	No significant defoliation detected.	Moderate defoliation of 127 ha in southern plantations.	Moderate defoliation of 402 ha in southern plantations.	No significant defoliation detected.	Moderate defoliation of 181 ha and severe severe defoliation of 37 ha in southern plantations.
Autumn gum moth *(Mnesampela privata)*	No significant populations or damage detected.	No significant populations or damage detected.	Moderate damage in 124 ha in the north-west.	Moderate damage in 35 ha in the north-west.	Severe damage in 18 ha of pulp plantation in north-west.
Gum leaf skeletoniser (*Uraba lugens*)	Widespread populations throughout state but severe defoliation limited to 4 ha.	No significant damage reported.	Severe damage reported for 2 ha in the north-east.	No significant damage reported.	No significant damage reported.
Other defoliating insects.	No reports of damage by other defoliators.	No reports of damage by other defoliators.	No reports of damage by other defoliators.	No reports of damage by other defoliators.	No reports of damage by other defoliators.

APPENDIX 3.1.a: 2(a) Insect pests in *Eucalyptus* plantations (cont'd)

	2011-12	**2012-13**	**2013-14**	**2014-15**	**2015-16**
Psyllids	No significant damage reported.	No significant damage reported.	No significant damage reported.	No significant damage reported.	No significant damage reported.
Stem borers	Borer damage associated with mortality across 217 ha of plantation.	Borer damage associated with mortality across 82 ha of plantation.	Borer damage associated with mortality across 72 ha of plantation.	Borer damage associated with mortality across 33 ha of plantation	Borer damage associated with mortality across 24 ha of plantation.
Shoot borers	None reported.	None reported.	None reported.	None reported.	None reported.
Shoot webbers	None reported.	None reported.	None reported.	None reported.	None reported.

APPENDIX 3.1.a: Table 2(b) Diseases in Eucalyptus spp. plantations

	2011-12	2012-13	2013-14	2014-15	2015-16
Mycosphaerella leaf disease – MLD (*Teratosphaeria nubilosa, T. cryptica*) *Kirramyces eucalypti*	A major component of ongoing poor crown density and defoliation across 2,731 ha of mid-rotation plantations, mainly in the north-east.	A major component of ongoing poor crown density and defoliation across 1,806 ha of mid-rotation plantations, mainly in the north-east.	Substantial crown recovery saw significant crown damage due to these fungi reduced to 353 ha.	Localised very wet summer in north-east saw an outbreak of MLD. Was primary cause of defoliation across 759 ha and contributed to damage across a further 1,347 ha.	Very wet January in same region saw MLD contributing to ongoing defoliation and reduced crown density across 1,825 ha.
Stem canker (*Botryosphaeria ribis, Holocryphia eucalypti*)	Stem cankers (mainly *Holocryphia eucalypti)* only in association with damage from wood-boring insects.	Stem cankers (mainly *Holocryphia eucalypti)* only in association with damage from wood-boring insects.	Stem cankers (mainly *Holocryphia eucalypti)* only in association with damage from wood-boring insects.	Stem cankers (mainly *Holocryphia eucalypti)* only in association with damage from wood-boring insects.	Stem cankers (mainly *Holocryphia eucalypti)* only in association with damage from wood-boring insects.
Phytophthora root rot (*Phytophthora cinnamomi*)	Not recorded as the primary causal agent for any significant problems.	Not recorded as the primary causal agent for any significant problems.	Not recorded as the primary causal agent for any significant problems.	Not recorded as the primary causal agent for any significant problems.	Not recorded as the primary causal agent for any significant problems.
Armillaria root rot (*Armillaria* spp.)	Mortality in small, localised patches (0.2 ha).	Small patch in single coupe in central north (0.1 ha)..	Patchy mortality throughout 43 ha of a single coupe in north-west.	Patchy mortality throughout 43 ha of a single coupe in north-west.	No new significant mortality detected.

APPENDIX 3.1.a: Table 2(c) Environmental and site-related problems in *Eucalyptus* spp. plantations

	2011-12	2012-13	2013-14	2014-15	2015-16
Wind and storm	Localised stem lean and windthrow across 2 ha in a single coupe in the central north.	Windthrow of up to 30% of stems across 14 ha in a single coupe in the north-east.	Scattered windthrow and stem breakage across multiple coupes in the south covering around 100 ha.	Scattered windthrow and stem breakage across multiple coupes in the south covering 191 ha.	Ongoing windthrow from previous year in a single coupe and fresh windthrow following thinning in another (74 ha).
Drought	None reported as direct cause.	22 ha of scattered or localised mortality mainly associated with ridge lines and rocky knolls.	None reported as direct cause.	None reported as direct cause.	Foliage death and scattered or localised mortality associated with shallow and/or rocky soils (12 ha).
Nutrient deficiencies / imbalance[1]	Early branch death (89 ha), reduced growth (423 ha), reduced crown density (132 ha) and variable growth (241 ha) were all associated with nutrient limitation.	Early branch death (15 ha), reduced growth (359 ha), reduced crown density (52 ha) and variable growth (555 ha) were all associated with nutrient limitation.	Early branch death (11 ha), reduced growth (333 ha), reduced crown density (15 ha) and variable growth (211 ha) were all associated with nutrient limitation.	Reduced growth (178 ha), reduced crown density (37 ha) and variable growth (113 ha) were all associated with nutrient limitation.	None reported.
Other environmental	Cold, exposure and frost contributed to shoot damage, stem defects and reduced performance across 224 ha. Poor drainage caused reduced or variable performance across 42 ha.	Poor drainage and exposure caused foliage discolouration or reduced performance across 38 ha. 85 ha of plantation burnt in wildfires in north-west of state.	Localised drainage issues caused variable performance across 11 ha.	None reported.	Extensive wildfires in the north-west of the state during summer of 2015-16 burnt 3,286 ha of plantation. 1,095 ha minimal (<10 %), 921 ha patchy (10-75%), 1,270 ha complete (>75%).

1. *Reporting on performance and health issues associated with nutrient limitations dropped out of the health surveillance program as fertilising and pruning programs were discontinued.*

APPENDIX 3.1.a: Table 2(d) Vertebrate pests in *Eucalyptus* spp. plantations

	2011-12	**2012-13**	**2013-14**	**2014-15**	**2015-16**
Shoot browsing	Reduced stocking across 134 ha of pulp, localised retarded growth affected 7 ha.	None detected.	Patchy defoliation of seedlings in a single coupe across 88 ha.	None detected.	None detected.
Possum damage	None detected.	Patchy branch breakage across 72 ha.	None detected.	None detected.	None detected.

APPENDIX 6.3a: RESERVATION OF HIGH QUALITY WILDERNESS

APPENDIX 6.3a: RESERVATION OF HIGH QUALITY WILDERNESS

High Quality Wilderness Area	Total wilderness area (ha)	1996	2001	2006	2011	2016					
		Total reserved (ha & %)	Total reserved (ha & %)	Total reserved (ha & %)	Total reserved (ha & %)	Formal reserves (ha)	Informal & private reserves (ha)	Total reserved (ha & %)	Increase since 1996 (ha & %)	Increase since 2001 (ha & %)	Increase since 2006 (ha & %)	Increase since 2011 (ha & %)
Ben Lomond	10 300	9 800 (95%)	9 800 (95%)	9 800 (95%)	9 900 (96%)	9 800	500	10 300 (100%)	500 (5%)	500 (4%)	500 (5%)	400 (4%)
Cradle - Central Plateau	376 100	338 900 (90%)	372 000 (99%)	372 400 (99%)	372 400 (99%)	371 300	1 900	373 200 (99%)	34 300 (9%)	1 100 (0%)	700 (0%)	800 (0%)
Donaldson	53 200	5 100 (10%)	27 100 (51%)	46 700 (88%)	46 900 (88%)	41 500	10 900	52 400 (99%)	47 300 (89%)	25 400 (48%)	5 700 (11%)	5 600 (10%)
Douglas Apsley	10 100	10 000 (99%)	10 000 (99%)	10 000 (99%)	10 000 (99%)	9 900	100	10 100 (100%)	100 (1%)	100 (1%)	100 (1%)	100 (1%)
Freycinet	8 500	8 500 (100%)	8 500 (100%)	8 500 (100%)	8 500 (100%)	8 400	0	8 400 (99%)	- 100 [5] (-1%)	- 100 (-1%)	- 100 (-1%)	- 100 (-1%)
Henty	24 000	1 800 (8%)	23 600 (99%)	23 600 (99%)	23 600 (99%)	23 600	200	23 900 (100%)	22 100 (92%)	200 (1%)	200 (1%)	200 (1%)
Little Henty	9 100	700 (8%)	700 (8%)	4 700 (52%)	4 700 (52%)	1 200	7 900	9 000 (100%)	8 300 (92%)	8 300 (92%)	4 300 (48%)	4 300 (47%)
Maria	8 500	8 500 (100%)	8 500 (100%)	8 500 (100%)	8 500 (100%)	8 400	0	8 400 (99%)	- 100 (-1%)	- 100 (-1%)	- 100 (-1%)	- 100 (-1%)
Meredith Range	63 400	15 200 (24%)	59 400 (94%)	60 600	60 600	59 100	3 800	62 900	47 700	3 500	2 300	2 400

APPENDIX 6.3a: RESERVATION OF HIGH QUALITY WILDERNESS

High Quality Wilderness Area	Total wilderness area (ha)	1996 Total reserved (ha & %)	2001 Total reserved (ha & %)	2006 Total reserved (ha & %)	2011 Total reserved (ha & %)	2016 Formal reserves (ha)	2016 Informal & private reserves (ha)	2016 Total reserved (ha & %)	2016 Increase since 1996 (ha & %)	2016 Increase since 2001 (ha & %)	2016 Increase since 2006 (ha & %)	2016 Increase since 2011 (ha & %)
				(95%)	(95%)			(99%)	(75%)	(6%)	(4%)	(4%)
Mt Field	15 400	13 600 (88%)	13 600 (88%)	13 800 (90%)	13 800 (90%)	14 500	300	14 800 (96%)	1 200 (8%)	1 200 (8%)	1 000 (6%)	900 (6%)
Mt Heemskirk	10 900	0 0%	9 900 (91%)	10 200 (94%)	10 300 (94%)	10 700	200	10 900 (100%)	10 900 (100%)	900 (9%)	600 (6%)	600 (6%)
Mt William	7 700	7 200 (93%)	7 200 (93%)	7 200 (93%)	7 200 (93%)	7 100	0	7 100 (93%)	- 100 (<-1%)	0 (0%)	0 (0%)	0 (0%)
Norfolk Range	92 300	80 100 (87%)	90 000 (98%)	91 200 (99%)	91 200 (99%)	89 900	1 400	91 300 (99%)	10 900 (12%)	1 200 (1%)	100 (0%)	100 (0%)
Savage	51 600	32 200 (62%)	35 000 (68%)	49 300 (95%)	49 300 (96%)	46 700	4 200	50 900 (99%)	18 700 (36%)	15 900 (31%)	1 700 (3%)	1 600 (3%)
South West	1 182 300	1 117 100 (94%)	1 150 000 (97%)	1 152 900 (98%)	1 153 000 (98%)	1171 800	2 000	1 173 800 (99%)	56 700 (5%)	23 900 (2%)	20 900 (2%)	20 700 (2%)
Sumac	14, 000	10 800 (77%)	11 000 (78%)	11 300 (80%)	11 300 (80%)	10 800	2 600	13 400 (95%)	2 600 (18%)	2 400 (17%)	2 100 (15%)	2 100 (15%)
Total HQ Wilderness	**1 937 900**	**. 659 600 (86%)**	**1 836 300 [4] (95%)**	**1 880 800 (97%)**	**1 881 100 (97%)**	**1884 600**	**36 100**	**1 920 700 (99%)**	**261 100 (13%)**	**84 400 (4%)**	**39 900 (2%)**	**39 600 (2%)**

Notes:

1. The extent of some wilderness areas published in the 1996 CRA and 1997 RFA included areas of sea (eg Bathurst Harbour); these are excluded in the above table.

2. Areas are rounded to the nearest 100ha to reflect the spatial resolution of the wilderness mapping, which was based on 1km x 1km units.
3. The 2016 reserve data is as at 30 June 2016.
4. The figure for the total reserved area of High Quality Wilderness in 2001 was incorrectly quoted in Table 6.2a of the report, *Sustainability Indicators for Tasmanian Forests 1996 – 2001* as the total (1 937 900 ha). It should have read 1 836 300 ha. The percentage figure in the previous report was correct (95%).
5. Some apparent small decreases in the area reserved in 2016 are due to a more precise input coastline into the formal reserve data.
6. In the review period there have been no updates to the wilderness inventory. The extents of the originally mapped wilderness areas are likely to have been reduced through adjacent land uses and roading etc. Such loss in extent has not been taken into account in the total area.
7. Some calculations for the increase in reserved area may appear to be erroneous. This is due to rounding errors.

APPENDIX 7.1.b: COMMUNITY AWARENESS

Government systems

Department of Primary Industries, Parks, Water and Environment (DPIPWE)

The activities of the DPIPWE underpin many of the actions taken across the government and private sectors, supporting the State's growth as a competitive place to do business and to invest in, while helping maintain the unique lifestyle of Tasmania's people. The Department is the government's primary interface with rural and regional communities.

DPIPWE actively fosters and builds partnerships with the community, industry and the different tiers of government.

Forestry Tasmania

During the first half of the reporting period, the following applied. The Forestry Tasmania mission is to 'manage State forests for optimum community benefit' which is enhanced by active communication and engagement with the community and fostering public support through sponsorship and development programs.

Forestry Tasmania funds Community Liaison Officers who are an important public point of contact and information on forestry matters and FT's local projects. Across the state, Forestry Tasmania has helped local communities develop walking tracks and picnic areas; partnerships such as these provide a sense of ownership of the local forest areas around the State.

Through the 'Community Assist' program, Forestry Tasmania has continued to support community service projects that have become a hallmark of the organisation's input in regional areas. These include events such as sporting activities, art, theatre and cultural activities.

Forestry Tasmania maintains a number of Community Forest Agreements with business, community and tourism/recreational organisations with an interest in forest management and forest use.

Several programs specifically seek to engage school students, including the 'Planet Ark Schools Tree Day' to encourage tree planting, the 'Care for People' schools award, and the Forest Education Foundation.

Other programs of community engagement include:

- Regular surveys of public attitudes to Forestry Tasmania and forest-related issues
- Active communications about planned burning programs, via dedicated websites, media advisories, and newspaper flyers
- Advertising of craftwood and specialty timbers availability, and of Adventure Forests tourism sites and activities
- Frequent media releases and media conferences on news and topical issues
- Active and assessed disclosure and publication of information requested under Right to Information legislation
- Publication of the 'Branchline' e-newsletter to provide stakeholders with information about current FT activities and issues

- Production (with Southern Cross Television) of the 'Going Bush' television series, featuring topical forestry subjects in an accessible and popular format; and
- Regular public lectures on scientific and forest management topics through the 'Forestry Talks' series.

During the second half of the reporting period Forestry Tasmania's focus moved from community outreach to operational engagement, in a large part driven by changing business objectives and certification requirements.

Private Forests Tasmania (PFT)

The objectives of PFT as set out in the *Private Forests Act 1994* include 'to foster the use and values of trees in sustainable land management'. As in past years, this environmental objective remained a significant aspect of PFT's work.

To achieve this it is PFT's vision that the Tasmanian private forestry sector is well informed, respected, sustainable, environmentally sound and a major driver in the Tasmanian economy; operates in a collaborative and communicative manner; utilises best-practices approaches; is at the forefront of the adoption of appropriate technologies; and works within a sound regulatory environment.

APPENDIX 7.1.d: SUSTAINABILITY MEASURING AND MONITORING PROGRAMS

APPENDIX 7.1.d: SUSTAINABILITY MEASURING AND MONITORING PROGRAMS				
SFM Criterion	**Type of Program**	**Program name**	**Lead agency**	**Description**
Biological Diversity	Measure	TASVEG	Department of Primary Industries, Parks, Water and Environment (DPIPWE)	Vegetation mapping at 1:25 000 and supporting database which provides an improved basis for monitoring, with finer spatial resolution.
	Monitor	Monitoring Vegetation Extent Project	DPIPWE	Assessment and implementation of methodologies for monitoring of vegetation type, extent, and distribution
		Forest operation mapping	Forestry Tasmania (FT) and Private Forests Tasmania (PFT)	Forestry Tasmania maps annual changes on public land which identifies changes that are used to update RFA forest community and old-growth mapping. PFT collates major forest changes on private land from information obtained from private commercial forest managers, aerial photography, satellite imagery and field work
		Fauna and flora population level survey	DPIPWE	Population levels of threatened species, species of conservation significance and some endemics are monitored periodically by the DPIPWE. Recovery Plans for some species require ongoing population surveys.
Productive capacity of forest ecosystems	Measure	National Plantation Inventory	PFT and FT	Survey the extent of plantation forest estate across all tenures.
		Timber inventory	FT and larger private commercial forest managers	Randomly sampled inventory plots are measured across forest estates and the results are used as the basis for calculating planned yields.
	Monitor	Compliance reports	Forest Practices Authority (FPA)	The achievement of reforestation standards, including stocking, is self-monitored and supported by lodgement of a compliance report after each discrete operational phase within a forest practices plan

APPENDIX 7.1.d: SUSTAINABILITY MEASURING AND MONITORING PROGRAMS				
SFM Criterion	**Type of Program**	**Program name**	**Lead agency**	**Description**
		Operational standards	FT and larger private commercial forest managers	To ensure that forest operations such as planting, pruning, and harvesting meet acceptable standards, FT and major private industrial companies routinely undertake quality-assurance audits and assessments
		Forest practices planning	FPA	15% assessment of forest practices plans and their implementation
Ecosytem health and vitality	Monitor	Policy for Maintaing a Permanent Native Forest Estate	FPA	Monitors areas of native forests that will be maintained above minimal levels, expressed as a percentage of the native forest estate assessed in 1996 under the RFA
	Measure and monitor	Systematic forest health surveys	FT and larger private commercial forest managers	Identifies the need for remedial treatments such as pest management, application of fertiliser, and silvicultural operations
Soil and Water resources	Measure	Soil profile program	FPA and DPIPWE	Develop whole of State forest soil information based on description of 32 soil profiles.
	Monitor	Warra Long Term Ecological Research site	FT	Soils, biodiversity, hydrology and their interactions are being monitored to establish baseline measurements and evaluate the impact of forest practices.
Carbon cycle	Measure and monitor	National Carbon Accounting System	Australian Greenhouse Office (Cwth)	In conjunction with Tasmanian agencies, continues to refine systems which measure and monitor inventories of forest biomass.
		Warra Long Term Ecological Research Site	DPIPWE and FT	Assessing the scientific values of Tasmanian forests through dendrochronology of long-lived trees to monitor climate change.
Socio-economic benefits	Monitor	Tourism visitor number surveys	PWS and FT	Routine of visitor numbers to selected reserves and facilities

APPENDIX 7.1.d: SUSTAINABILITY MEASURING AND MONITORING PROGRAMS				
SFM Criterion	**Type of Program**	**Program name**	**Lead agency**	**Description**
Legal institutions	Monitor	State of the Forests reporting	FPA	Report each five years on the status of, and changes to, Tasmania's forests across all tenure
	Monitor	State of the Environment reporting	Tasmanian Planning Commission (TPC)	Reports each five years on the condition of the environment; trends and changes in the environment; the achievement of resource management objectives; and recommendations for action to be taken in relation to the management of the environment.
	Measure and monitor	State of the TWWHA Report	DPIPWE	Reports on evaluation of management effectiveness under the management plan

APPENDIX 7.1.e: SCIENTIFIC PUBLICATIONS RELEVANT TO TASMANIAN FORESTS FROM 2011 TO 2016

1. Biodiversity conservation and management

Journal publications

Allchin R, Kirkpatrick J, Kriwoken L (2013) On not protecting the parrot: The impact of conservation and planning legislation on an endangered species in Tasmania. *Journal of International Wildlife Law and Policy* 16(1), 81-104.

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Baker SC, Spies TA, Wardlaw TJ, Balmer J, Franklin JF, Jordan GJ (2013) The harvested side of edges: Effect of retained forests on the re-establishment of biodiversity in adjacent harvested areas. *Forest Ecology and Management* 302, 107-121.

Baker TP, Baker SC, Dalton PJ, Fountain-Jones NM, Jordan GJ (2016) Temporal persistence of edge effects on bryophytes within harvested forests. *Forest Ecology and Management* 375, 223-229.

Baker TP, Jordan GJ, Dalton P, Baker SC (2013) Impact of distance on the re-colonization of bryophytes in regenerating Tasmanian wet eucalypt forests. *Australian Journal of Botany* 61(8), 633-642.

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Biffin E, Brodribb TJ, Hill RS, Thomas P, Lowe AJ (2012) Leaf evolution in Southern Hemisphere conifers tracks the angiosperm ecological radiation. *Royal Society of London Proceedings, B. Biological Sciences* 279 (1727), 341-348.

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