

A U S T R A L I A N

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

*'a thick scrub of
dwarf lancewood,
as tough as whalebone...'*

John McDouall Stuart, 3 May 1861

Key Issues

- Sixty-eight per cent of lancewood forest in the Northern Territory is under pastoral lease.
- The Northern Territory has an estimated 4 million cubic metres of pole timber and half a million cubic metres of sawlogs, but sustainable yields and harvest rotations are not known.
- Economic exploitation of the wood resource for timber flooring, cabinet work and other specialist wood products has not yet proven feasible.
- Lancewood forests are well studied and mapped in the Northern Territory. Queensland lancewood communities are well studied, but less well mapped.
- Lancewood has little formal protection in the Northern Territory but some areas are under consideration for reserve status. In Queensland, its conservation is considered of low priority as it is known to occur on reserves throughout its range.
- Plant species diversity in lancewood forests is moderate over the whole range, but is low at any one site; animal species diversity is also low but variable between sites.
- Lancewood is used locally for traditional Aboriginal uses and farming uses.
- The greatest threats to lancewood communities appear to be from inappropriate burning practices which kill existing plants and inhibit successful regeneration.

*This brochure is about lancewood (*Acacia shirleyi*) communities in the Northern Territory and Queensland.*



AUSTRALIA is the land of the gum tree. Eucalypts dominate forest and woodland close to where most people live but there are vast areas where it is too dry for eucalypts. The main trees in these areas are hardy wattles and casuarinas. Lancewood* (*Acacia shirleyi*) is one of these wattles.

The most prominent tree found with lancewood in the Northern Territory is called bulwaddy or karmanji (*Macropteranthes kekwickii*). In Queensland it is associated with several other wattles, notably bendee (*Acacia catenulata*). Many species of eucalypt also occur with lancewood, and these vary from place to place. Lancewood communities cover about 2.4 million hectares or 1.7% of the Northern Territory. The total area in Queensland may be greater than in the Northern Territory, but probably does not exceed 11 million hectares.

Lancewood communities have a distinctive appearance (see photographs on pages 1 and 4) which contrasts markedly with that of the surrounding eucalypt woodland.

About the Resource

LANCEWOOD is a tree about ten metres tall with a conspicuously dense, dark green crown. It occurs in the semi-arid zone of northern Australia, in the Northern Territory and Queensland.

Biological Significance

Lancewood forests can vary greatly in the density of both mature and young trees. The number of trees per hectare has been found to vary from 15 to more than 4400, with an average of between 380 and 950. There is evidence of previous burning in most lancewood communities. Death of some older trees appears to be due to fire, and patches of dense regrowth may be found where canopy cover has been thinned by burning. Lancewood also occurs in areas which receive some degree of fire protection (e.g. from their position in the landscape or from the low fuel loads in the understorey).

Lancewood appears to regenerate most commonly from seed after rain, but there is little information about this stage of its life cycle. No significant vegetative regeneration has been

documented. Patches of lancewood can die suddenly if soil water is depleted beyond a critical threshold.

Flora

About 400 plant species have been recorded in Northern Territory lancewood forests and woodlands, although only a few occur frequently. However, any one site averages only 24 species in lancewood communities, and up to 29 species where bulwaddy also occurs. Detailed floristic studies of lancewood have not yet been done in Queensland.

Six main types of lancewood community have been identified in the Northern Territory:

- lancewood open forest
- lancewood woodland
- lancewood open forest/eucalypt woodland
- lancewood/bulwaddy open forest
- bulwaddy low open forest/eucalypt woodland
- lancewood/bulwaddy woodland

In Queensland, the lancewood communities appear to be more complex. Six forest and woodland types have been defined on a regional basis:

- lancewood open forest with mixed *Eucalyptus*, *Angophora*, *Lysicarpus*, *Acacia sparsiflora* and *A. rhodoxylon* (central eastern Queensland);
- lancewood/bendee low woodland with *Eucalyptus* and *Grevillea* (central southern Queensland);
- lancewood low woodland mixed with bendee and yapunah (*Eucalyptus thozetiana*) (west and central Queensland);
- lancewood low woodland with bendee and occasional snappy gum (*Eucalyptus leucophloia*) (western Queensland);
- lancewood low woodland/open forest with occasional *Eucalyptus* of several species (north central Queensland);
- lancewood low open forest with bulwaddy (north-west Queensland).

Lancewood communities are diverse. Sometimes lancewood is the only dominant tree or shrub,

* Lancewood in the Northern Territory is known by a number of regional Aboriginal names including mirlimun, arnawun, marrman and karnawuna.

especially in the Northern Territory and nearby north-western Queensland. Elsewhere, lancewood is one of the dominant trees, together with a wide range of eucalypt species, bulwaddy and a number of other acacias. In some areas, lancewood-dominated communities grade imperceptibly into others where the dominants contain no lancewood at all.

Shrubs are generally absent or sparse but when they are present they include wild orange (*Capparis umbonata*) bauhinia (*Lysiphyllum cunninghamii*), poverty bushes (*Eremophila*) and plumwood (*Terminalia*).

The ground layer under lancewood consists mainly of open tussock grasses including wanderric grass (*Eriachne ciliata*), rare paspalidium (*Paspalidium rarum*), golden-beard grass (*Chrysopogon fallax*) species of three-awn (*Aristida* spp.) and *Mnesithea formosa*. In dry regions, spinifex species (*Plectrachne* and *Triodia*) also occur. Sometimes there are small numbers of sedges and herbs such as *Bulbostylis barbata*, tropical speedwell (*Evolvulus alsinoides*), *Waltheria indica*, tickweed (*Cleome viscosa*) and *Polycarpea* species.

Fauna

Fauna surveys of lancewood communities have been carried out in the Northern Territory. The diversity and abundance of vertebrate fauna in relatively pure lancewood stands are very low, and vary markedly with patch size, rockiness and associated plant species. The added floristic and structural diversity where bulwaddy occurs with lancewood leads to greater numbers and a greater variety of animals.



Bulwaddy (Macropteranthes kekwickii) thicket, northern Tanami Desert.

Recent fauna surveys found that a few bird species (the apostlebird, grey-crowned babbler, hooded robin, rufous whistler and variegated fairy-wren) were more abundant in lancewood than in adjacent vegetation, but this was not the case with mammals and reptiles. Table 1 shows common birds, mammals and reptiles of lancewood forests in the Northern Territory.

Use of the Resource

LANCEWOOD is one of several forest types in Australia lying between the moister coastal regions and the drier inland regions. It supports a modest diversity of other plants and animals, but has been used only a little by people.

(continued on page 6)

TABLE 1

Animals commonly recorded in lancewood include:



Graeme Chapman

Rufous whistler (*Pachycephala rufiventris*).

Birds

- * apostlebird (*Struthidea cinerea*)
- diamond dove (*Geopelia cuneata*)
- * grey-crowned babbler (*Pomatostomus temporalis*)
- * hooded robin (*Melanodryas cucullata*)
- pie'd butcherbird (*Cracticus nigrogularis*)
- * rufous whistler (*Pachycephala rufiventris*)
- * variegated fairy-wren (*Malurus lamberti*)
- willie wagtail (*Rhipidura leucophrys*)

Mammals

- antelope wallaroo (*Macropus antilopinus*)
- common rock-rat (*Zyzomys argurus*)
- dingo (*Canis familiaris*)
- echidna (*Tachyglossus aculeatus*)
- euro (*Macropus robustus*)
- northern nailtail wallaby (*Onychogalea unguifera*)
- spectacled hair-wallaby (*Lagorchestes conspicillatus*)

Reptiles

- Bynoe's gecko (*Heteronotia binoei*)
- dragon (*Gemmatophora gilberti*)
- gecko (*Oedura rhombifera*)
- Gould's goanna (*Varanus gouldii*)
- northern dtella (*Gehyra australis*)
- skink (*Carlia amax*)
- skink (*Menetia maini*)
- spiny-tailed gecko (*Diplodactylus ciliaris*)

* More common in lancewood than in adjacent vegetation types.



P. Fitzgerald

Distribution of Lancewood

Lancewood extends from Limbunya (near the Western Australian border) in the Northern Territory eastward in a band stretching roughly from Katherine in the north to Powell Creek in the south. It extends through Queensland in a broad easterly then southerly arc that excludes only northern Cape York Peninsula, south-western Queensland and the moist coastal zones.

Lancewood generally occurs on lateritic or sandstone outcrops, plateaus and breakaways formed predominantly from Tertiary sandstones, but occasionally on older sediments. In some instances lancewood communities form a distinct band on the upper to mid slopes of plateaus, extending onto rises and plains in the southern part of the Northern Territory, and onto hilly country in south-eastern Queensland.

Lancewood occurs at altitudes of 20–400 m above sea level but mostly above 100 m.

Soils under lancewood communities are generally well-drained and gravelly without marked layering. There are some shallow red, yellow and black earths. In the central area of their range in the Northern Territory, the communities

occur on the rises and plains of the extensive Sturt Plateau, on massive red and yellow earths, extending onto gravelly sands in the drier southern areas. In Queensland, lancewood is also found on shallow rocky lateritic soils and occasionally on volcanic soils.

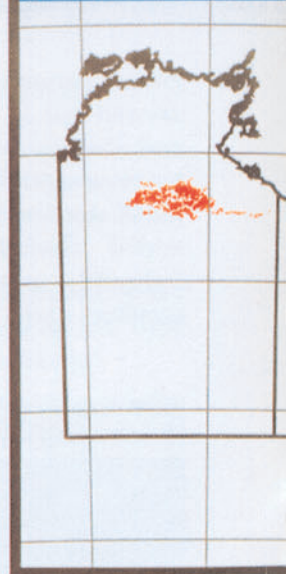
Most lancewood communities receive 500–800 mm of rain annually although this may vary markedly from year to year. Most rain falls between November and April. Evaporation is highest towards the south-western margin of the lancewood distribution, ranging from 3600 to 4200 mm a year. Temperatures range from 10 to 40° C.

Photograph: *Lancewood forest, Roper Valley Station*

130 deg E

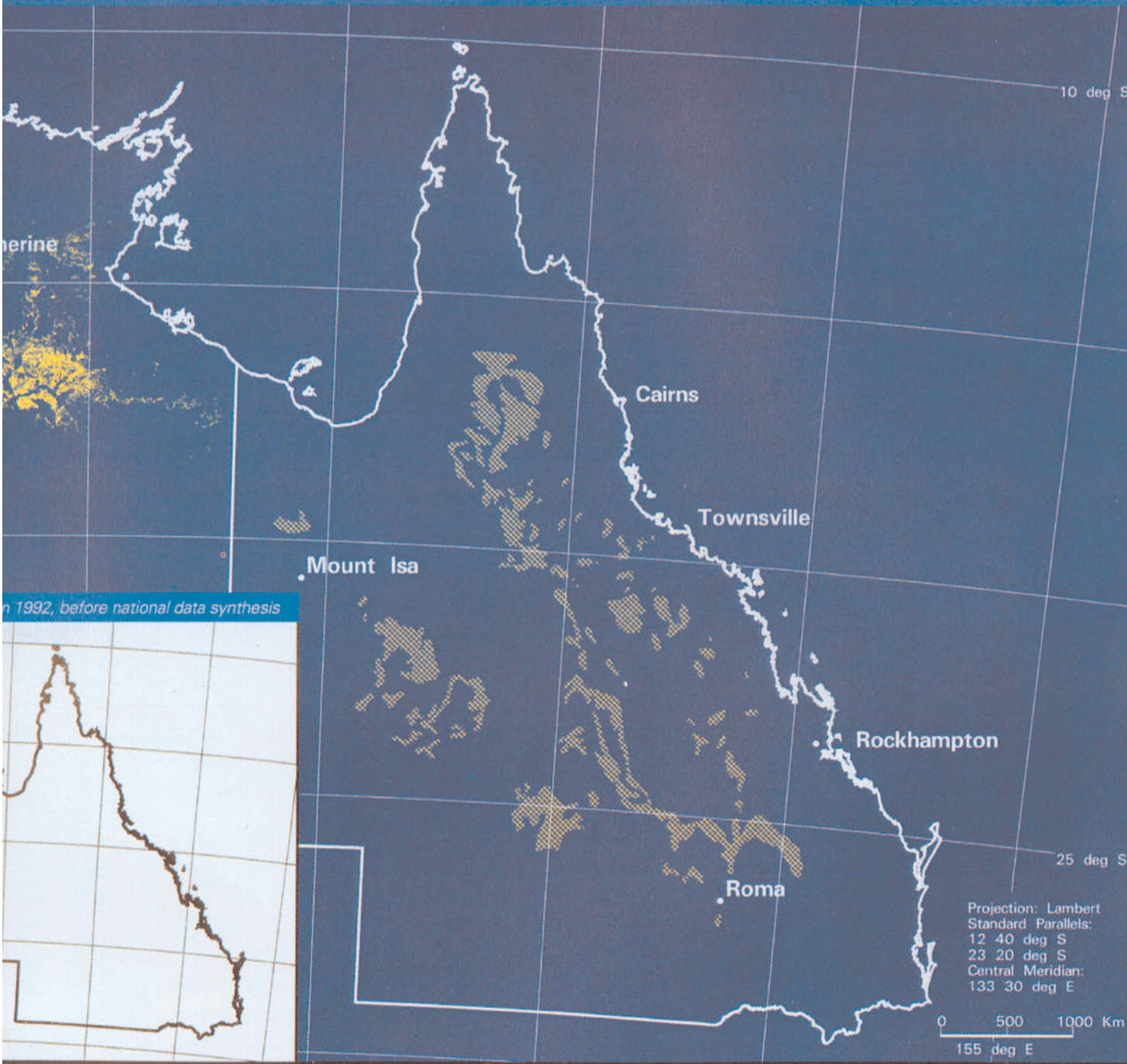


Distribution generally known



The scientific name *Allocasuarina* was given by J.H. Maiden in 1905. Maiden was a botanist, scientist and educator. He worked for the Queensland Department of Education and served for 33 years. He died three years before the silver-leaved ironwood was named in his honor by John Shirley.

Distribution of Lancewood Communities



For lancewood, *Acacia shirleyi*, was given by the botanist () after Dr John F. Shirley (1849–1922), an English-born botanist. Dr Shirley arrived in Brisbane in 1878 to join the Department of Instruction. He spent most of his working life as an inspector in rural Queensland, travelling up to 8000 km a year. He was a member of the Council of the Royal Society of Queensland, until his death at the age of 73. Maiden also named Shirley's lancewood, *Eucalyptus shirleyi*, from western Queensland, after

Lancewood distribution for the Northern Territory was derived from comprehensive surveys specifically for lancewood and recorded in geographic information system format. Distribution data for Queensland were based on the compilation of small-scale vegetation and land use maps depicting the approximate distribution of lancewood.



Data supplied as part of the National Forest Inventory by the Conservation Commission of the Northern Territory and the Queensland Department of Environment and Heritage.

Ownership

In the Northern Territory, 68% of lancewood forests are on pastoral leases (Table 2). There are no comparable data yet for Queensland, but a similarly high proportion is expected on private or leasehold land.

Cultural and economic values

Aboriginal people use lancewood for clap-sticks, nulla-nullas, boomerangs and heads for hooked or barbed spears. It is an excellent firewood as it burns slowly and evenly, producing lasting coals. The smoke from burning timber repels mosquitoes. Witchetty grubs are often found in lancewood roots. Bulwaddy is heavy and dense, and is used for boomerangs, woomeras, yam sticks and nulla-nullas.

Aboriginal and European graziers use lancewood for poles, fence posts and stockyard rails. Small trees have been harvested in limited quantities for wood turning.

In the Northern Territory, it has been estimated that the volume of lancewood standing logs was almost four million cubic metres, and that of sawlogs was less than half a million cubic metres (Table 3). Many trees have a large amount of internal damage as a result of rot and wood-boring insects. There are no management plans yet for lancewood communities and there is no information on sustainable yield (such as potential harvest and regrowth rates). In summary, lancewood has some desirable commercial characteristics and occurs in substantial quantities, but is widely and sparsely distributed over a large region with poor or limited access.



Lancewood flowers and fruits

G. Wightman

Large lancewood trees usually branch within about 3 m of the ground and average about 20 cm in diameter. This clear length of trunk, which made lancewood useful for fence posts, can also be used for timber. In recent times, lancewood has been tested for basic wood properties. These studies show that it produces a dense, very hard timber (Table 4). Because of its attractive and rich grain marking (see opposite page), and its excellent durability and strength, lancewood is a potential source of cabinet and flooring timber. The economic feasibility of using the small sizes of logs is not yet proven.

Conservation

IN the Northern Territory, no reserves have been set aside specifically to conserve these communities, and only very small areas are found in Gregory and Nitmiluk (Katherine Gorge) National Parks. Road reserves carry some lancewood, but the amounts are insignificant for community conservation. There are proposals before Government, however, which would provide formal protection for representative areas of lancewood in the Territory.

In Queensland, lancewood communities occur in 12 national parks and one environmental park. These parks represent the distribution of lancewood in that State. The Queensland Department of Environment and Heritage considers lancewood communities to represent a low priority for any targeted conservation initiatives, because of the adequate level of representation in reserves and the large area remaining on leasehold land that is under a low level of threat.

Threats

IN both the Northern Territory and Queensland, lancewood experiences only a low level of threat due to the large and extensive areas over which it occurs. Harvesting of lancewood does not yet pose a threat to its conservation. Minor grazing by cattle in lancewood communities results in some soil compaction and damage to annual plants.

Fire plays a part in maintaining the sharp boundary between lancewood and surrounding eucalypt forest. Annual burning to eliminate woody weeds and stimulate grasses also kills lancewood and favours expansion of open eucalypt woodland. Further research is needed to establish the long-term impact of current burning practices and to develop management strategies to maintain lancewood.

TABLE 2 Ownership categories for lancewood communities in the Northern Territory

	Area (ha)	Percentage
Pastoral lease a	1 656 200 000	68
Freehold	374 000 000	15
Perpetual pastoral lease	356 800 000	15
Crown lease, perpetual	25 500 000	1
Other land b	20 500 000	1
Total	2 433 000 000	100

a Under new pastoral legislation in the Northern Territory, pastoral leases are to be converted into perpetual pastoral leases.

b Includes stock route, vacant Crown land, term Crown lease, government owned, reserve, special purpose lease, not known.

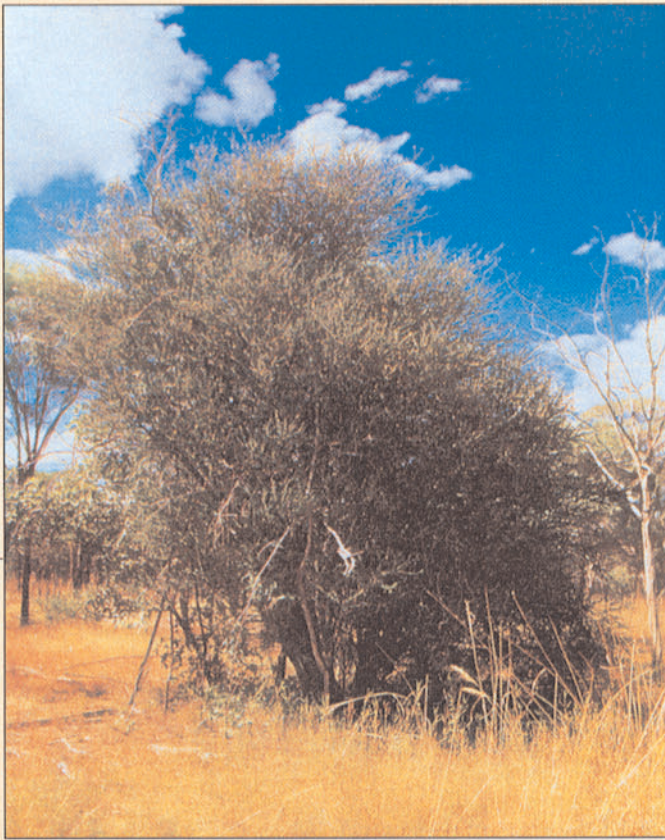
TABLE 3 Preliminary estimates of existing log volumes of lancewood in the Northern Territory, by vegetation community

community	Area (ha)	Volume (m ³)	
		poles	sawlogs
Lancewood open forest (closed forest)	524 800	1 584 952	158 495
Lancewood woodland	114 700	216 329	27 413
Lancewood open forest/ eucalypt woodland	128 600	137 638	12 863
Lancewood/ bulwaddy open forest	218 700	0	0
Bulwaddy low open forest/ eucalypt woodland	717 900	0	0
Lancewood/ bulwaddy woodland	728 600	2 025 536	226 597
Total	2 433 300	3 964 455	425 368

TABLE 4 Some selected physical and mechanical properties of lancewood (*Acacia shirleyi*) with two other species for comparison

	<i>Acacia shirleyi</i>	<i>Eucalyptus tetrodonta</i>	<i>Callitris</i> sp.
density	1.18	1.04	0.74
hardness	14.9	9	6
% shrinkage	0.58	0.77	0.47
compression strength kg/cm ²	1000	820	510
bending strength kg/cm ²	2300	1950	1100

Data are rounded values taken from *Diagrams of technological characteristics of main tropical timbers*, Tome IX, *North-Australian timbers*. Centre Technique Forestier Tropical.



M. Fagg

Bulwaddy (Macropteranthes kekwickii), Buchanan Hwy, about 50 km east of Top Springs, Northern Territory.

Outlook

THE wide and scattered distribution of lancewood both significantly limits its extensive economic utilisation and provides passive protection from overexploitation. The development of appropriate milling techniques and markets may overcome current impediments to the national and international use of lancewood timber. Under current legislation, the development of this resource will also require the development of management plans which result in the sustainable use of lancewood forests. Current knowledge about the biology of lancewood communities appears insufficient to develop management plans.

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Front cover: *Lancewood (Acacia shirleyi) open forest/woodland, Daly Waters region.*

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