



Australian forest profiles

Casuarina

The family Casuarinaceae occurs naturally in Australia, Southeast Asia and the Pacific and comprises four genera and 90 species. Australia has 66 species in three genera: six in *Casuarina*, 59 in *Allocasuarina* and one in *Gymnostoma*. Commonly called she-oaks (and sometimes oaks) because of the similarity of their timber to that of European oaks, casuarinas are a distinctive part of many Australian coastal and riverine landscapes.

The word 'casuarina' is derived from the Malay word for cassowary, kasuari, and is a reference to the similarity of the tree's drooping branches to the feathers of the bird. Casuarinas also bear a resemblance to pine trees, with needle-like foliage and woody fruits. The foliage, however, is not composed of true leaves but rather of green, jointed branchlets that function like leaves. The true leaves are tiny, tooth-like structures protruding from around the top of each joint.

Only some casuarina species form forest communities¹; others are too short or sparsely distributed to be classified as forest. Most casuarina forests are low in height, sometimes with a dense, shrubby understorey. The tallest casuarina forests occur along rivers, where trees can grow to more than 20 metres.



Above: fruits of coast she-oak (*Casuarina equisetifolia*).

Right: Jointed branchlets and flowers of coast she-oak.



River she-oak coastal forest, New South Wales.

Casuarina forests occur as woodlands or open forests over more than 2.2 million hectares and make up about 1.5% of Australia's total forest area.

Table 1 shows that the total area of casuarina forest increased by nearly a quarter of a million hectares between 2003 and 2008, mainly as a result of improved mapping in the Northern Territory. The table also shows that more than 800 000 hectares of casuarina forest classified in 2003 in an 'unknown' crown cover class has been reclassified as either woodland or open forest, and that a large area of forest previously classified as open forest is now classified as woodland.

Where are Australia's casuarina forests?

Casuarina forests occur in all states and territories of Australia (Table 2). Its largest expanse occurs in a band from the semi-arid zone in South Australia through western New South Wales and into Queensland (Figure 1). Significant forests are also found in coastal New South Wales. Belah (*Casuarina cristata*) forests have the widest distribution, growing in habitats ranging from stony slopes to heavy clay soils.

Common inland species include belah and river she-oak (*C. cunninghamiana*), which often occur in association with acacias and eucalypts. Coast she-oak (*C. equisetifolia*) occurs in pure stands on coastal fore-dunes in eastern Australia and, in less exposed sites, also in association with coastal banksias. Pure stands of the rock she-oak (*Allocasuarina huegeliana*) are found

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: Casuarina forest distribution, 2008

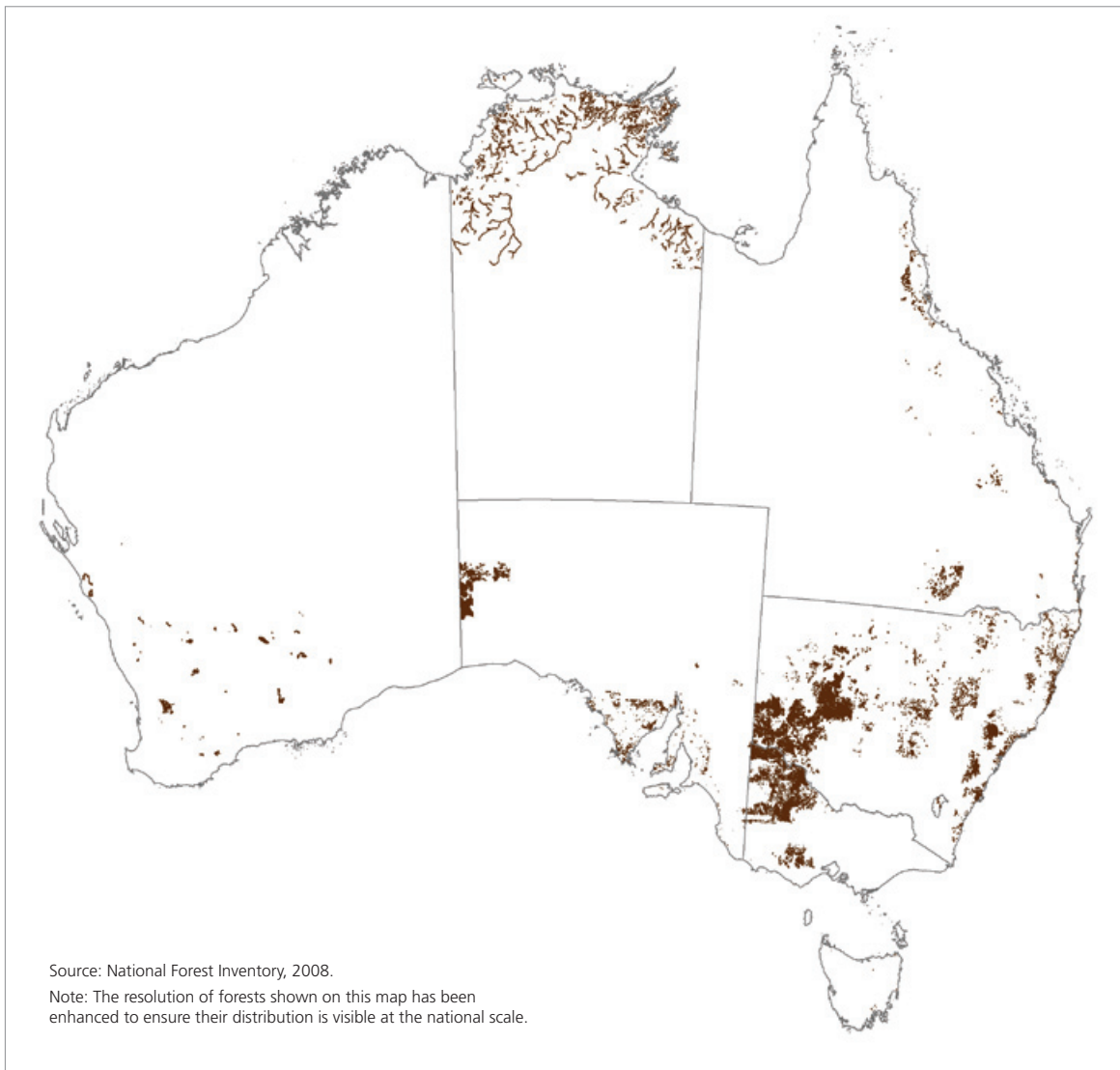


Table 1: Area of casuarina forest, by crown cover, 2003 and 2008 ('000 hectares)

	Woodland	Open	Closed	Unknown crown cover	Total
Casuarina 2003	359	871	0	809	2 039
Casuarina 2008	2 082	191	0	0	2 274

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%.

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

on granite soils and outcrops in Western Australia. Because it is more resistant than local eucalypts to drought, drooping she-oak (*A. verticillata*) forms pure stands on very dry sites in Tasmania.

Ownership and management

New South Wales contains 52% of Australia's casuarina forests, South Australia 30% and Victoria 6% (Table 2). About 45% of the casuarina forest estate occurs on leasehold land, 37% in nature conservation reserves and 13% on private land. Less than 5% is located in multiple-use public forests or on other crown land.



Glossy black cockatoo (*Calyptorhynchus lathami*), an endangered forest-dwelling species, depends on casuarina seeds for food.

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

Tenure	ACT	NSW	NT	Qld	SA	Tas.	Vic.	WA	Australia
Leasehold land	42	918 135	34 408	20 165	13 427	0	0	20 036	1 006 213
Multiple-use forests	0	8 362	0	2 575	0	0	19 988	0	30 925
Nature conservation reserves	207	109 850	15	3 486	629 681	619	71 641	8 747	824 246
Other crown land	0	20 685	3 986	960	5 273	97	3 033	35 497	69 531
Private land	0	104 608	75 079	28 801	21 470	700	36 506	18 093	285 257
Unresolved tenure	0	5 922	284	5 366	1 078	0	0	0	12 650
Total	249	1 167 562	113 772	61 353	670 929	1 416	131 168	82 373	2 228 822

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

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

Casuarina forest species are found in all states and territories. Examples include:

Australian Capital Territory: *Casuarina cunninghamiana* (river she-oak).

New South Wales: *C. cristata* (belah), *C. cunninghamiana*, *C. glauca* (swamp oak), *C. pauper*, *Allocasuarina leuhmannii* (buloke), *A. verticillata* (drooping she-oak), *A. littoralis* (black oak).

Northern Territory: *A. decaisneana*, *C. equisetifolia* (coast she-oak).

Queensland: *A. leuhmannii*, *C. cristata*, *C. equisetifolia*, *A. torulosa* (forest oak), *A. littoralis*, *C. cunninghamiana*, *C. glauca*, *G. australianum* (Daintree pine).

South Australia: *A. verticillata*, *C. pauper*, *A. decaisneana*, *A. leuhmannii*.

Tasmania: *A. verticillata*, *A. littoralis*.

Victoria: *C. pauper* and/or *A. leuhmannii*, *A. verticillata*.

Western Australia: *C. cristata*, *A. huegeliana*, *A. decaisneana*, *C. obesa*, *A. fraseriana* (Western Australian she-oak).



River she-oak (*C. cunninghamiana*) on the banks of the Cotter River, Australian Capital Territory.

Environmental

Casuarina forests are important for biodiversity, supporting a wide range of vertebrate and invertebrate fauna. The glossy black cockatoo (*Calyptorhynchus lathami*), which is endangered in parts of its range, depends on seeds of the forest oak and black oak (*A. littoralis*) as its primary food source.

In many agricultural areas, drainage and flood mitigation measures undertaken mostly during the period 1960–1990 caused a decline in casuarina forests along creeklines and watercourses.

Casuarina vegetation communities associated with swamps and rocky outcrops have been relatively protected from interference and many occur within conservation areas. Even these, however, are threatened by increased waterlogging and salinity as a result of clearing and the fragmentation of upland forests.

Coastal development and urbanisation are also affecting casuarinas in wetlands and in the zone just above high tide.

Casuarinas such as belah are often used in reforestation because of their value as windbreaks and in soil reclamation and erosion control. They are also planted in many other countries for these purposes – including in the United States (especially California and Hawaii), China, Egypt, India and New Zealand.

Values and uses

Wood

The wood of some casuarina species is used in flooring, cabinet-making and other ornamental woodworking. The Western Australian she-oak (*Allocasuarina fraseriana*), for example, is used for making furniture and forest oak (*A. torulosa*) is used to make roof shingles. The quantity of wood available for such purposes is small because the resource is limited and the products are expensive and keenly sought after.



Swamp oak (*Casuarina glauca*) cones.

Coast she-oak is used for timber, poles, pulpwood and mulch and is also reputed to be an excellent fuelwood because it is relatively smokeless when it burns. It also produces high-quality charcoal. Belah is often used for fence posts and firewood.

Indigenous uses

Indigenous people traditionally use the hard wood of she-oaks for making boomerangs, shields and clubs. In Wylie Swamp, South Australia, archaeologists found a 10 000-year-old boomerang made of she-oak wood. Young shoots are chewed to reduce thirst, and cones are also eaten.

Other uses

The foliage of some species, such as river she-oak and belah, is used as fodder for stock during drought. Casuarina bark has been used in tannin production.

Atmospheric nitrogen fixation

Casuarina roots fix atmospheric nitrogen through nodules that contain specially adapted symbiotic actinomycete bacteria of the genus *Frankia*. Because of this, casuarinas can grow on nutrient-poor soils and in other marginal environments, such as granite outcrops or sandy soils.



River she-oak (*C. cunninghamiana*) cones and foliage.



Black oak (*A. littoralis*) woodland, Toohy Forest, southeastern Queensland.

References and further reading

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