Australian Government
Bureau of Rural Sciences

Australian forest profiles
Eucalypts

Eucalypts are iconic Australian forests. Almost all the 700 known eucalypt species are native only to Australia.

Eucalypt forests evolved from rainforest ancestors, adapting to an environment in which nutrient-poor soils were common and the land was increasingly arid. Fire has also been an important evolutionary factor; many eucalypts have evolved strategies for adapting to and recovering from fire.

Eucalypt forests are by far the continent's most common forest type, covering more than 116 million hectares (79% of Australia's native forest estate).

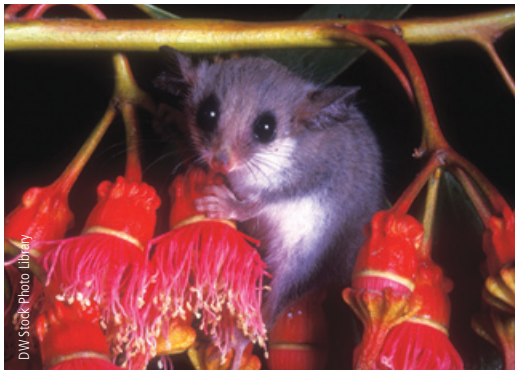
Three genera – *Eucalyptus*, *Corymbia* and *Angophora* – are usually referred to as eucalypts. In this profile, 'eucalypt forests' are those forests dominated by *Eucalyptus* or *Corymbia*.

Eucalypts belong to the Myrtaceae family, which also includes, among other genera, bottlebrushes (*Callistemon* species) and tea trees (*Leptospermum* and *Melaleuca* species).

Where are Australia's eucalypt forests?

Eucalypt forests are found throughout Australia except in the most arid regions (Figure 1). For national reporting, eucalypt forests are grouped into 11 categories defined by dominant species and structure (Table 1). The most important of these are the eucalypt medium woodland (38% of Australia's total forest area), eucalypt medium open forest (19%) and the eucalypt low woodland (9%).

The forests of southeastern Australia contain a wider range of dominant eucalypt species than those of southwestern or northern Australia. In the southeast, the greater topographic variability results in major changes in species groupings.



The pygmy possum (*Cercartetus nanus*) feeds on eucalypt nectar and pollen and plays a part in the pollination of eucalypt flowers.

Eucalypt tall open forest.

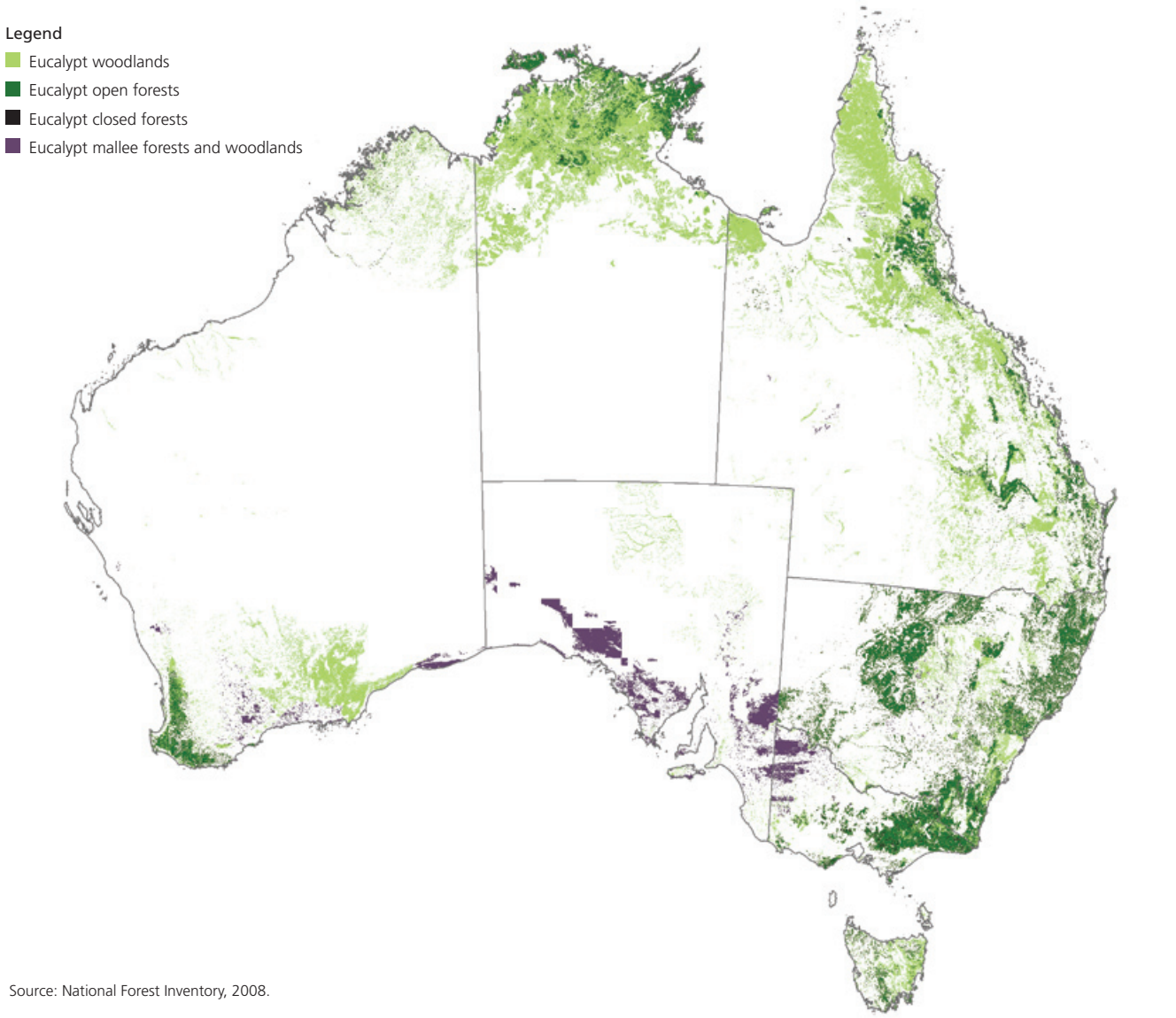
What's in a name?

The word 'eucalyptus' is derived from the Greek words *eu*, meaning 'well', and *kalyptos*, meaning 'covered'. This refers to the operculum (bud cap) that covers the stamens (male floral parts) during the development of the eucalypt flower and falls off as the flower blooms.

Argyle apple (*Eucalyptus cinerea*) blossom showing bud caps falling to expose the stamens.

Many eucalypts produce a resinous gum, giving rise to the common name 'gum tree'. Most species produce large numbers of small flowers grouped in clusters, which attract insects to assist in pollination, but some develop fewer, larger flowers that are pollinated by birds and sometimes mammals.

Figure 1: Eucalypt forest distribution



Source: National Forest Inventory, 2008.

Table 1: Area of eucalypt forest types

Forest type	Area ('000 hectares)	% of total native forest
Eucalypt low closed	44	0.03
Eucalypt low open	2 648	1.8
Eucalypt low woodland	13 423	9
Eucalypt mallee open	376	0.3
Eucalypt mallee woodland	8 871	6
Eucalypt medium closed	254	0.2
Eucalypt medium open	28 145	19
Eucalypt medium woodland	56 187	38
Eucalypt tall closed	123	0.2
Eucalypt tall open	5 881	4
Eucalypt tall woodland	497	0.3
All eucalypt	116 449	79
Other	30 948	21
Total native forest	147 397	100

Source: MIG (2008).

In southwestern and northern Australia, where the topography is less variable, a few species of eucalypts, such as woollybutt (*E. miniata*), stringybark (*E. tetrodonta*) and jarrah (*E. marginata*), dominate large areas of forest, although many other species occur in localised areas.

Values and uses

Wood

Wood harvested in eucalypt forests is used for many purposes, including house construction, furniture manufacture, handicrafts, veneer, poles, piles, girders, fuelwood and pulp and paper. Slow-growing eucalypts, such as those in the wheatbelt and goldfields of Western Australia, produce some of the world's densest timbers.

Environmental

Eucalypt forests are extremely important for the conservation of Australia's biodiversity and the maintenance of ecosystem processes. They provide habitat for a part of the continent's rich array of plant and animal species, help protect soil and water values in important catchments, including the Murray–Darling Basin, and constitute a reservoir of carbon.

Left to right: Log landing in medium open eucalypt forest. The area of native eucalypt forest available for harvesting has declined and so has the volume harvested. Log landing during salvage operations in a burnt alpine ash (*Eucalyptus delegatensis*) forest following fire in 2003. Loading red gum (*Eucalyptus camaldulensis*) sleepers, Horsham, Victoria.

Indigenous uses

Indigenous people use a great range of materials from eucalypt forests for traditional purposes. The seeds of many eucalypt species are ground and made into cakes, while the forests also yield foods such as fruits and nuts, berries, tubers of rushes and yams, grass seeds, honey, wallabies, possums, snakes and lizards. The bark of mallee roots is roasted, pounded and chewed, and flowers of some eucalypts are soaked in water to make sweet drinks. The wood is used for fuel and fashioned into spears, digging sticks, clap-sticks, clubs and boomerangs. Resins are used for making adhesives, medicines, and dressings for wounds.

Eucalypt forests also provide much of the raw material for a flourishing contemporary Indigenous art and craft industry that produces carvings, bark paintings, fibre craft weavings, ochres and dyes. The industry generates hundreds of jobs and is worth millions of dollars a year to Indigenous communities.

Other uses

Many eucalypt forests provide nectar and pollen for an economically and socially important apiary industry. Eucalypt forests, particularly open forests, are widely used for camping, bushwalking and bird watching.

Classification of eucalypt forests

Eucalypts form the overstorey and dominant components of a wide range of forests, which can be classified according to crown cover and tree height. Crown cover is the area of ground covered by tree canopies, ignoring overlaps and gaps within individual canopies. It is usually measured from above using aerial photographs or other remote sensing imagery.

In Australia:

- woodland is defined as forest with a crown cover of 20–50%
- open forest has a crown cover of 50–80%
- closed forest has a crown cover of greater than 80%
- mallee is a special form of eucalypt forest that occurs as either woodland or open forest.

Within these crown cover classes there are three height classes – tall, medium and low.

Eucalypt trees also often grow in shrublands and grasslands. Such vegetation types are only classified as forests if the emergent trees have a crown cover greater than 20%.

Eucalypt woodland forest

Eucalypt woodland forest makes up nearly half (70.1 million hectares) of Australia's total native forest estate. It occurs in four main areas: tropical northern Australia; subtropical and warm-temperate eastern Australia; the warm temperate southwest; and the cool temperate regions of southeastern Australia, including Tasmania (Figure 2).

More than one-third (42%) of all eucalypt woodland forests (excluding mallees) occur in Queensland and there are also large areas in the Northern Territory (29%) and Western Australia (16%). Tropical eucalypt woodland forests range in height from very low to very tall and often feature an understorey of palms, cycads and grasses. The majority of eucalypt species is evergreen, meaning that they retain their leaves year-round. Some species in the seasonally inundated cracking clays of northern Australia, however, lose all or part of their leaf canopies when water-stressed and flower and have a flush of growth just prior to the start of the monsoonal rains. This characteristic is called 'drought deciduousness'.

In temperate regions, the natural distribution of eucalypt woodland forests largely coincides with the country's agricultural heartlands. As a consequence, most such woodlands are now remnant patches in agricultural and pastoral landscapes.

River red gum (*E. camaldulensis*) is the most widely distributed of the eucalypt species and is found in all Australian mainland states. Some of its most extensive forests occur as woodlands along the Murray River and its tributaries.

Left to right: Echidna (*Tachyglossus aculeatus*). Facilities like this skywalk are available in many forest areas to assist ecotourism, recreation and nature education. Eucalypt low woodland.

Figure 2: Eucalypt woodland forest distribution

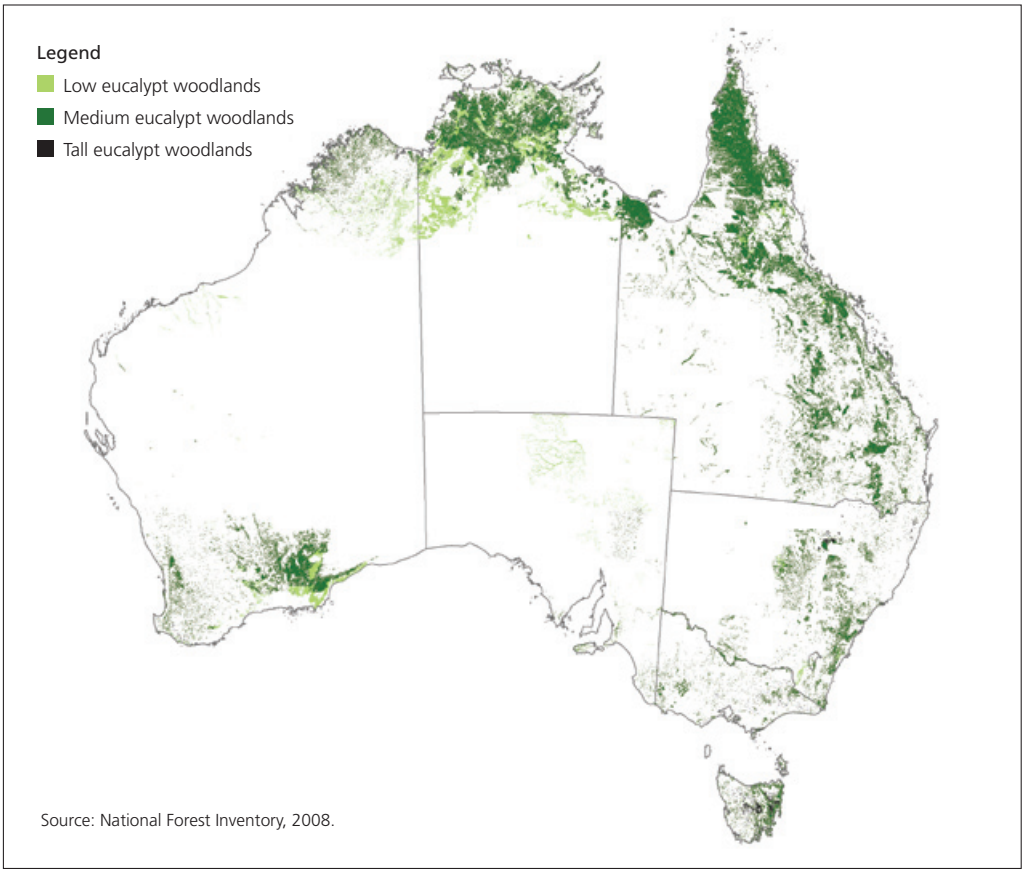
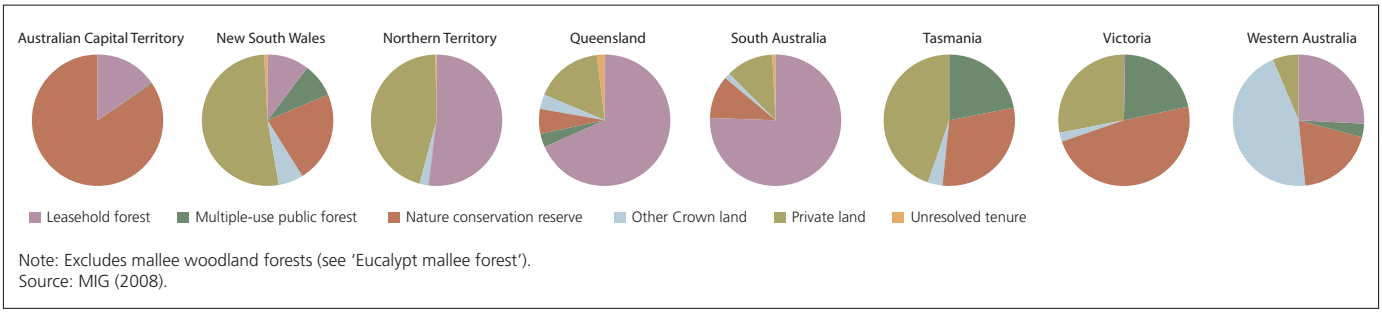


Figure 3: Eucalypt woodland forest tenure, by state and territory, 2008



Note: Excludes mallee woodland forests (see 'Eucalypt mallee forest').
Source: MIG (2008).

Ownership and management

Most eucalypt woodland forests are on leasehold or private land (Figure 3), but nearly 9% are in nature conservation reserves and 3% are in multiple-use public forests. Forty-five per cent of Western Australia's eucalypt woodland forests occur on 'other crown land', which is crown land reserved for purposes such as scientific research, education, stock routes, mining and use by the defence forces or Indigenous communities.

Eucalypt open forests

Figure 4 shows the distribution of eucalypt open forests in Australia. In the southeast, these forests can be quite diverse, containing up to 10 eucalypt species per hectare. Others, such as the southwest's open jarrah forests, are dominated by only one or two species. The largest expanses of eucalypt open forest are in New South Wales (44% of the total), Queensland (18%), the Northern Territory (17%) and Victoria (12%). In general, open forests occur where average annual rainfall exceeds 600 millimetres and where the phosphate level of the soil is moderate

Left to right: Bee hives in private native forest. Bees on honeycomb. Bird watching.

Left to right: Indigenous consultation in forest management, Northern Territory. The red gum forests of the Barmah region are a significant ecological asset on the Murray River – their good health relies on an adequate allocation of water to environmental flows in a highly regulated river system. Circular pool, Walpole, Western Australia.

by Australian standards. Tall open forests (with trees at least 30 metres tall) are found in southwestern Australia and, on the east coast, in a discontinuous arc of high-rainfall country ranging from northeastern Queensland to southern Tasmania, where the dominant species changes gradually with latitude.

Ownership and management

One-third of eucalypt open forests (12.2 million hectares) is owned privately, 29% (10.8 million hectares) is on leasehold land, and just over 18% (6.69 million hectares) is in nature conservation reserves (Figure 5).

Historically, jarrah (*E. marginata*) and karri (*E. diversicolor*) forests in Western Australia's southwest have provided much of the state's timber supply. In recent years the sustainable sawlog yield has declined as more of these forests have been placed in nature conservation reserves (and consequently are no longer available for harvesting) and as forest harvesting practices have been modified.

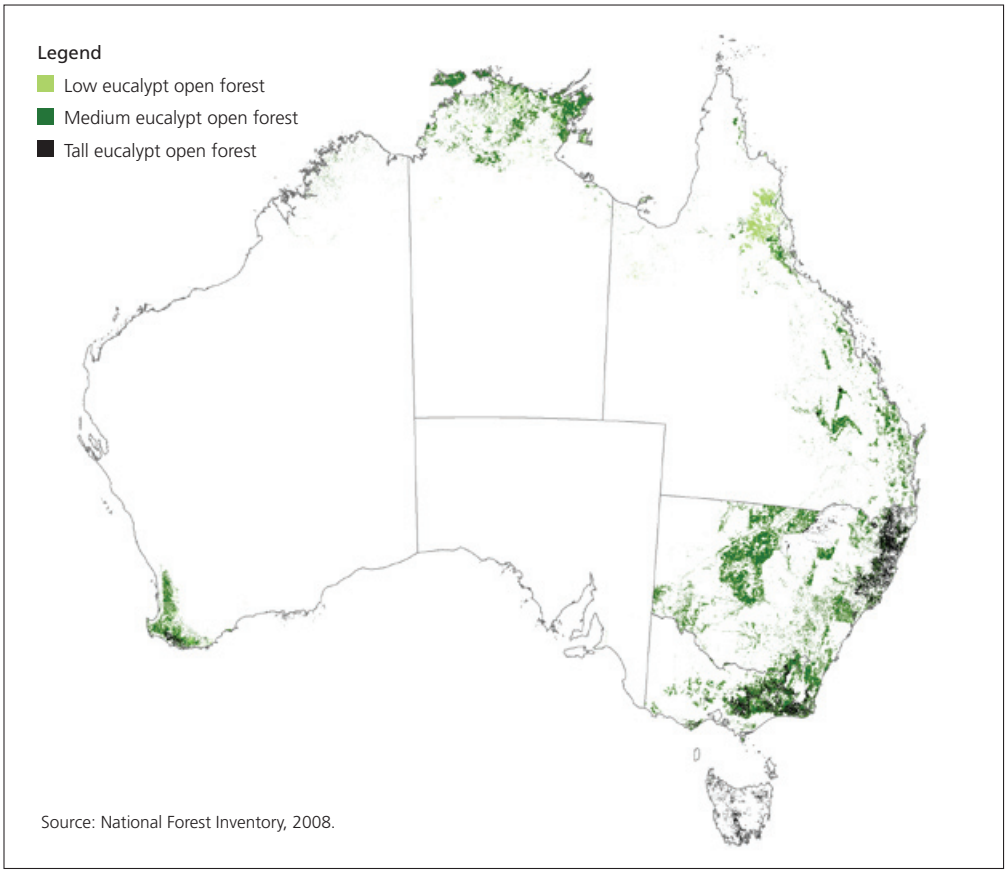
One of the most commercially important forest species in coastal New South Wales and Queensland is blackbutt (*E. pilularis*).

Australia's tall trees

Tall open forests – also known as wet sclerophyll forests – are open forests dominated by trees at least 30 metres tall. This forest type contains large quantities of plant biomass per unit area, and also includes trees that are among the tallest in the world.

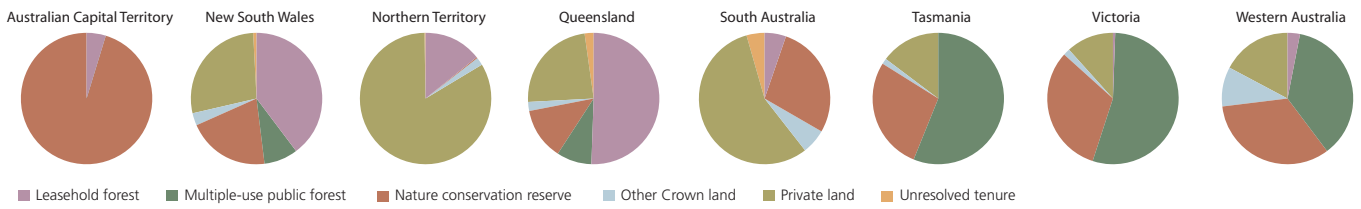
Mountain ash, *Eucalyptus regnans*, is the world's tallest flowering plant, reaching heights of more than 100 metres. Mountain ash forests occur in Victoria's Central Highlands (east of Melbourne), the Otway Ranges, and the Strzelecki Ranges in Gippsland. Other tall-growing ash species include alpine ash (*E. delegatensis*), silvertop ash (*E. sieberi*), and messmate stringybark (*E. obliqua*), which occur in the wetter mountains of Victoria and Tasmania. The ash group of eucalypts is particularly important for the supply of timber for house frames, flooring, furniture and, because of their light colour, much of the native forest pulp production for papermaking in southeastern Australia. Ash forests are also critical for the conservation of biodiversity and watershed protection.

Figure 4: Eucalypt open forest distribution



Source: National Forest Inventory, 2008.

Figure 5: Tenure of eucalypt open forest, by state and territory, 2008



Note: Excludes mallee woodland forests (see 'Eucalypt mallee forest' below).
Source: MIG (2008).

Research on alternatives to clearfelling in Australia's eucalypt forests

Recent research has led to the development of new silvicultural regimes designed to replace most clearfelling and improve forest conservation. As a result of research undertaken at the Warra Long-term Ecological Research Site in Tasmania, for example, variable retention silviculture has been applied operationally in several locations in the state.

Variable retention silviculture has been applied operationally in several locations in Tasmania, here contrasted in the foreground with clearfelled coupes in the background.

Eucalypt closed forest

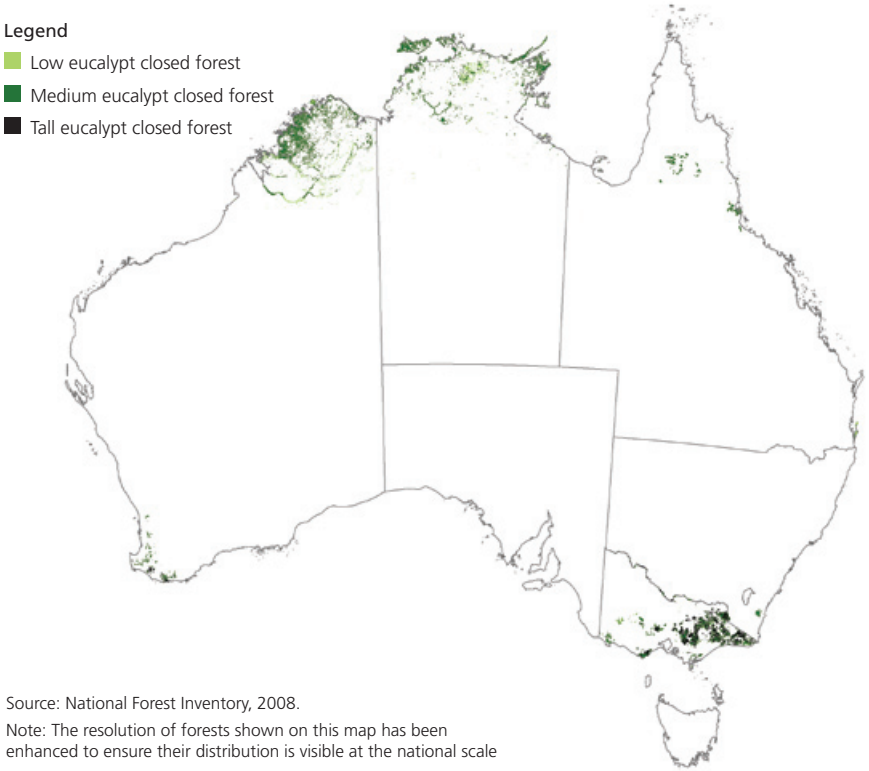
Eucalypt closed forest usually occurs in wet or sheltered areas at the margins of, or within, open eucalypt forest. Victoria contains more than half the 420 587 hectares of eucalypt closed forest mapped in Australia, the Northern Territory almost 20%, Western Australia 13%, Queensland 10% and New South Wales just over 2% (Figure 6). There are no significant eucalypt closed forests reported in the Australian Capital Territory, South Australia or Tasmania.

Ownership and management

Nearly half (44%) of all eucalypt closed forest is in multiple-use public forests, mainly in Victoria, about 21% is in nature conservation reserves, and 19% is on private land.

Stacking jarrah boards for export, southwest Western Australia.

Figure 6: Eucalypt closed forest distribution



Source: National Forest Inventory, 2008.
Note: The resolution of forests shown on this map has been enhanced to ensure their distribution is visible at the national scale

Tall closed eucalypt forest, Victoria.

Reductions in sustainable yield in Western Australia

Since 1970, the area of native forest available for timber production in the state's southwest has decreased by about 50% (Figure 7). This reflects a shift in state government policies.

Recently sustainable yields were reviewed during the preparation of the *Forest Management Plan 2004–13*, which covers all the main timber production areas in the state's southwest. As a result of this review, the sustainable yield for sawlogs was reduced because of large increases in conservation reserves (and therefore decreases in the area of forest available for harvesting) and more conservative forest management practices. Sustainable yields for jarrah and karri sawlogs were lowered by 63% and 64%, respectively, over pre-2004 levels (Figures 8 and 9).

Source: MIG (2008).

Figure 7: Trends in the area of jarrah and karri available for timber harvesting, 1970 to 2005

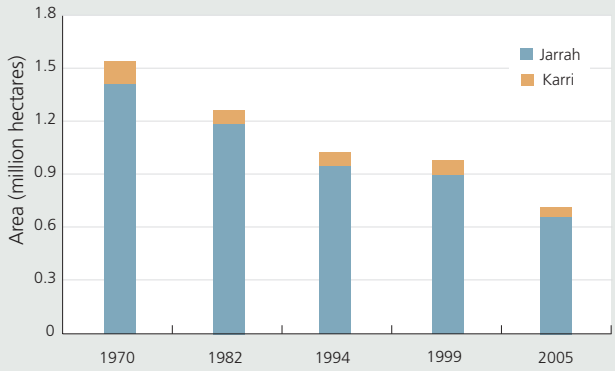
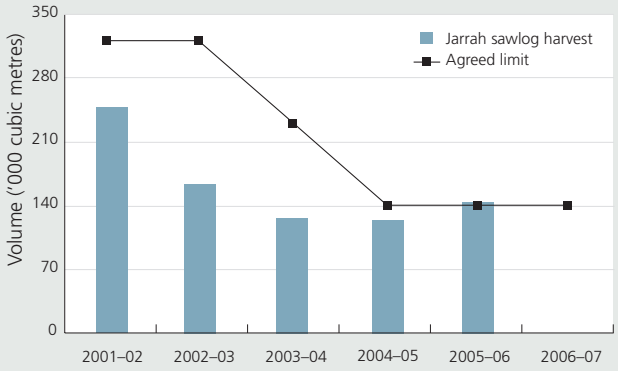
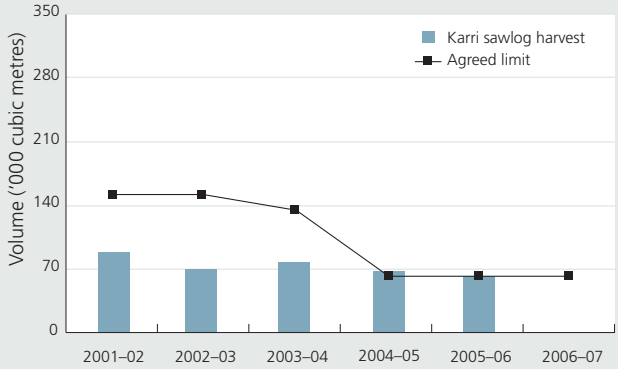


Figure 8: Jarrah (*Eucalyptus marginata*) sawlog timber harvested relative to agreed limits



Note: 2003–04 limits represent a transition from previous limits to current limits established under the *Forest Management Plan 2004–13*.

Figure 9: Karri *(Eucalyptus diversicolor)* sawlog timber harvested relative to agreed limits



Note: 2003–4 limits represent a transition from previous limits to current limits established under the *Forest Management Plan 2004–13*.

Eucalypt mallee forest

Mallee eucalypts have multiple stems arising at ground level from a large woody structure known as a lignotuber or mallee root. There are up to 250 eucalypt species of mallee form. Most are found in southwestern Australia, where as many as three-quarters of the eucalypt species are mallees (Figure 10). Not all mallee is forest; trees must be taller than 2 metres at maturity and crown cover greater than 20%.

Most eucalypt mallee forests occur in areas where average annual rainfall is in the range 250–400 millimetres and most rain occurs in winter. Where rainfall is higher, mallees are replaced by woodlands of single-stemmed eucalypts, sometimes of the same species. Where rainfall is lower, mallee forests usually give way to acacia forests or to shrublands and grasslands.

Ownership and management

Most mallee forests are found in South Australia (68%), New South Wales (23%), Victoria (16%) and Western Australia (13%). There are no mallee forests in the Australian Capital Territory, the Northern Territory or Tasmania. A substantial proportion (51%) of mallee forest is within nature conservation reserves, the majority in Victoria and South Australia (Figure 11).

Almost all mallee forest outside nature conservation reserves is used for cattle grazing. There is little active management for wood production because productivity is low.

White mallee (*Eucalyptus dumosa*), Lake Mungo National Park, New South Wales.

Figure 10: Eucalypt mallee forest distribution

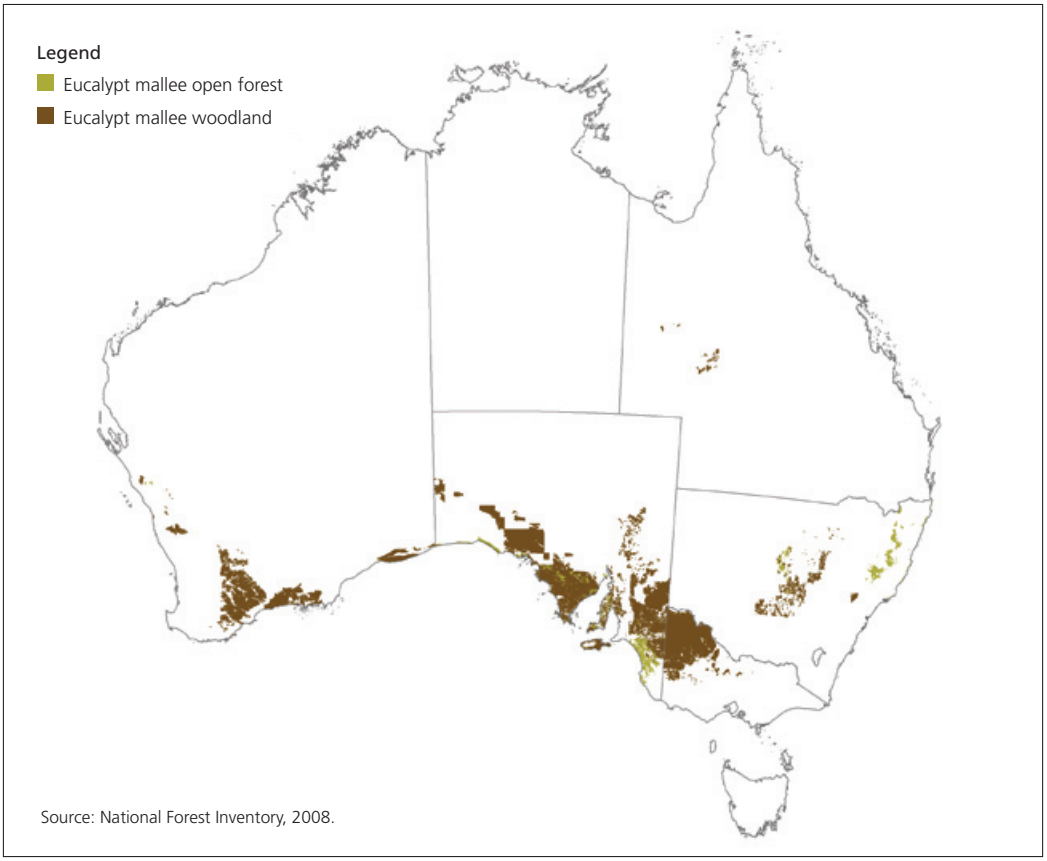
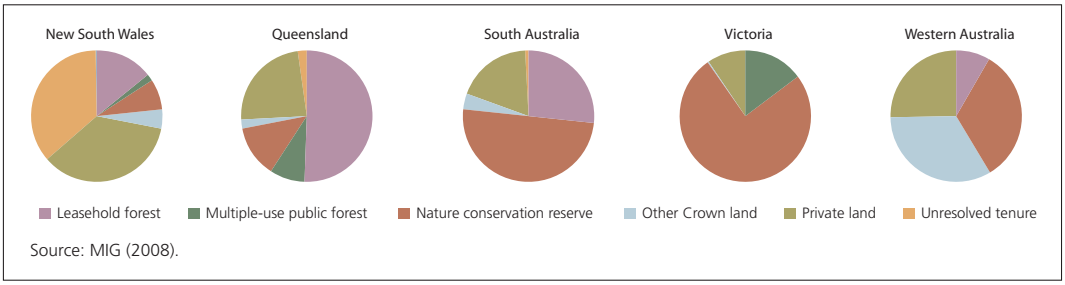


Figure 11: Tenure of eucalypt mallee forest, by state and territory, 2008



Further reading

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