

A U S T R A L I A N
Forest Profiles

A series from the **National Forestry Inventory** about forest types and major issues relating to them.

Key Issues

- Ash forests are defined in this profile as wet forests dominated by tall and very tall trees of species within the ash-group of eucalypts. Much of the pre-1750 extent of ash forests remains because of inaccessibility to early settlers and the general unsuitability of climate and terrain for agricultural development. In the Central Highlands area of Victoria for example, 98% of the pre-1750 area remains and 97% of that area is public forest.
- The ash forests of south eastern Australia comprise less than ten per cent of Australia's total open forest but they are highly valued as water catchments, for fauna and flora conservation, recreation and timber and fibre production.
- Ash forests depend on high intensity fires to regenerate. As a result, most of the forests are essentially even-aged or have well-defined multiple age classes. Fires ignited by lightning over millions of years, and by humans over tens of thousands of years, have been a force throughout the evolution of eucalypt forests. Frequency of fire has increased following European settlement and there have been fires of catastrophic magnitude in the ash forests in the State. In Victoria, the bushfire of 'Black Friday', 13th January 1939, burnt 13 800 km², including most of the ash forests in the State. This fire, and others like it, reduced the area of oldgrowth ash forests in some areas and affected flora and fauna conservation and water production.
- Ash forests are noted for their aesthetic beauty, their high productivity and the successional processes that may lead to closed forest (or rainforest) in the long-term absence of fire.
- Ash forests are extremely important to the timber industry in Victoria and Tasmania. The growth rates of timber from these forests can be as great as 25m³/ha/year or more (5m³/ha/year of sawlog quality), several times more than that of the drier eucalypt forests and rivalling that of the fastest growing plantations in South America.



This brochure describes the cultural, economic and heritage values of the tall, wet ash forests of South Eastern Australia

I N T H I S P R O F I L E , we differentiate between ‘ash forests’ and the botanical grouping of ‘ash’ eucalypts. The botanical ash-group comprises some 35 species; it includes the commercially important mountain ash (*Eucalyptus regnans*), alpine ash (*E. delegatensis*), messmate stringybark (*E. obliqua*) and silvertop ash (*E. sieberi*), as well as snow gums, scribbly gums, mallee ashes and other species closely related to the peppermint group. ‘Ash forests’ is a term that, in general use, conveys tall, wet forests of ash-group eucalypts, and this is the context of ash forests in this profile.

Since most of the ash-group eucalypts do not form tall, wet forests, they are excluded from this profile. For example, there are extensive forests of ash-group eucalypts in the drier areas of Western Victoria and South Australia, including Kangaroo Island, and scribbly gum grows in dry forests and woodlands on the western slopes of the New South Wales Tablelands. While messmate stringybark belongs within the ash-group, its distribution in South Australia, Tasmania, Victoria, New South Wales, and a small area in south east Queensland is so wide that it grows mostly outside the range of tall wet ash forests. Our inclusion of messmate stringybark is restricted to its occurrence, especially in Tasmania, within the wetter, tall open forests that we recognise as ash forests.

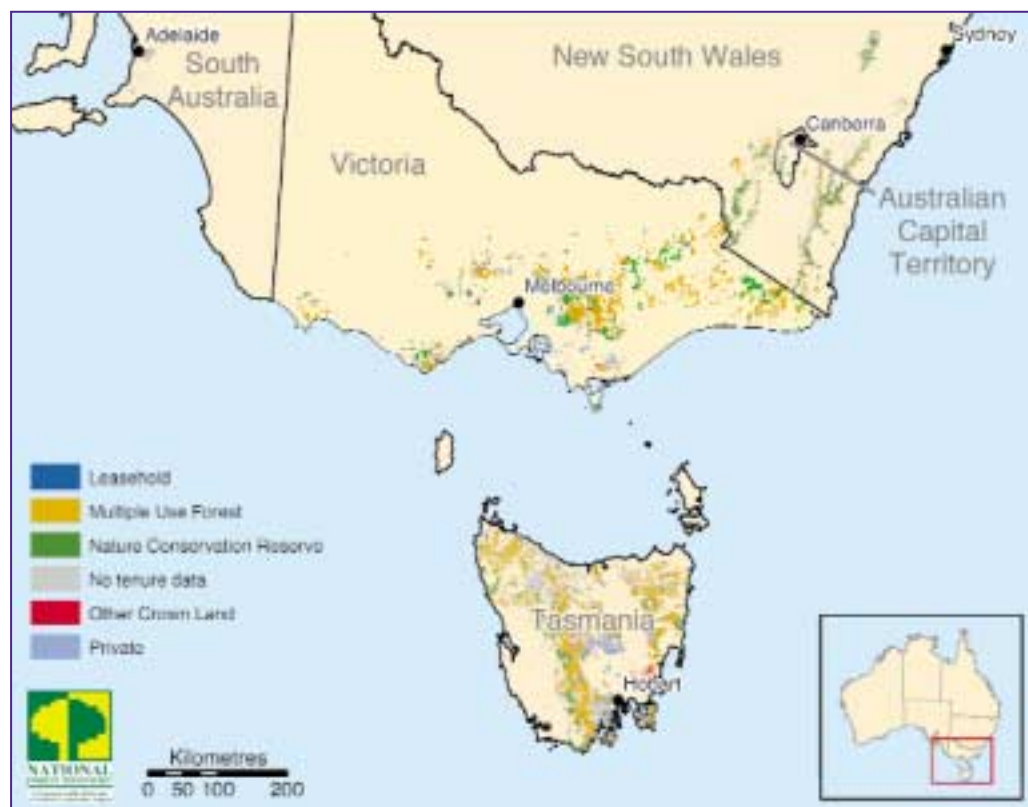
The ash forests of south eastern Australia cover more than 3 million hectares. At their best expression, they consist of essentially pure stands of tall, fast-growing, light-demanding eucalypts in various parts of Tasmania and the mountainous regions of Victoria and southern New South Wales. Mountain ash and alpine ash depend on high and regular rainfall and tend to be site-specific forests that are classified as tall open forest or, in this profile, as ash forests. Other ash-group eucalypts, messmate stringybark and silvertop ash, together with non-ash eucalypts such as manna gum (*E. viminalis*) and shining gum (*E. nitens*), may also form tall open forest. However messmate stringybark, silvertop ash and manna gum grow over a wide range of habitats, from the mountains to the sea,

often in mixture with other eucalypts. Ash forests of mountain ash, alpine ash and messmate stringybark border cool-temperate closed forests (or rainforests) in wetter, protected gullies in Victoria and New South Wales and wetter slopes and gullies in Tasmania. Where rainforest species extend out of the gullies, they may become dominant in the understorey of tall open forest. This makes the precise definition of the boundary between tall open forest and closed forest sometimes difficult to determine.

Origin

During the northward drift of Australia since Jurassic times, the vegetation over much of the continent changed from one dominated by cool-temperate rainforest (*Nothofagus spp.*) to one dominated by hard-leafed genera, including Eucalyptus, with a distribution largely restricted to the Australian continent. With increasing aridity came a greater incidence and spread of fire from lightning. It is probable that the tall eucalypts evolved in limited refuges from which they spread in favourable times. Fire and high, regular rainfall have been major factors shaping the evolution of these fast-growing, light-demanding eucalypts in close proximity to rainforests.

Distribution of Ash Forest by Tenure



ABOUT THE ASH FORESTS

Mountain ash

Mountain ash (*Eucalyptus regnans*) is the world's tallest flowering plant (or angiosperm), reaching a height of up to 110 metres. It is mostly confined to the mountains of the eastern half of Victoria at altitudes of 150 to 1 100 m (with smaller occurrences in western Victoria in the Otway ranges). In Tasmania it occurs from sea level to 600 m in the north east, south east, and in the valleys of the Derwent and Huon Rivers. The species name (from *regnare*—to rule) is appropriate to the immense height, girth and dominance of the trees. The common name 'mountain ash' is most widely recognised, but 'swamp gum'



Mountain ash regeneration following 1939 bushfires in the Toolangi District, Vic—showing typical uniform growth

Mountain Ash (*E. regnans*)



and 'stringy gum' are also used in Tasmania. The name 'ash' arises from the similarity of the pale, strong and straight-grained wood of these trees to that of the unrelated ash (*Fraxinus*) in the Northern Hemisphere.

While enormous mountain ash trees of 130 metres height or more were reported in the late 1800s, the methods of measurement are somewhat suspect. The most accurate measurement was in 1881 near Thorpdale, Victoria; here a mountain ash tree was measured as 114 metres. The tallest living tree is now a coastal redwood (*Sequoia sempervirens*; a gymnosperm, a group that includes the conifers and their allies) in California.

Alpine ash

Alpine ash (*Eucalyptus delegatensis*) is sometimes referred to as 'gum-topped stringy bark' in Tasmania, and woollybutt in southern New South Wales. It is restricted to higher elevations, mostly between 900 m and 1 450 m in Victoria and southern New South Wales. It is common or mostly dominant in tall forests on well-drained, moderately steep mountain slopes and in cool mountain valleys. Forests dominated by alpine ash in Tasmania grow in undulating high country including the Central Plateau, the North East Highlands and the Western Tiers. The seeds of alpine ash need the cold ground conditions produced by several weeks of snow to germinate the following spring.

Alpine Ash (*E. delegatensis*)



Stands of alpine ash covered in snow on Mount Buller, Vic (above) and at Thredbo, NSW (below)



Messmate stringybark

Messmate stringybark (*Eucalyptus obliqua*), commonly just 'messmate', is widespread through Tasmania, southern Victoria, eastern New South Wales and south eastern South Australia. It is the most common and most commercially important ash-type species in Tasmania. It grows extensively through the foothills up to 1 000 m, both in more or less pure stands and in mixture with the closely related peppermint group (eg. *E. radiata*, *E. dives*) and gums (eg. *E. cypellocarpa*, *E. viminalis*, *E. globulus*). In the wetter regions, messmate stringybark occurs as tall open forest, forming distinct boundaries with mountain ash tall open forest. Hybrids between mountain ash and messmate stringybark are sometimes observed at these boundaries. At the other extreme, messmate stringybark may have a small, shrubby growth form in dry, coastal sands. The thick, fibrous bark of messmate stringybark provides considerable protection from fire. The trees are rarely killed by fire, and re-sprout after fire through coppice and shoots from the stem and branches (epicormic shoots).

Eucalyptus obliqua was the first eucalypt to be named and described. It was collected on Bruny Island, off south eastern Tasmania, during Cook's third voyage, and was described by L'Héritier in 1788. The type specimen is held in the British Museum. As Brooker and Kleinig (1983) note, in choosing the name *Eucalyptus* (from the Greek *eu* and *calyptos* = well covered), L'Héritier 'perpetuated, most likely by accident, a feature common to all eucalypts—the operculum' (the cap of the flower bud).

(Below) A stand of regrowth messmate stringybark in Powelltown, Vic



Cut-tail/brown-barrel

Cut-tail or brown-barrel (*E. fastigata*) is closely related to mountain ash with very similar morphological features. It occurs in higher elevation areas from around 650 to 1 400 m in East Gippsland, South East New South Wales and extending through to the Northern Tablelands of New South Wales. It has thick, fibrous bark that occurs through to the larger branches leaving the smaller branches smooth-barked. This thick lower bark makes it relatively fire-resistant. Under favourable conditions it occurs as tall open forest in pure stands. However, it more commonly occurs with other eucalypts such as alpine ash, mountain gum, shining gum and messmate.

Cut-tail/Brown-barrel (*E. fastigata*)



The thick lower bark of cut-tail/brown-barrel makes it relatively fire-resistant

Messmate Stringybark (*E. obliqua*)



(Below) A stand of silvertop ash



Silvertop ash

Silvertop ash (*Eucalyptus sieberi*) occurs extensively through eastern Victoria and south eastern New South Wales, with a more localised distribution in north eastern Tasmania. Like messmate stringybark, it grows in mixture with other eucalypts on the drier sites, but may grow as more or less pure, tall open forest on the wetter sites. Silvertop ash has been excluded from the ash area statement and tenure map in this publication, however, as it is problematic to separate drier sites from the wet ash forests for mapping purposes and in New South Wales, Victoria and Tasmania silvertop ash predominately forms the overstorey of dry forest. Silvertop ash is also relatively fire-resistant.

Silvertop Ash (*E. sieberi*)



The importance of fire

Unlike drier forests, tall open forests in south eastern Australia depend on fire to regenerate. For example, there are no seedlings or saplings beneath the forest canopy of mature mountain ash forests, and seed store in the soil is small due to harvesting by ants. Seed is stored in woody capsules in the canopy, which carries up to 14 million seeds per hectare. Following crown scorch associated with wildfire, the small valves in the woody capsules open, and the seed is shed within hours or weeks. Seedlings germinate profusely on the soil burned bare by fire, and a rate of 2.5 million seedlings per hectare has been recorded. Germination, growth and competitive development all increase with increasing fire intensity. Competition is intense, and the number of trees reduces to about 4 000 per hectare at age 7 years and to 20–40 per hectare in the mature forest aged 250 years.

The early rapid growth of mountain ash and alpine ash after fire is due both to lack of competition from other species and to the ash bed created by intense fire. The growth rate of seedlings on fire-heated soil is many times greater than that on unheated soil.



A regeneration fire in a messmate forest, north east Victoria

(Insert) Fire triggers woody seed capsules of Messmate stringybark to release seed

Regeneration after timber harvesting

The use of fire after timber harvesting, to provide a receptive seed bed on which the germination and growth of seedlings is maximised, is based on research in Victoria and Tasmania in the 1950s. Since then, the wetter forests of south eastern Australia have been harvested and regenerated under a regime of clear-felling and subsequent slash-burning. The efficacy of this regime and alternatives has been tested most rigorously, beginning in the late 1980s at Tanjil Bren in Victoria. These trials involved varying degrees of timber removal and methods of disturbance to provide a seed bed. The results show that clear-felling or seed tree systems (where 5–15 trees per hectare are retained), together with slash-burning, are the most successful in regenerating the ash forest and are cost-effective in forests used for sustainable timber production. This conclusion accords with practical

experience in Victoria and Tasmania over the past 40 years, and with the fact that, in nature, mountain ash forests do not regenerate without the major disturbance of bushfire. However, the trials also support modification of clear-fell systems to improve the survival of understorey species and in certain situations adopting seed tree systems to improve longer term habitat for arboreal species. Rotation length may also be important for the conservation of some flora and fauna species in timber production areas (eg. mosses and lichens, hollow-dependent fauna).

In the silvertop ash and messmate forests, seed tree systems have been shown to be effective. The shelterwood system (harvesting the forest in two stages, the second cut after regeneration establishment) has been applied successfully in some areas.

Ownership

Distribution of ash forests in south eastern Australia
by species and tenure (hectares)

ASH FOREST AREA STATEMENTS								
State	Species	Tenure						Total
		Multiple Use Forest	Nature Conservation Reserve	Private ⁷	Other Crown Land	Lease	No Data	
NSW ^{1,2,3}	<i>E. delegatensis</i>	19,949	91,591	27,060	8,447		0	147,047
	<i>E. fastigata</i>	63,451	99,097	34,042	2,914	Included in	0	199,504
	<i>E. obliqua</i>	20,532	23,664	6,769	539	Private	0	51,504
	TOTAL—NSW	103,932	214,352	67,871	11,899		0	398,054
VIC ⁴	<i>E. delegatensis</i>	181,576	121,228	437	7,716	0	0	310,956
	<i>E. fastigata</i>	36,303	16,894	749	44	0	0	53,990
	<i>E. obliqua</i>	401,553	210,420	223,139	19,441	6,449	0	861,001
	<i>E. regnans</i>	137,661	66,434	35,288	3,036	7,131	0	249,550
	TOTAL—VIC	757,092	414,975	259,613	30,238	13,580	0	1,475,497
TAS ⁵	<i>E. delegatensis</i>	267,992	142,053	141,914	14,480	0	0	566,439
	<i>E. obliqua</i>	319,681	118,616	123,631	12,581	0	0	574,510
	<i>E. regnans</i>	55,744	10,018	4,975	1,381	0	0	72,118
	TOTAL—TAS	643,417	270,687	270,520	28,442	0	0	1,213,067
SA ⁴	<i>E. obliqua</i>	16	2,928	6,303	1,111	221	332	10,910
	TOTAL—SA	16	2,928	6,303	1,111	221	332	10,910
ACT ^{6,3}	<i>E. delegatensis</i>	0	4,645	0	0	0	19	4,665
	<i>E. fastigata</i>	38	1,949	0	0	0	344	2,332
	TOTAL —ACT	38	6,595	0	0	0	363	6,996
	TOTAL	1,504,495	909,536	604,307	71,689	13,800	695	3,104,525



A mountain ash seedling

- Notes: 1 Includes approximately 38,000 ha (10%) of sub-dominant Ash species
 2 Source date—2000
 3 There are small additional areas of Ash in NSW and the ACT which are represented spatially (refer to map) but which are not represented in the tables
 4 Source date—2001
 5 As at 30th June 2001
 6 Source date— Ash species, 2000, Tenure data 2001
 7 Includes Leasehold land in NSW

USE OF THE RESOURCE

Timber

The pale, strong, straight-grained and relatively open-textured wood of mountain ash, alpine ash and messmate is used extensively in Australia for house building, flooring, weatherboards and joinery. Ash species are the most common group of species used by furniture and cabinet manufacturers in the eastern mainland States. Timber from the ash forests is marketed under the names Victorian Ash, Tasmanian Ash and Tasmanian Oak. The ash forests supply a large part of the raw material for the pulp and paper industry to produce high quality printing and writing paper and most of the timber for the woodchip industry in south eastern Australia. Pulpwood sourced from ash forests is highly cost-effective because of high growth rates, long fibre length and the lower quantity of black tannins produced during the paper manufacturing process.

Although the eucalypt ash forests account for only a small proportion of the total forest area in south eastern Australia, they provide a substantial share of higher-quality sawlogs for sawn timber.



(Top) Cross-cutting alpine ash logs in Bago Forest, NSW

(Above) Alpine ash woodchips. Ash forests supply most of the woodchip industry in south eastern Australia, and

(Below) Ash species are also the most commonly used by furniture and cabinet manufacturers in that area



(Above) Log landing in regrowth mountain ash forest

(Insert) Light-coloured timber from alpine ash contrasts with messmate stringybark.



Water

Ash forests in Australia's relatively high rainfall areas cover important water catchments. For example, water for the city of Melbourne comes from some 155 000 hectares of forested catchment in the Victorian Central Highlands, about one-half of which is mountain ash forest. This one-half yields about 80% of the streamflow because of the high rainfall. Long-term research in these catchments has shown streamflow from regrowth forests that regenerated after the 1939 bushfire decreased markedly relative to streamflow from old age forest in the years before the fire. Models indicate that streamflow from regrowth forest decreases over the first 20 – 30 years to about 50% of that from old age forest and then increases to equal that from old age forest at about 150 years. The age-structure of the mountain ash forest of the Victorian Central Highlands is now well within the range where streamflow from the catchments is increasing, and management is based on that premise.



Regrowth mountain ash forest, Healesville, Vic

Heritage, Tourism and Recreation

Archaeological sites suggest that Aborigines occupied coastal and foothill forests in proximity to the ash forests of south eastern Australia for at least 18 000 years. The use of fire was probably the main influence that Aboriginal people had on the ash forests. Regular burning maintained the open woodland preferred by Aboriginal people, but fire in the dense forests was used to bring out reptiles and small mammals, to aid digging for tubers or larvae, to maintain open pathways, to encourage 'green pick' (as an attraction to kangaroos and other herbivores) and to encourage the regeneration of edible plant foods.

The ash forests are strongly linked to the history and development of the timber industry in Australia. Splitters worked the forests for palings, shingles and pit-sawn timber from the beginning of European settlement. The timber industries in Victoria and Tasmania expanded rapidly to meet the demand for timber following gold discoveries in Victoria in the mid-nineteenth century. Steam-powered sawmills were established from about the 1850s to cater for the demand for building materials in the cities and export timber markets. By 1885 there were 62 sawmills along the coastline of Tasmania connected by tramlines to the inland forests. Today, splitters' huts, old mills, tramlines, tunnels, and trestle bridges survive as historic sites among often thick, regenerating forest. Australia's first commercial pulp mill, at Maryvale in Victoria, was built in 1937 to utilise residues from harvested ash forests. The first experimental paper making plant was established at Geeveston in Tasmania in 1928, stimulating the development of the State's paper manufacturing industry.

The economic value of tourism and recreation in and around the ash forests approaches that of the timber industry. Twenty per cent of Tasmania's total area is now classified as the Tasmanian Wilderness World Heritage Area. Although forest features in less than half of this area, significant areas of forests including ash forests were incorporated into the World Heritage Area following protests over logging and a Commission of Inquiry in the 1980s. Ash-type forests are represented in many national parks, notably Mt Field National Park in Tasmania, where a tall forests walk is available for visitors; the Otway National Park in Victoria, where mountain ash and rainforests contrast with coastal heathlands and open woodlands; the Yarra Ranges, Alpine and Errinundra National Parks in Victoria; and the South East Forests National Park in New South Wales.

FOREST MANAGEMENT

Conservation

Since the conclusion of Regional Forest Agreements in Victoria, Tasmania and New South Wales, between 20–50% of the ash forests in each of these States are within formal conservation reserves.

The ash forests are diverse floristically and have a very high value for wildlife. They harbour rare species such as Leadbeater's possum and the spot-tailed quoll, and well-established and viable populations of several species such as the feathertail glider and yellow bellied glider which are rarely observed due to their secretive habits. While some threatened or sensitive fauna are conserved indirectly by conservation of their habitat, others require special attention. Of particular note are species that depend on tree hollows for nesting, and some predators that have the additional requirement of large territories of forest containing elements of old growth forest (such as the sooty, masked and powerful owls). The maintenance of a suitable network of forest habitat for these species is an important issue, particularly where old growth forest is scarce or becoming scarce. 'Loss of hollow-bearing trees' is listed as a potentially threatening process under the *Victorian Flora and Fauna Guarantee Act 1988*. Other species, such as long-footed potoroo (animal) and rough eyebright (plant), have their own management strategies and are listed in the *Threatened Species Protection Act* (Tasmania), or *Flora and Fauna Guarantee Action Statements* (Victoria).

O'Shannassy Catchment

The O'Shannassy Catchment is one of a number of catchments for the city of Melbourne that have been closed to timber harvesting and visitors, some since the late nineteenth century. The magnificent and often breathtakingly beautiful forests include three main vegetation communities: a fern-gully community dominated by myrtle beech in the wettest and most sheltered, medium-altitude gullies; myrtle beech/mountain ash forest on medium-altitude, protected slopes and gullies; and mountain ash forest on the medium-altitude, relatively exposed slopes. Much of the O'Shannassy Catchment has never been utilised for timber and approximately 80% of the area survived the 1939 fires. As a result the vegetation is old, rich and undisturbed. Many of the mountain ash trees are older than 200 years, often 75 m or more in height and provide abundant hollows which are important for a number of animal species.



Ash forests harbour rare species such as the spot tailed quoll

Threats

Perhaps the greatest threat to the ash forests is extensive bushfire. While the extreme weather conditions that prevailed in the 1939 (Black Friday) and 1983 (Ash Wednesday) fires are rare, there is no doubt that they will be repeated from time to time. However, fire is both a threat and a necessity in ash forests. Fire is required to regenerate ash forests but will alter their age structure.

The long-term survival of old growth forest must also be considered. Much of the old growth is now over 200 years old, and fungal decay is weakening both the stems and the crowns of the trees. These trees will progressively die or fall, and without disturbance will be replaced by rainforest understorey and shrub species. Planning for future old growth forest will require the controlled use of fire, both on and off reserves. It will also require the application of specific management strategies.

Loss of hollow-bearing trees is a major threat to the fauna that depend on them. For example, Leadbeater's possum expanded rapidly after the 1939 fires as a result of the regeneration of wattles on which it feeds. The large living and dead ash trees which remained standing following these fires provided nesting hollows. However, these trees are slowly disappearing through continued decay and collapse. While these will be replaced once the regrowth forests mature, the maintenance of viable populations of hollow-nesting fauna requires active management to provide suitable habitat.



Old growth forest reserve in Tasmania showing characteristic signs of crown die-back

Outlook

More than most other forest types, ash forests reflect the dynamic nature of forest ecosystems and the important role of disturbances such as fire.

The management and utilization of the ash forests of south eastern Australia have been reviewed repeatedly, most recently as part of the process leading to Regional Forest Agreements. Under these agreements, standard proportions of each forest community and old growth stages are protected in conservation reserves. Industry is provided with ongoing access to areas for timber production.

Regional Forest Agreements will be reviewed regularly. Forest management, both off and on reserves must be flexible and adaptive to new scientific knowledge, changing community expectations, manufacturing processes and market conditions. With careful management, ash forests will continue to provide a wide range of aesthetic, conservation and production values to the Australian community.



Fungi decorate a myrtle beech tree in a mature ash forest

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Front cover

Old growth mountain ash forests.

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