6 White Cypress Pine

AUSTRALIAN

Forest Profiles

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

Key Issues

- White cypress pine (*Callitris glaucophylla*) is the commonest tree found in the temperate and semi-arid woodlands of eastern Australia.
- White cypress pine is a durable timber used for a range of building needs and increasingly used for furniture.
- More white cypress pine is harvested than any other single native species in Australia each year—annual sustainable yield of white cypress from New South Wales and Queensland totals about 230 000 cubic metres (m^3).
- The most important threats to white cypress are clearing and grazing, feral animals (especially rabbits) weeds and fire.
- Fire can damage white cypress forests but can also be beneficial in opening up dense stands of regenerating forest.
- Demand for cypress is increasing and production is expected to remain at least at current levels.
- With current proposals to reserve 15% of the area of pre-European vegetation types, there is concern about how to interpret the mixed cypress pine ecosystems—because of management changes white cypress pine forests currently cover a greater area than before European settlement.

NATIONAL FOREST INVENTORY
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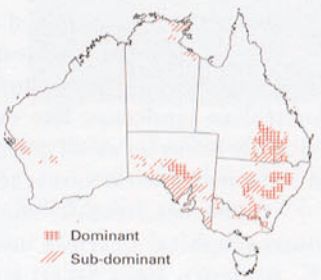
This brochure describes the cultural, economic and heritage values of the white cypress pine (Callitris glaucophylla)*



* Cypress pine species are widely distributed in Australia. The square hatching shows the distribution of dominant cypress species including white cypress pine.

THE Australian cypress pine (genus *Callitris*) is one of a small number of genera of ancient Gondwanan conifers that have survived to this day. Species of *Callitris* occur only in Australia and New Caledonia.

The genus *Callitris* was established by Etienne Pierre Ventenat in 1808 (probably from a specimen of *C. rhomboidea*). The name '*Callitris*' is derived from the Greek calli (= beautiful) and treis (= three), the scale leaves being in whorls of three. Later, Mirbel of the Paris herbarium thought the name was too similar to *Calytrix* and incorrectly substituted *Frenela*.

Although *Frenela* has been used in Australia, it is now accepted that *Callitris* is the legitimate name. There are fourteen species of *Callitris* in Australia and a further two in New Caledonia.

Taxonomic confusion about *Callitris* has been caused by the similarity of different species. *C. glaucophylla* has had several synonyms applied to it: *C. glauca*, *C. columellaris*, *C. columellaris* var *campestris*, *C. hugelli* and *Frenela robusta*. Although its accepted common name is white cypress, it is still sometimes called cypress pine, Murray pine and western cypress. The name Murray pine is appropriately applied to C. *preissii*.

Cypresses are a widespread component of Australia's tree flora even though they do not dominate the Australian landscape like eucalypts and acacias. They typically occur as small populations in drier regions but in some places form vast tracts.

Some are broadly distributed and cross major biogeographical barriers including the Nullarbor Plain (*C. preissii*), Bass Strait (*C. rhomboidea*), the Great Sandy Desert (*C. glaucophylla*) and the Gulf of Carpentaria (*C. intratropica*). Half of the Australian cypress species are restricted to the east coast of Australia.

The major commercial species is white cypress pine *Callitris glaucophylla*. It is the commonest tree in the temperate and semi-arid woodlands of eastern Australia and provides the bulk of cypress timber. However, *C. intratropica* is an important timber species in the Northern Territory.

About the Resource

C. GLAUCOPHYLLA has a straight trunk and can grow to a height of 30 metres but is more usually 15–20 metres. It has a characteristic mature foliage with fine bluish green branchlets covered by closely adhering leaves. Like all conifers, the white cypress produces its seeds in cones.

It appears white cypress pine originally occurred largely in woodland form (that is, areas only sparsely populated by trees). However, with European settlement, burning practices changed, domestic and feral grazing animals were introduced and forests were silviculturally treated. This had the effect of turning much of the woodland into a forest structure and dramatically increased the extent of cypress and mixed forests. Both 'forest' and 'woodland' are used to refer to cypress pine areas in this publication.

In open stands, white cypress trunks are usually straight with branches over much of the trunk.

Under favourable weather conditions, and in the absence of fire or grazing, white cypress pine can aggressively colonise new sites. It is a prolific seeder with recorded seedfalls of up to 5 000 000 seeds per hectare (ha).

Biological Significance

Flora

Callitris glaucophylla is most commonly associated with bloodwoods (*Corymbia bloxsomei* and *C. trachyphloia*), ironbarks (particularly the narrow leaved ironbark, *Eucalyptus crebra* but also *E. fibrosa* and *E. melanophloia*) and bimble box (*E. populnea*). Other species often found in association with white cypress include *Corymbia tessellaris*, *Acacia* species, *Angophora* species, *Allocasuarina* species and, in southern New South Wales, yellow box (*Eucalyptus melliodora*).

White cypress pine forests and woodlands vary in type. Cypress pine can be present as a uniform, dominant overstorey, or as an understorey in eucalypt or *Angophora*-dominated woodland. Dense cypress thickets can suppress all other understorey. In more open areas, the understorey can vary from grass to a woody shrub cover.

Fauna

White cypress occupies a diverse range of habitats and accordingly is associated with a wide range of fauna. Fauna diversity is greatest in mixed cypress forests; surveys have shown diversity to be extremely low in pure cypress stands.

Fauna found in white cypress forests of New South Wales can be broadly categorised as grassy woodland species, shrubby woodland species and opportunistic species. Grassy woodland species include the Australian bustard, Australasian bittern, bush stone-curlew, eastern grass owl, superb parrot, turquoise parrot and plains wanderer. Shrubby woodland species include Dunmall's snake, pied honeyeater, malleefowl, tiger quoll, black-stripe wallaby and the kultarr. In addition, many fauna species are associated with the various eucalypt species present in the forests. Examples include the masked owl, pale-headed snake and the glossy black cockatoo. Koalas are also found in the forests—even though their diet consists mainly of eucalypt species, during summer days they may shelter from the heat in cypress pines.

In Queensland, research has been confined to mixed white cypress and eucalypt forests. A range of vegetation associations occur within this broad habitat type and there is likely to be considerable variation in the fauna encountered. This varies with factors such as mix of tree species, type of under-storey plants, presence of water, occurrence of riparian vegetation, and the extent of grazing (which acts to reduce diversity). There is evidence to show that the selective removal of eucalypts changes forest structure and decreases suitability of *Callitris* forest for some fauna.

Fauna in a white cypress/spotted gum (*Corymbia citriodora*) forest of south Queensland (Barakula State Forest) have been surveyed. These surveys have listed so far: 131 vertebrate species including 19 mammalian species (4 arboreal glider/possum species, 5 macropod species, 6 bat species and 4 feral species); 84 bird species; 9 amphibian species; and 19 reptile species (17 lizards, 2 snakes) (Hannah and Agnew, unpublished report). Two species are of particular interest: the yellow-bellied glider (*Petaurus australis*) is the subject of special management concern in Queensland's State forests, and the yellow-tufted honeyeater (*Lichenostomus melanops*) is listed as 'rare' in Queensland under the *Nature Conservation Act—Wildlife Regulations 1994*.

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A koala sheltering from midday sun in a white cypress.

Use of the Resource

Cypress pines have been an important part of the culture of Australian Aborigines and, particularly in some parts of Australia, an important source of timber for Europeans. In Queensland, there is more timber produced from white cypress than from any other native tree outside plantations, and in New South Wales, more than any other native species except blackbutt (*E. pilularis*).

Ownership and distribution

Most of Australia's white cypress forest occurs in New South Wales and Queensland. However, there are areas of largely sub-dominant cypress pine forest, including white cypress, in South Australia and Western Australia. The economically-important white cypress forests occur:

- as medium sparse stands in two areas of New South Wales: the Pilliga north of Coonabarabran and the Cobar peneplain—elsewhere in New South Wales, the cypress forests have been extensively cleared for agriculture, leaving small islands of State forest and corridors of retained forest along roads and stock routes; and

continued on page 6

Distribution of White

View over a white cypress pine area in south Queensland showing the open canopy of the cypress stands and the different colours and other species (including a large area of flowering wattle) occurring with the cypress pine.

THE better quality stands of white cypress are usually restricted to flat to undulating topography and light textured soils and occur in discontinuous bands from the Murray River in New South Wales to the Dividing Range north of Injune in Queensland. Most of the white cypress forests in New South Wales occur in the Coonabarabran and Cobar regions. In Queensland there are three main concentrations: in a band from Injune through Mt. Moffatt to Augathella and south to Mitchell; near Yuleba and north of Chinchilla to Taroom; and west of Millmerran and Inglewood. Rainfall is generally in the range of 300–650 mm, and temperatures range from below 0°C to greater than 40°C.

TABLE 1. Areas of c contain m States an

New South Wales
Queensland
South Australia
Victoria
Western Australia
Northern Territory
Australia

e Cypress Pine Forest

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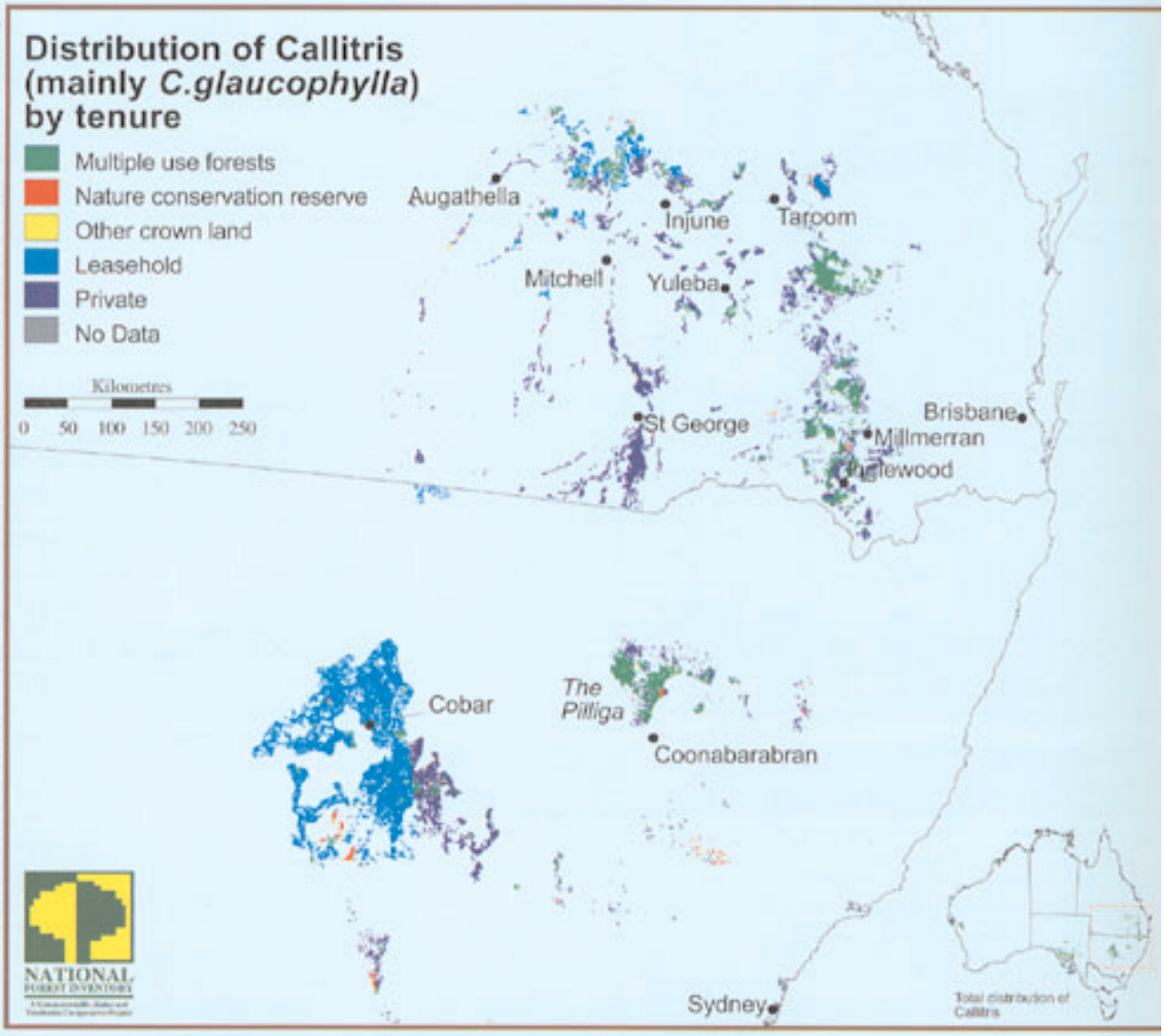


cypress forest. For Queensland and New South Wales the forests mainly white cypress pine. Much of the cypress forest in the other nd the Northern Territory includes other cypress species.

Dominant cypress forest (ha)	Sub-dominant cypress forest (ha)
382 000	1 769 000
454 000	1 036 000
139 000	2 301 000
37 000	1 500
0	589 000
0	481 000
1 012 000	6 177 500

Data supplied as part of the National Forest Inventory by Forest Ecosystem and Planning Section, Queensland Department of Natural Resources; DPI Forestry, Queensland Department of Primary Industries; State Forests of New South Wales; and New South Wales Parks and Wildlife Service.

Baker and Smith, 1910

'Preparing Pine Timber in the Interior for Marketing (Callitris spp.)' Montage and caption from Baker and Smith 1910.

- as medium-dense and medium-sparse stands in the brigalow belt of Queensland, mainly on Crown-leasehold lands and within multiple-use forests (State forest).

Estimates of areas of cypress pine vary markedly according to whether it is dominant of sub-dominant (mixed) cypress forest that is being measured. Thus, in Queensland, there are 454 000 ha of dominant white cypress and 1 036 000 ha of sub-dominant white cypress forest. New South Wales has the next largest area of cypress with 382 000 ha of dominant and 1 769 000 ha of sub-dominant white cypress forest. (Table 1, page 5).

In New South Wales, most white cypress is found within multiple-use forests and, in Queensland, on leasehold and private (freehold) land (Table 2).

Cultural and economic values

'Callitris should rank as one of the most important of Australian pines for forest culture, not only for timber, the chief feature of which is its immunity from the attacks of termites, but also for other economics such as oils, barks, sandarac [resin], etc' (from Baker and Smith 1910).

Timber and other products

European settlers quickly recognised the value of cypress timber. The resistance of the timber to termites was considered its greatest asset and, as the longevity of structures made from cypress became recognised, cypress began to replace Baltic pine for floors in Sydney houses. Since that time, the timber has been used for a range of building needs including house framing, feature walls, exterior cladding, decks and fences.

Although generally resistant to termites, *Callitris* species are attacked by other insects such as sawfly larvae (*Zenarge turneri*) which feed on cypress foliage and the pine jewel beetle (*Diodoxis scalaris*), a pest of white cypress. Adult female jewel beetles lay eggs in the sapwood of wounded or stressed standing trees and newly felled logs. The larvae develop as the timber seasons, feeding in the sap wood and leaving extensive tunnels packed with frass. When several larvae are active in a piece of timber, damage can be severe. If the timber is covered, for example by plasterboard or cladding, the adults will also chew through the covering material to the surface. However, the beetles only lay eggs in unseasoned timber, and new adults do not re-infest the seasoned timber. Kiln-drying destroys eggs and larvae developing in the timber.

Resistance of *Callitris* to termite attack and fungal decay is attributed to naturally occurring chemicals such as guaiol and callitrol. It can resist decay and termites for up to fifty years and has therefore been widely used for in-ground applications including house stumps, fence posts and telephone poles.

Disadvantages of the timber are its brittleness and tendency to split when being nailed, although this can be largely overcome by the use of blunt or sheer point nails. Splitting is also reduced by using the timber green or partly green, a feasible strategy since subsequent shrinkage is minimal.

White cypress is often highly patterned and although knots are common they are tightly held and add to the decorative value. The wood is increasingly being used for furniture manufacture.

Although there appear to have been many uses for cypress pine in the past, it is only used for timber now. Examples of past uses for cypress products are:

- *Callitris* resin substituted for sandarac resin in specialist varnishes, hair sprays and incense;
- tannin extracted from *Callitris* bark to impart a strong red colour to leather; and
- firewood—some users appreciated its qualities while others thought it dangerous since it burnt so fiercely.

'Wood fragrant, varies much as to colour from a light to a dark brown, with often pinkish longitudinal streaks, often full of beautiful markings, very durable; ... an excellent cabinet wood.' (F. M. Bailey, 1886, reporting on Queensland timbers in the Colonial and Indian Exhibition)

TABLE 2 **Percentages of dominant cypress forest (including species other than *C. glaucophylla*) within different land tenures in Australia.**

	Multiple-use forests (%)	Nature conservation reserve (%)	Leasehold and other Crown land (%)	Private (%)
New South Wales	60	9	6	25
Queensland	24	1	25	51
Victoria	0	87	1	12
South Australia	0	0	100	0
Western Australia	0	0	0	0
Northern Territory	0	0	0	0
ACT	0	0	0	0
Australia	31	6	27	36

TABLE 3 **Sawnwood processed from cypress forests in New South Wales and Queensland.**

	New South Wales (m^3)	Queensland (m^3)*	Totals
1991–92	41 700	64 500	106 200
1992–93	37 100	65 600	102 700
1993–94	36 400	80 500	116 900

*Figures include timber processed from Crown and private lands.

Source: ABARE Quarterly Forest Product Statistics 1992–94.

Photograph: white cypress panelling (Timber Research and Development Advisory Council of Queensland)

depression labour was used extensively for thinning in the 1930s. Another silvicultural treatment was the removal by ringbarking/poisoning of competing species (notably eucalypts). The resulting forest is often dominated by a uniform overstorey of cypress pine and is substantially a manufactured forest. Opportunistic thinning of post-1950 regeneration has been undertaken since the 1960s, often under drought or unemployment relief funding.

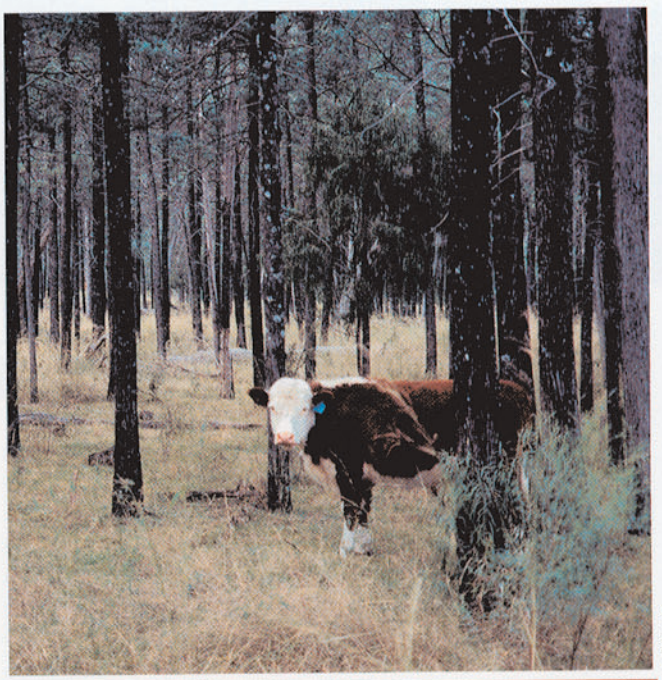
Conservation

The distribution and extent of white cypress forests in Australia has changed markedly during the past one hundred or so years. Late last century a series of wet summers promoted increased seed germination and regrowth. Removing eucalypts from mixed forests resulted in areas of better stocked, more uniform cypress forests. In contrast, during the first half of this century, the regeneration of white cypress and other native flora was adversely affected by rabbit infestations. This was particularly marked in western New South Wales where intense rabbit feeding inhibited regrowth of *Callitris*. Rabbits caused less damage after myxomatosis virus was introduced in the 1950s but, in more recent years, further damage to vegetation and soils by high populations of rabbits has affected *Callitris* stands.

Large areas of cypress forests remain in several areas of southern Queensland and in the Cobar and Pilliga regions of New South Wales. It is difficult to determine how much of the original stands of white cypress pine has been cleared. One reason for this in Queensland is that mixed eucalypt/cypress areas have often been classified as eucalypt. Also, the area of white cypress varies with fire history. Recent information on regional ecosystem types in Queensland indicates that more than 30% remains of the area of the *Callitris*-containing ecosystem types. Forests outside conservation reserves are used extensively for grazing and apiculture. Properly controlled, grazing can assist in fire management, control of regeneration and improving financial viability.

White cypress is present in significant tree numbers in reserves as a part of the total forest flora such as in the Carnarvon National Park in Queensland. In the lower Snowy River Valley part of the Kosciuzsko National Park, and along the valley into Victoria's Alpine National Park.it is co-dominant with white box (*Eucalyptus albens*). The remaining areas of *Callitris* were an important consideration in the identification of conservation reserves and park boundaries in the Victorian mallee. There is no commercial harvesting of cypress pine on public land in Victoria.

With current proposals to reserve 15% of the area of pre-European vegetation types, there is concern about how to interpret the mixed cypress pine ecosystems that are the result of management changes made since European settlement. Because of these management changes the cypress pine forests currently cover a greater area than before European settlement.



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Cattle grazing under well-spaced white cypress pine in Courallie State Forest, New South Wales.

Outlook

THE most important threats to the integrity of white cypress forest are clearing and grazing, feral animals, weeds and fire. The importance of these varies with land tenure. On public lands substantial damage can be caused by browsing/grazing by feral animals and domestic stock. On leasehold and freehold land clearing for cropping and grazing are additional threats. For some white cypress forests, fire can be used to manage tree density, weeds and growth, but fires that are too intense or frequent can cause damage.

A sustained reduction in rabbit numbers is probably the most important determinant of productive white cypress forests in western New South Wales. It was after the introduction of myxomatosis that these areas recovered in the 1950s.

In general, cypress pine forests on public lands are quite secure, provided management regimes are sufficiently conservative to control fire, feral animals and grazing. The outlook is less clear for pastoral lands, although maintenance as woodland is favoured in those areas whose relatively low economic land values discourage intensive land management.

There are many issues (for example, access to cypress on leasehold properties and outcomes from Regional Forest Agreement/Comprehensive Regional Assessment processes) that could affect future production of white cypress timber in New South Wales and Queensland. If possible negative effects from these factors are excluded, production levels are expected to at least remain stable. Future demand for cypress is more likely to increase than decrease. Local and international

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Lace monitor in a Casuarina *in white cypress woodlands.*

interest in timbers that are naturally resistant to termites is opening new markets. Market opportunities in South-east Asia, Japan and Korea are also increasing.

Plans for developing the Australian cypress industry are outlined in the *Australian Cypress Strategic Plan*, an initiative of State Forests of New South Wales, Cypress Sawmillers and the Forests Products Association. Major aims of the plan are to raise the image of white cypress and develop market niches for cypress products.

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Photographs were kindly supplied by State Forests of New South Wales (SFNSW) and the Timber Research and Development Advisory Council of Queensland. Others were from ForEd Resource ([1983] 1. The forest environment [kit] Land Use Information Branch, Queensland Department of Forestry [now QDPI, Forestry]).

Front cover: *A silviculturally treated (thinned) stand of white cypress with a grassy understorey, Barakula, southern Queensland.*

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Forwarder collecting white cypress pine sawlogs that have been felled and delimbed (New South Wales).

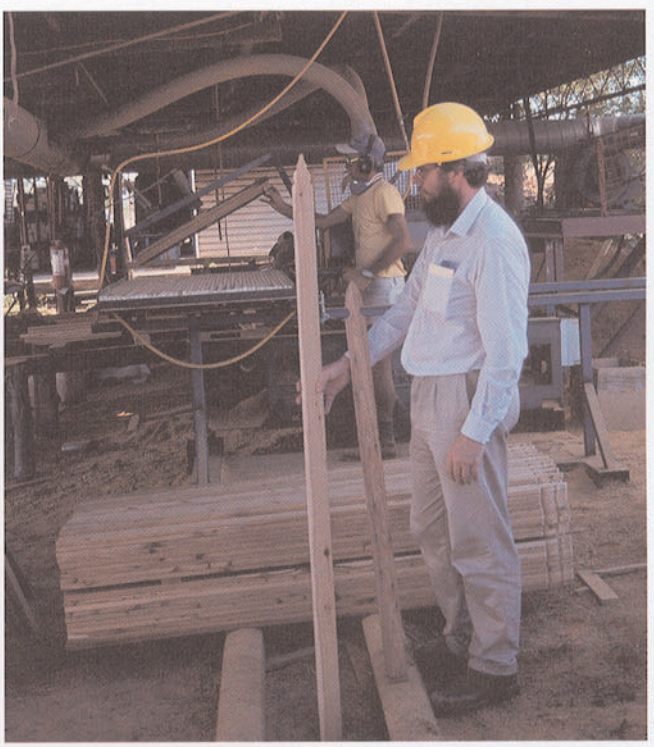
Harvesting of white cypress

The estimated annual sustainable yield of white cypress from State forest in New South Wales is 90 000 cubic metres (m^3). In Queensland, the annual sustainable yield of white cypress for State forest and leasehold land is 140 000 m^3.

The quantities of white cypress sawnwood processed in New South Wales and Queensland in recent years are shown in Table 3 (page 7). Figures for sawlogs are higher than those shown, which are for sawnwood (e.g. in New South Wales, in 1993–1994, 113 000 m^3 of white cypress sawlogs were produced). Milling partially accounts for this difference, but large quantities of white cypress are also harvested as posts for vineyards and fencing.

Heritage value

Cypress pine appears to have been widely used by aborigines and it is likely that *C. glaucophylla* was a particularly valuable species for them. There is evidence that cypress was used for firewood and torches as well as for spears, spear throwers, ceremonial objects, paddles, and musical sticks. Resin was mixed with kangaroo dung and used as an adhesive, and foliage and bark were used to repel mosquitoes. Several medical uses are documented: leaves were infused in



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Fence pickets manufactured from white cypress pine.

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Prefabricated wall frames made from white cypress pine.

water or mixed with animal fat for external application for rashes and colds; and smoke from leaves inhaled to induce sweating (the chemical alpha-pinene has been isolated from leaf material).

Generally, cypress pine forests were an important and integral part of Aboriginal life. As a consequence, these forests contain significant sites of cultural value to indigenous people. In addition, because of early patterns of European settlement for grazing, these forests contain numerous sites of European heritage value, including homesteads, stagecoach stations and sawmills.

Forest management

For forests of *C. glaucophylla* to produce high quality timber they need to contain well-spaced, mature trees. In Queensland, productivity of cypress forests is indicated by 'site form' (estimated height of a 25 cm diameter tree). A growth model (known as 'stand basal area accretion'), which relies on basal area, site form and time since last silvicultural treatment and harvesting, is used for harvesting scheduling.

Before the onset of forest and/or pastoral management, many cypress stands appear to have had an open structure with clumps of large trees, often with fire scars. Various factors can prevent the development of this preferred open structure.

In 1928, Swain noted that the severe droughts of 1902 and associated bushfires had severely depleted cypress stands in Queensland. Consequences of severe depletion are twofold: it can take up to 100 years for a productive forest to recover fully; and seasons favourable for regrowth lead to massive regeneration. Regeneration is also favoured by the creation of reserves, fire protection, rabbit control (particularly in New South Wales) and the exclusion of sheep. Whereas browsers like sheep and rabbits will eat cypress (although it may not be preferred), cattle do not. Therefore cypress has invaded cattle country and this is posing problems for graziers.

If allowed to persist, regeneration causes stands to 'lock up' or stagnate into thickets with no subsequent height or diameter growth, until released by disturbances such as wind, insect attack and fires (see box on page 10)

In the past, thickets were thinned artificially, usually by hand but occasionally mechanically. In New South Wales, thinning was a condition of leases in the 1890s. In both Queensland and New South Wales,

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Regeneration of white cypress pine with dense growth of saplings, Barakula, southern Queensland.

Cypress pine forests and fire

THE role of fire in managing cypress forests is complex. Aboriginal management tended to maintain grassland with scattered trees—the grass attracted marsupials and these were more accessible for hunting. With the introduction of cattle and grazing, there was usually insufficient fuel to carry a fire and so cypress (and other flora) could proliferate and further suppress grass.

It is thought that burning by aborigines sometimes limited and sometimes maintained stands of cypress. On the one hand, fire protection has resulted in heavily stocked stands of *C. intratropica* in Arnhem Land, yet there is evidence that *C. glaucophylla* and *C. intratropica* populations have been retreating since the breakdown of traditional burning practices in the Northern Territory. In South Australia, protection from excessive grazing and fire appear to be the major management requirements for maintaining *Callitris* communities. In Queensland, burning is being used as a cost-effective way to reduce fuel in some poorer mixed cypress forests even though this results in an increase in the number of damaged logs harvested.

Using fire to thin locked stands (thickets), but preventing more frequent burning, can be a productive strategy because thinning of undisturbed, even-aged stands of *C. glaucophylla* markedly increases the diameter increment of the remaining trees. Fire can be used to lower tree density, increase growth rate and reduce weeds. However, locked stands can be difficult to burn and will do so only in extreme conditions.

Outside State forests and other reservations, fires may be encouraged to control regenerating cypress that has invaded grazing land, replaced grass and is considered to be a weed.

Geographic position and conditions will determine whether fire should be prevented or used as a management tool. Fire intensity varies not only with species, but also soil type—because this influences the type of undergrowth and litter. Whereas occasional, low level fires may thin a cypress pine forest and promote better growth of the trees, fires that are too intense or frequent, may cause damage to them.