



Australian forest profiles

Callitris

The *Callitris* genus occurs only in Australia (14 species) and New Caledonia (two species). This distribution reflects the fact that Australia and New Caledonia were once part of a single landmass, the ancient super-continent of Gondwana.

Callitris trees are commonly called cypress pines because of their resemblance to northern hemisphere cypresses. They are not true pines, although they are conifers. The taxonomy of the genus was revised in 2005–06.

Australia has more than 2.5 million hectares of callitris forest, which is 2% of its total forest cover.¹

Callitris species are found in a wide variety of climates and are tolerant of temperatures ranging from below 0°C to more than 40°C. They mostly occur where annual rainfall is greater than 300 millimetres – including on Queensland’s Atherton Tablelands, where annual rainfall is as high as 2 000 millimetres. Some callitris forests survive, however, on annual rainfalls as low as 200 millimetres, including in a small area of desert in Western Australia. They occur on a wide range of soil types, but most commonly on nutrient-poor soils with sandy or loamy surface layers and a clay loam at depth. Callitris has mycorrhiza – mutually beneficial associations between fungi and plant roots – that enhances the plant’s uptake of nutrients, especially phosphorus, from nutrient-poor soils and gives the fungi access to carbohydrates from the tree’s roots.

Table 1 shows that the total area of callitris forest increased by more than a quarter of a million hectares between 2003 and 2008 as a result of improved mapping and also a real expansion of the genus onto former grazing land. It also shows that more than one million hectares of callitris forest classified in 2003 in an ‘unknown’ crown cover class was reclassified in 2008 as either woodland or open forest. Callitris woodland is now known to occur on about 800 000 hectares and callitris open forest on nearly 1.8 million hectares.



White cypress pine (*Callitris columellaris*) open forest, Queensland.



Callitris woodland with co-dominant eucalypts.

While callitris trees occur in association with many fire-tolerant species, they do not survive intense fire. When burnt, callitris regenerates from seed and will recover over decades, although it will disappear from sites altogether if fires occur too frequently or if grazing is excessive. Callitris species survive in Australia’s fire-prone environment in areas protected from fire by the local topography and where the slow rate of fuel accumulation prevents frequent, high-intensity fires. Prescribed burning during the cooler months can lessen the risk of wildfires by reducing fuel loads in the forest.

Callitris forests typically occur in small populations in drier inland regions. In some places, however, they form vast tracts. Coastal cypress pine forest (*Callitris columellaris*, also called white cypress pine) occurs in a fragmented distribution along the coast in northeastern New South Wales, where it has been proposed for endangered ecological community listing. Pure stands of callitris forest are most often restricted to undulating or flat land with sandy soils, or in upland rocky areas protected from fire. More commonly, species of callitris co-dominate in forest canopies with *Eucalyptus*, *Casuarina* or *Acacia* species over a herbaceous, sparse, shrubby understorey.

1 Australia’s definition of forest is ‘an area dominated by trees having usually a single stem and a mature or potentially mature height exceeding 2 m and with an existing or potential crown cover of overstorey strata about equal to or greater than 20%.’

Figure 1: Callitris forest distribution, 2008

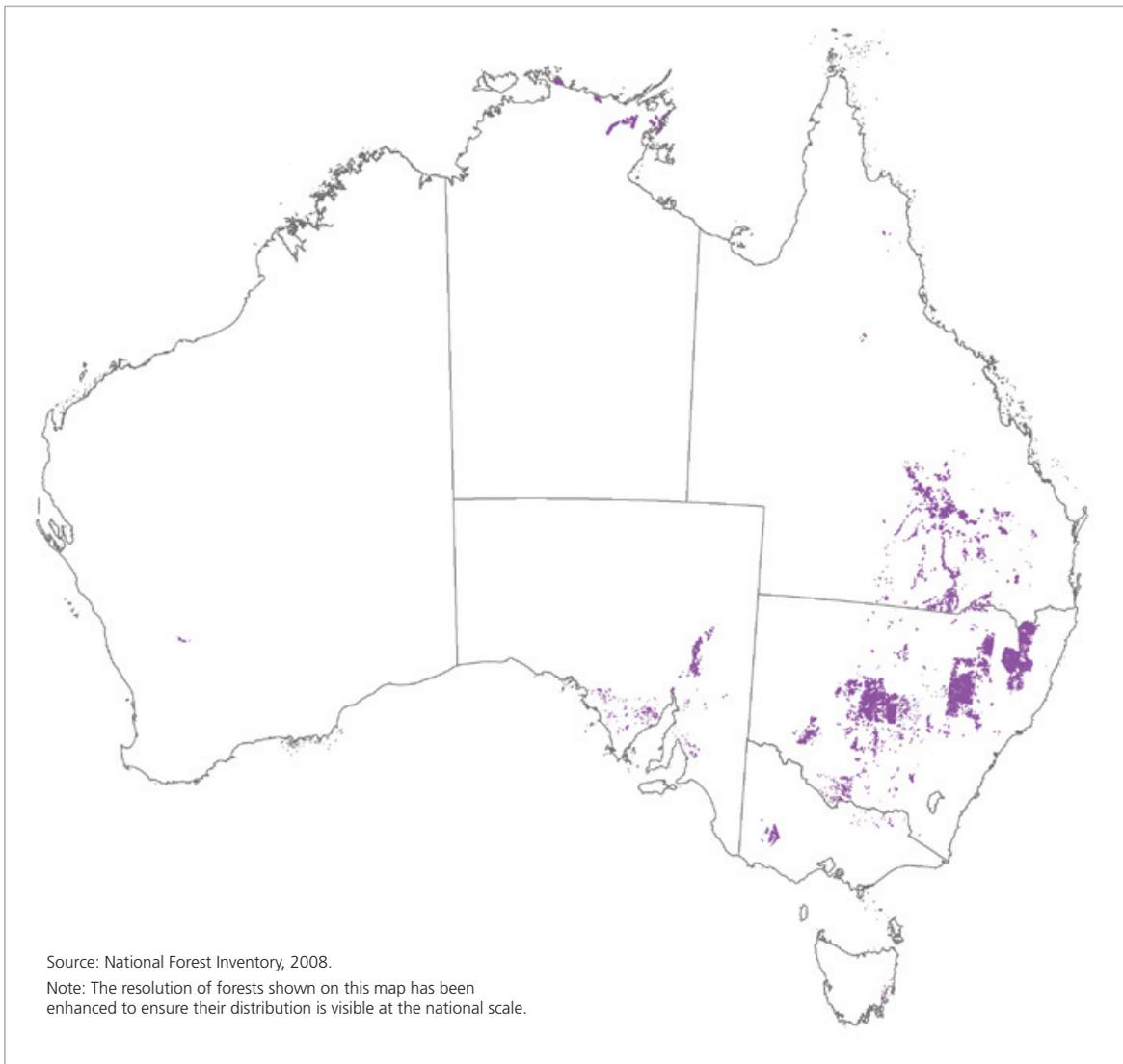


Table 1: Area of callitris forest, by crown cover class, 2003 and 2008 ('000 hectares)

	Woodland	Open	Closed	Unknown crown cover	Total
Callitris 2003	502	622	0	1 206	2 330
Callitris 2008	803	1 793	0	0	2 597

Note: 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 has a crown cover of 20–50%, open forest a crown cover of 50–80%, and closed forest a crown cover of greater than 80%.

Source: NFI (2003), MIG (2008).



In the absence of fire and grazing, callitris advances into eucalypt woodland (left). Fire reverses this tendency by killing most of the young encroaching callitris (middle). The small group of callitris shown on the right has survived in an upland rocky area that has insufficient ground cover to carry a fire.

Coastal cypress pine forest in the New South Wales north coast bioregion – proposed endangered ecological community listing

Coastal cypress pine forest is found typically on the inland side of coastal sand plains, north from the Angourie area on the far north coast of New South Wales, including the local government areas of Tweed, Byron, Ballina, and Richmond Valley. The community typically comprises a mixture of eucalypts, acacias, banksias and/or rainforest trees. Some stands of the community that have been partially cleared in the past are now reduced to scattered trees. Fires have also influenced stand structure, as the dominant tree species, *Callitris columellaris*, is generally killed when burnt. Post-fire regeneration of the community may therefore only have the structure of a shrubland or heathland and no longer be mapped as forest.

Estimates based on field observations of old remnant trees in cleared land around the remaining stands suggest that the geographic extent of the community has declined by more than 77%. The actual reduction in geographic distribution is likely to be greater than that, since any stands that were totally removed could not be included in this method of assessment. Small-scale clearing continues to threaten the

community, mainly as a result of coastal development and associated roads. In the past 20 years, fragmentation of the community has increased as a result of clearing for tea tree plantations, caravan parks, road construction and associated quarrying. The integrity and survival of remaining small and isolated stands of the community are impaired by the small population sizes of the component species, disruption of pollination and dispersal of fruits and seeds, and likely reductions in the genetic diversity of isolated populations. Other threats include habitat degradation as a result of trampling by people and livestock, rubbish dumping, and weed invasion.

A number of threatened species have been recorded in coastal cypress pine forest or associated vegetation, including *Acronychia littoralis* (scented acronychia), *Archidendron hendersonii* (white lace flower), *Geodorum densiflorum* (pink nodding orchid) and *Drymaria rigidula* (basket fern).

Source: www.environment.nsw.gov.au/determinations

Where are Australia's callitris forests?

Australia's 2.6 million hectares of callitris forests are components of many Australian ecosystems, from the arid tropics to the Australian Alps (Figure 1). The most common species is white cypress pine. New South Wales has 59% of the area of callitris forest, Queensland 23% (Table 2).

Changes in fire frequency and land management since European settlement have allowed white cypress pine forests to expand in extent. Woodlands and open forests of white cypress pine and other callitris species grow in Queensland, New South Wales and South Australia. Tall open forests of Port Jackson pine (*C. rhomboidea*) grow in Tasmania and there are open forests of Rottneest Island pine (*C. preissii*) in coastal Western Australia and South Australia. Woodlands dominated by black cypress pine (*C. endlicheri*) and family pine (*C. verrucosa*) grow in localised areas in Queensland, New South Wales and the Australian Capital Territory. *Callitris oblonga* is the only member of the genus adapted to riverine habitats, but it can also grow on very dry sites.



Black cypress pine (*Callitris endlicheri*).

Ownership and management

Most callitris forests (83%) are found on leasehold and private land (Table 2). About 7% is designated as multiple-use public forest (in which one possible use is wood production).

Table 2: Tenure of callitris forest, by state and territory, 2008 (hectares)

Tenure	ACT	NSW	NT	Qld	SA	Tas.	Vic.	WA	Australia
Leasehold land	24	672 838	6	331 739	81 280	0	0	0	1 085 887
Multiple-use forests	0	80 550	0	103 726	0	60	661	0	184 997
Nature conservation reserves	0	101 495	0	8 394	24 054	390	23 953	0	158 286
Other crown land	0	50 169	0	7 913	658	55	35	195	59 025
Private land	0	631 865	314 504	123 112	10 767	284	451	1 081	1 082 064
Unresolved tenure	0	2 821	412	22 236	1 061	0	0	0	26 530
Total	24	1 539 738	314 922	597 120	117 820	789	25 100	1 276	2 596 789

Note: Totals may not tally due to rounding. The six forest tenure categories above are defined in MIG (2008, pp xvii–xviii).

Source: MIG (2008).



Rottneet Island pine (*Callitris preissii*).

Values and uses

Wood

A large number of small local sawmills once relied on callitris forests for their timber supply. Many of these mills have now closed as much of the cypress pine forest devoted to timber production has been incorporated into conservation areas.

Nevertheless, *Callitris* is still the second most important genus in the native forest-based timber industry after *Eucalyptus* and is the only significant softwood timber harvested commercially in native forests. In 2007, 58 000 m³ of cypress pine sawlogs were harvested in New South Wales and, in 2004–05, 138 000 m³ were harvested in Queensland.

The strength and durability of the timber are important assets. It can resist decay and termites for up to 50 years and like all softwoods is immune to lyctid borer attack. The timber has been used widely for in-ground applications such as house stumps, fence posts and telephone poles, as well as for flooring and furniture. *Callitris* makes excellent kindling wood but burns too hot and too rapidly for use in domestic stoves and heaters.

Environmental

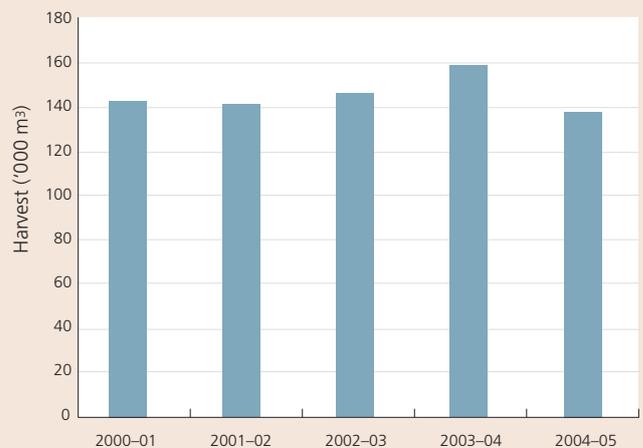
Fauna diversity is high in mixed eucalypt/callitris forest but extremely low in pure callitris stands. A survey in mixed eucalypt/callitris forest in the Barakula State Forest (south Queensland) found 127 native animal species, including 84 birds, 6 bats, 19 reptiles and two rare or threatened species (the yellow-bellied glider, *Petaurus australis* and the yellow-tufted honeyeater, *Lichenostomus melanops*).

Indigenous uses

Callitris forests are an important part of the culture of Australia's Indigenous people and contain many sites of significant cultural value. Indigenous people have traditionally used northern cypress pine (also called blue cypress pine, now included in *Callitris columellaris*) wood for firewood and torches, as well as for the manufacture of spears, spear throwers, ceremonial objects, paddles and music sticks. Resin is used to make glue while the cones, bark, leaves and ash are components in various medicines. *Callitris* bark is used to make rope and to repel mosquitoes and, in Arnhem Land, to make waist belts. The Walbiri people of Central Australia make implements from the wood of the white cypress pine.

Queensland's native cypress pine industry

Cypress pine occurs in natural stands on state forest land, timber reserves and other Crown lands around Inglewood, Millmerran, Chinchilla, Taroom, Yuleba, Roma, Injune, Mitchell, Augathella and Tambo in southeastern Queensland. In the domestic market, cypress has been used traditionally for flooring, framing, cladding, decking and fence materials. Export markets for high-grade flooring have been expanding in Japan and the United States, with some Queensland sawmills exporting up to 80% of their production. Most cypress sawlogs sold by the Department of Natural Resources and Water to southern Queensland sawmills are covered by 15-year supply agreements (to 2014) entered into with the state government in 1999. An inventory was completed in 2003–04 to provide data for long-term cypress harvest plans.



Source: Department of Primary Industries (Queensland) Yearbook 2005.

Other uses

Resin from the white cypress pine has been used as a substitute for sandarac resin, a raw material for specialist varnishes, and as incense. Blue cypress pine produces an oil suitable for aromatherapy; most production is derived from plantations rather than native callitris forests. Large areas of callitris forests are also used for grazing and beekeeping.



White cypress pine (*Callitris columellaris*).

The word 'callitris' is derived from the Greek *calli* (meaning beautiful) and *treis* (meaning three), because their scale-like leaves occur in whorls of three. Like all conifers, callitris trees produce their seeds in cones.

The Pilliga Scrub

The Pilliga Scrub is a vast woodland in western New South Wales characterised by native white cypress pine and ironbark forests, spring flowers and abundant fauna. Pilliga is an Aboriginal word meaning swamp oak. The name was adopted in the mid-1800s for one of the original grazing properties, near where the town of Pilliga now stands. Occupying about 500 000 hectares between the Namoi River in the north and the Warrumbungle Ranges in the south, the Pilliga comprises the largest remaining area of native forest in New South Wales west of the Great Dividing Range.

The current forest structure reflects the history of settlement in the region, following many thousands of years of Aboriginal occupation. When European settlers arrived in the early 1830s they established grazing runs throughout the forests, which then comprised well-scattered large trees over a grassy understorey. Burning by Aborigines and grazing by kangaroo rats (*Notomys* spp.) had, up to then, kept the forest floor relatively free of regeneration.

The introduction of cattle and sheep by settlers resulted in significant ecological changes. The soils deteriorated and the mix and grazing quality of the native grasses changed. The kangaroo rats were displaced. A prolonged drought during the 1870s and early 1880s caused most of the grazing runs to be abandoned. Then, during the late 1880s and early 1890s, there was a succession of good seasons, which, in the absence of grazing pressure and regular burning, led to the massive regeneration of native cypress and eucalypts across much of the Pilliga.

The introduction and spread of rabbits throughout the area in the early 1900s reduced the potential for regeneration in the Pilliga until the introduction of the rabbit control agent myxomatosis in the 1950s. With the consequent decline of the rabbits, a new wave of young cypress and eucalypt seedlings was able to establish and grow.

The success of cypress regeneration represents a management challenge. Many hundreds of seedlings and saplings can be present on a single hectare, and competition among them can result in 'lock-ups' – where growth is brought to a standstill as available light, moisture and nutrients are expended solely on survival. In areas managed for sawlog supply, these stands must be thinned, a task that is carried out by workers using brushcutters.

The cypress regeneration that occurred in the late 1800s forms the basis of the timber industry operating in the Pilliga



The dense regeneration of callitris that occurs in the absence of fire and grazing requires thinning in areas managed for sawlog production.



Assessing timber regrowth in a stand of callitris.

today. The 1950s regeneration and subsequent growth is being managed to provide a sustainable yield of timber into the future.

The New South Wales government, in its Western Woodlands decision, gazetted extensive new Community Conservation Areas (CCAs) under the *Brigalow and Nandewar Community Conservation Act 2005*, affecting the Brigalow Belt and Nandewar regions from Dubbo to the Queensland border. This added 352 000 hectares of land to nature conservation reserves, including the Pilliga, Goonoo, Terry Hie Hie and Bebo forests. Under the Act:

- 348 000 hectares of former state forest were included in the CCAs
- CCAs were created with four defined zones
 - Zone 1: Conservation and recreation
 - Zone 2: Conservation and Aboriginal culture
 - Zone 3: Conservation, recreation and mineral exploration (mining and gas)
 - Zone 4: Forestry, recreation and mineral extraction.
- A Community Conservation Council was established to oversee the CCAs and, in turn, will be advised by three community-based advisory committees based on catchment management areas
- Timber industry participants have 20-year wood supply agreements and receive development assistance funds
- New visitor infrastructure in the CCAs is being built with the assistance of a capital investment fund
- A job creation package is being implemented for the non-commercial thinning of productive cypress pine forests.



A radio-tracking study of nine barking owls (*Ninox connivens*), a vulnerable species, has been undertaken in Pilliga cypress forests to determine the key elements of habitat required by the species and to provide appropriate guidelines for forest managers.

References and further reading

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White cypress pine, Pilliga region, New South Wales.

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