Eucalyptus globulus subsp. *globulus*

SUBGENUS: *Symphyomyrtus*
SERIES: *Viminales*

Common name:
blue gum

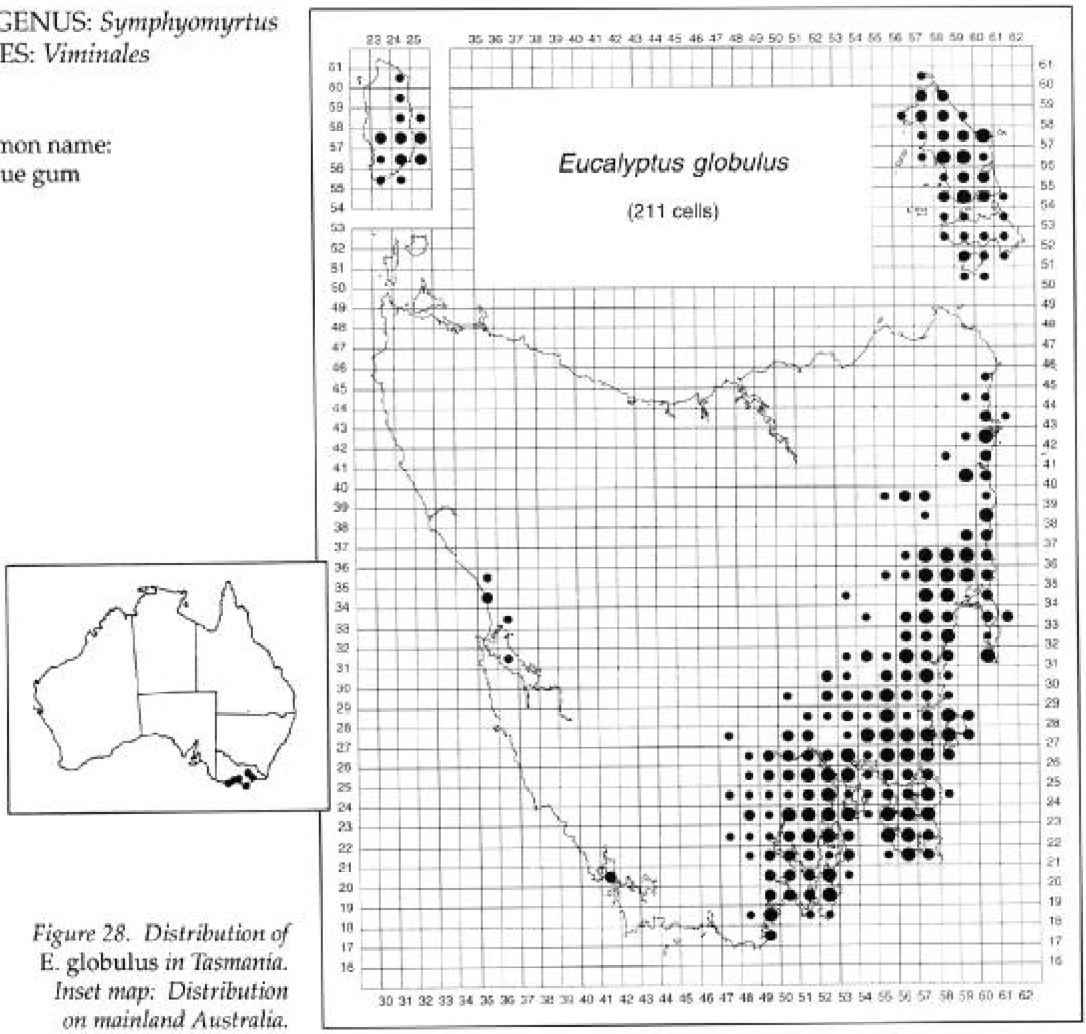


Figure 28. Distribution of E. globulus *in Tasmania. Inset map: Distribution on mainland Australia.*

Populations of *E. globulus* with multiple fruit per umbel which have been previously classified as *E. globulus* subsp. *pseudoglobulus* (Buchanan 1995) or *E. bicostata* (Curtis and Morris 1975; Chippendale 1988) are included here with *E. globulus* subsp. *globulus* (after Jordan *et al.* 1993). On capsule morphology, populations of *E. globulus* on the west coast and northern Flinders Island are intermediate between *E. globulus* subsp. *globulus* and the mainland *E. globulus* subsp. *pseudoglobulus* (Kirkpatrick 1975b; Jordan *et al.* 1993; Potts and Jordan 1994b). Similar intermediates are also found in Victoria (e.g. Otway Ranges and south Gippsland; Jordan *et al.* 1993). However, the morphologically intergrading populations on northern Flinders Island are not markedly differentiated from other populations on Flinders Island on the basis of molecular markers (Nesbitt *et al.* 1995), growth response (Potts and Jordan 1994a), or juvenile leaf morphology (Potts and Jordan 1994b).

Eucalyptus globulus is widespread in predominantly coastal and near-coastal situations of lowland eastern and south-eastern Tasmania and the Bass Strait islands (Figure 28). It occupies a range of substrates, from the undulating country and fertile wet gullies of the generally seaward foothills and tiers, to the infertile, dry dune sands and sea cliffs of the coast. There are scattered populations of *E. globulus* along the west coast, and inland extensions in the Midlands and associated eastward valley systems.

Eucalyptus globulus is a lowland species occurring from near sea-level to about 650 m and up to 830 m, but is typically found below 400 m (Figure 29). Most of the higher altitude occurrences are known from the vicinity of the Eastern Tiers and north of the Fingal Valley. Its main flowering period is September to December, peaking in October and November in eastern Tasmania (Figure 30). More information is needed to define the flowering period of the western populations (including King Island) which consistently flower later than eastern populations in field trials (Gore and Potts 1995).

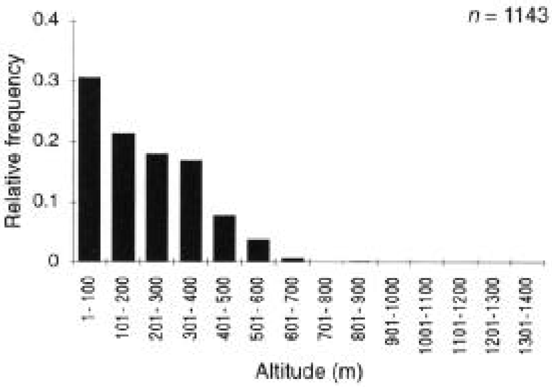


Figure 29. Altitude distribution of E. globulus.

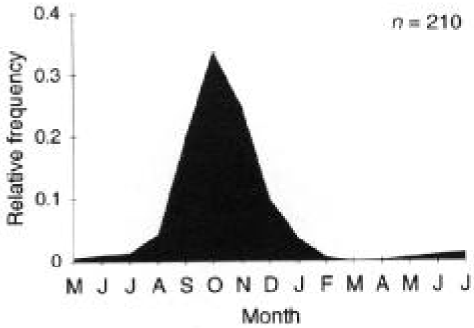


Figure 30. Flowering times for E. globulus.

Eucalyptus globulus is an occasional dominant and frequent subdominant tree in wet and dry sclerophyll forests and woodlands. In wet sclerophyll forests, it occurs in the canopy with *E. obliqua* or *E. regnans* over tall shrub understoreys. In dry sclerophyll forests, *E. globulus* may form pure stands in grassy communities but, in heathy or shrubby communities, is frequently co-dominant with, or occurs as an occasional emergent above, the more common peppermint species (*E. amygdalina, E. pulchella* or *E. tenuiramis*). In exposed coastal situations, fully mature, stunted individuals of *E. globulus* with heights less than 1.5 m have been recorded from Maria Island (Brown and Bayly-Stark 1979a) and at Cape Tourville on Freycinet Peninsula (Chambers 1992). The transition from the dwarf habit on cliff edges to tall trees in nearby sheltered forest is associated with genetically based clinal variation (Chambers 1992; Dingle 1994).

COMMENTS: The distribution of *E. globulus* is well known due to extensive seed collecting from native stands throughout Tasmania, the Bass Strait islands and southern Victoria (Orme 1983b; Volker and Orme 1988). *Eucalyptus globulus* is a fast-growing species with relatively large flowers (Photo 9) that are easily manipulated in breeding studies, and it has become one of the most important species for pulpwood production in temperate regions throughout the world (Eldridge *et al.* 1993). The King Island provenance has been of interest to plant breeders but was cleared extensively in the last century for agriculture. Many of the remnant trees are relatively isolated and seed collected from them may be inbred (Potts and Jordan 1994a).

Some records of *E. globulus* from the Midlands, and north and north-east coasts are considered spurious and may reflect roadside introductions or forest plantation sites (e.g. cells 5141, 5240, 5243, 5244, 5341, 5445, 5745). However, a recently reported, although unverified, occurrence may extend the north-eastern distribution towards Gladstone (cells 5745, 5846) and a rare, high-altitude outlier (830 m) is recorded from the north-east (F. Duncan, unpublished data). Marginal unverified records in the southern Midlands (e.g. cells 4928, 4728, 5432) may reflect actual occurrences but require field investigation.

The west coast populations of *E. globulus* are markedly differentiated from east coast populations and these scattered, disjunct occurrences are of particular biogeographic interest (Jordan *et al.* 1993; Potts and Jordan 1994a). Genetic studies of the relative affinities of the eastern and western populations may ultimately indicate likely directions of migration between Tasmania and Victoria. Putative locations near Sandy Cape (cells 3140, 3142) indicated by Jackson (1965) are possible but have remained unverified despite persistent searches. Anecdotal rumours of the Port Davey population of *E. globulus* having been planted by early European settlers at Whalers Cove are unlikely as this population is relatively distinct and appears to contain advanced generation hybrids with a series *Ovatae* species (Potts and Jordan 1994a).

KEY REFERENCES: Battaglia *et al.* (1995); Eldridge and Griffin (1990); Farrow *et al.* (1994); Gore *et al.* (1990); Griffin (1993); Hallam *et al.* (1989); Hardner and Potts (1995a); Jordan *et al.* (1993, 1994); Kirkpatrick (1971, 1974, 1975a, b); Kirkpatrick *et al.* (1973); McAulay (1937); Metcalfe *et al.* (1991); Nesbitt *et al.* (1994, 1995); Orme (1983b); Paton (1980); Potts and Jordan (1994a, b); Potts and Marsden-Smedley (1989); Potts and Savva (1989); Rhizopoulou and Davies (1993); Scarascia-Mugnozza *et al.* (1989); Tibbits (1986a); Volker and Orme (1988); Volker *et al.* (1990, 1994); West (1981).

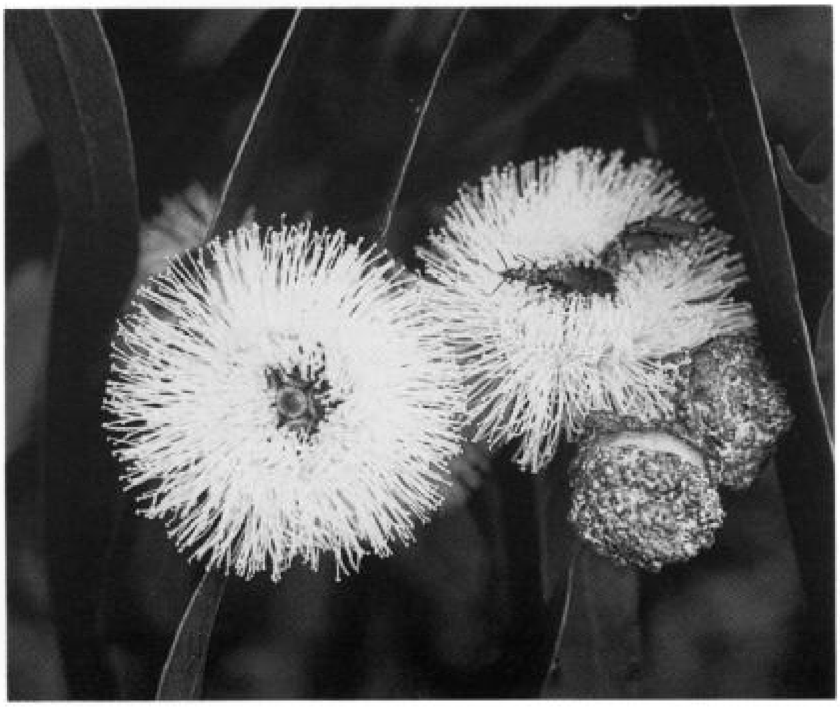


Photo 9. Eucalyptus globulus (x *1*)*, the largest flowered eucalypt species in Tasmania.*

Eucalyptus gunnii

SUBGENUS: *Symphyomyrtus*
SERIES: *Viminales*

Common name:
cider gum

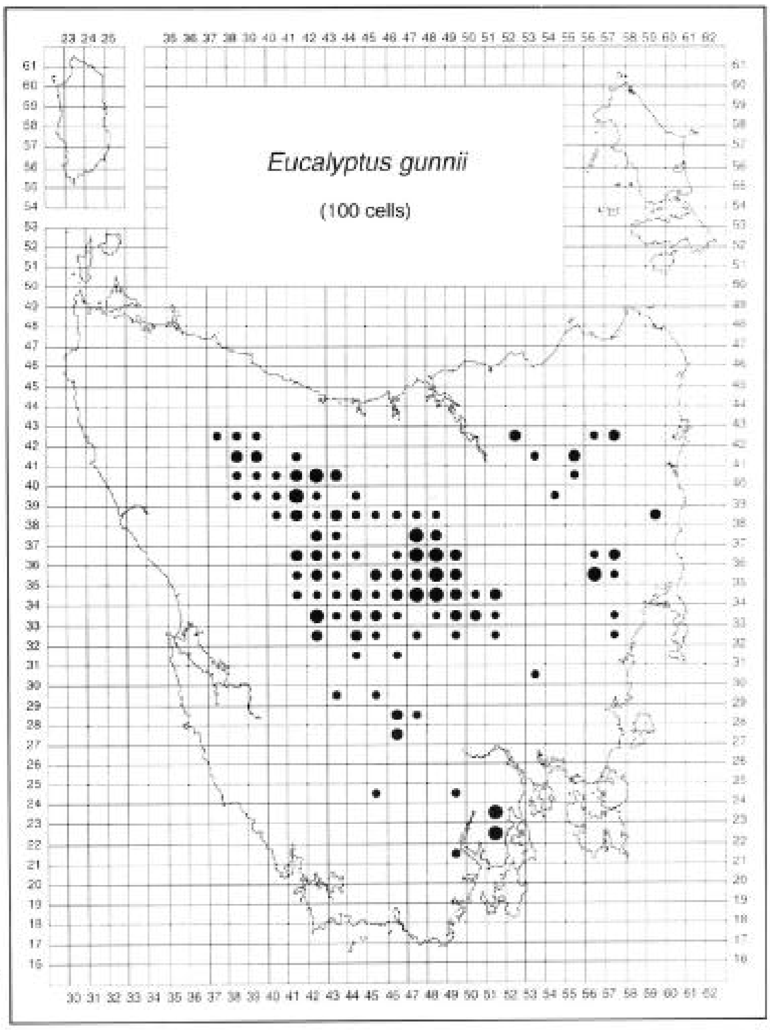


Figure 31. Distribution of E. gunnii *in Tasmania.*

Eucalyptus gunnii is an endemic subalpine species growing on poorly drained, frost-prone plateaux, flats and hollows. It occurs in north-western, central and north-eastern highland regions, and in disjunct habitats of the Eastern Tiers and the southern dolerite mountains (Figure 31). *Eucalyptus gunnii* and *E. archeri* clinally intergrade on the Central Plateau along the north–south gradient in rainfall and frost severity, but occupy spatially separate habitats in the north-eastern mountains. In the alpine plateau environment, an east–west gradient in exposure results in the clinal transition between *'divaricata'* and 'southern *gunnii*' morphs of *E. gunnii* (Potts and Reid 1985a; Potts 1985). The *'divaricata'* morph, distinguished as a species by Brett (1938, i.e. *E. divaricata* McAulay and Brett) is now treated as a minor variant of *E. gunnii* (Pryor and Johnson 1971; Potts and Reid 1985a). Potts and Reid (1985a) summarised the variation in the *E. gunnii–archeri* complex into five morphs, corresponding to the cline from green to waxy glaucousness (Barber 1955), which is the main taxonomic character used in distinguishing *E. gunnii* and *E. archeri* (Curtis and Morris 1975).

Eucalyptus gunnii is generally found above 800 m in the inverted tree-lines on the Central Plateau, and more widely (500–1200 m) in the north-east (Figure 32). However, relict populations generally occur at lower altitudes (330–740 m) in the east, south-east and far north-west where poorly drained sites are locally subject to frost and cold-air pooling. The main flowering period is from November to March, peaking from December to February (Figure 33).

Eucalyptus gunnii (Photo 10) most typically dominates grassy and sedgey open forest and woodlands. In restricted situations at lower altitudes, it may dominate montane tall forest

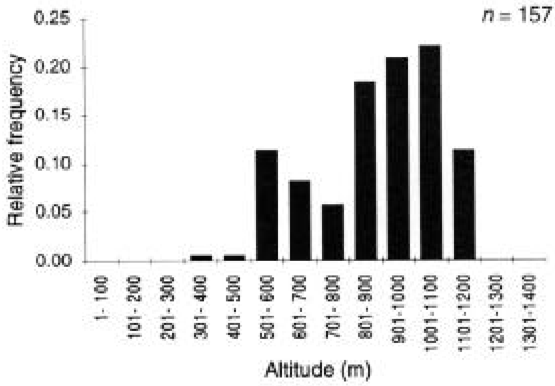


Figure 32. Altitude distribution of E. gunnii.

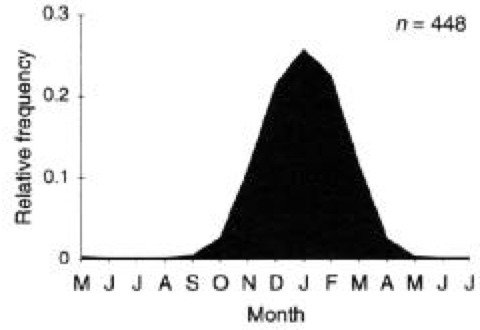


Figure 33. Flowering times for E. gunnii.

with various shrub and rainforest understoreys, or co-exist with other subalpine eucalypts such as *E. delegatensis*, *E. coccifera* or *E. dalrympleana. Eucalyptus gunnii* and *E. urnigera* are closely related taxa that may co-occur on the southern Central Plateau but, in the south-east (e.g. Snug Plains), they are ecologically separate. The small southern and far north-western populations of *E. gunnii* occur at relatively low altitudes where they are associated with buttongrass plains and tussock grassland respectively (Potts and Reid 1985a). Relict patches of *E. gunnii* have also been found within closed riparian scrub at relatively low altitudes (500 m) in the Eastern Tiers (Askey-Doran 1993). *Eucalyptus gunnii* frequently forms large plate lignotubers which survive aerial defoliation due to extreme frost or fire and resprout vigorously. The ability to coppice from an underground lignotuber following adversity has enabled some individuals to exhibit unusual longevity (Head and Lacey 1988).

Eucalyptus gunnii is one of the most frost tolerant eucalypts (Hooker 1844; Barber 1955; Marien 1979) and is the subject of a breeding program to develop frost resistant clones for eucalypt plantation establishment in France (Cauvin 1983; Cauvin and Potts 1991). Some populations of *E. gunnii* are known for the production of a sugary sap from the trunk that was reputedly used by the local Aboriginal community for the production of an alcoholic drink, and hence the common name of 'cider gum' (e.g. Ellis 1973). The attractive juvenile leaf of the coppice foliage has also led to its widespread use by florists.

COMMENTS: The intergradation between *E. gunnii* and *E. archeri* leads to some difficulties in field identification of the two species. In addition, both *E. gunnii* and *E. archeri* may be present in the same grid cell, but occupying separate habitats. For example, in the north-eastern highlands, *E. gunnii* occurs on Mount Arthur (cell 5242) and Mount Victoria (cells 5642, 5742), whilst *E. archeri* occurs on the other nearby mountains, and both species are recorded from near Ben Nevis (cell 5541). Additional relict, relatively low-altitude occurrences of *E. gunnii* may be found where habitat conditions suffice (cf. Askey-Doran 1993, cell 5938). The population near the fire tower on Snow Hill (cell 5635) has some morphological affinities with *E. urnigera* (Potts and Reid 1985a, b) but has been encompassed here in *E. gunnii*. Several unverified, marginal records of *E. gunnii* require further evidence of an occurrence (e.g. cells 4241, 4727, 4826, 4828, 5139, 5141). Some old herbarium records collected by Gunn in 1840 near Plenty (cell 4926) and Rodway in 1892 near Hamilton (cell 4829) were not verified and no populations have been reported in this area.

Records of *E. gunnii* from Mount Wellington (cells 5125, 5225) have not been verified and probably represent misidentification of mallee *E. urnigera* in poorly drained, exposed situations on the plateau.

KEY REFERENCES: Barber (1955, 1956); Cauvin (1983); Cauvin and Potts (1991); Cauvin *et al.* (1993); Head and Lacey (1988); Hooker (1844); Jackson (1973); Maiden (1901); Orme (1983a); Paton (1980); Potts (1984, 1987, 1985, 1990b); Potts and Jackson (1986); Potts and Reid (1985a, b); Potts *et al.* (1987); Scarascia-Mugnozza *et al.* (1989); Tibbits *et al.* (1991).

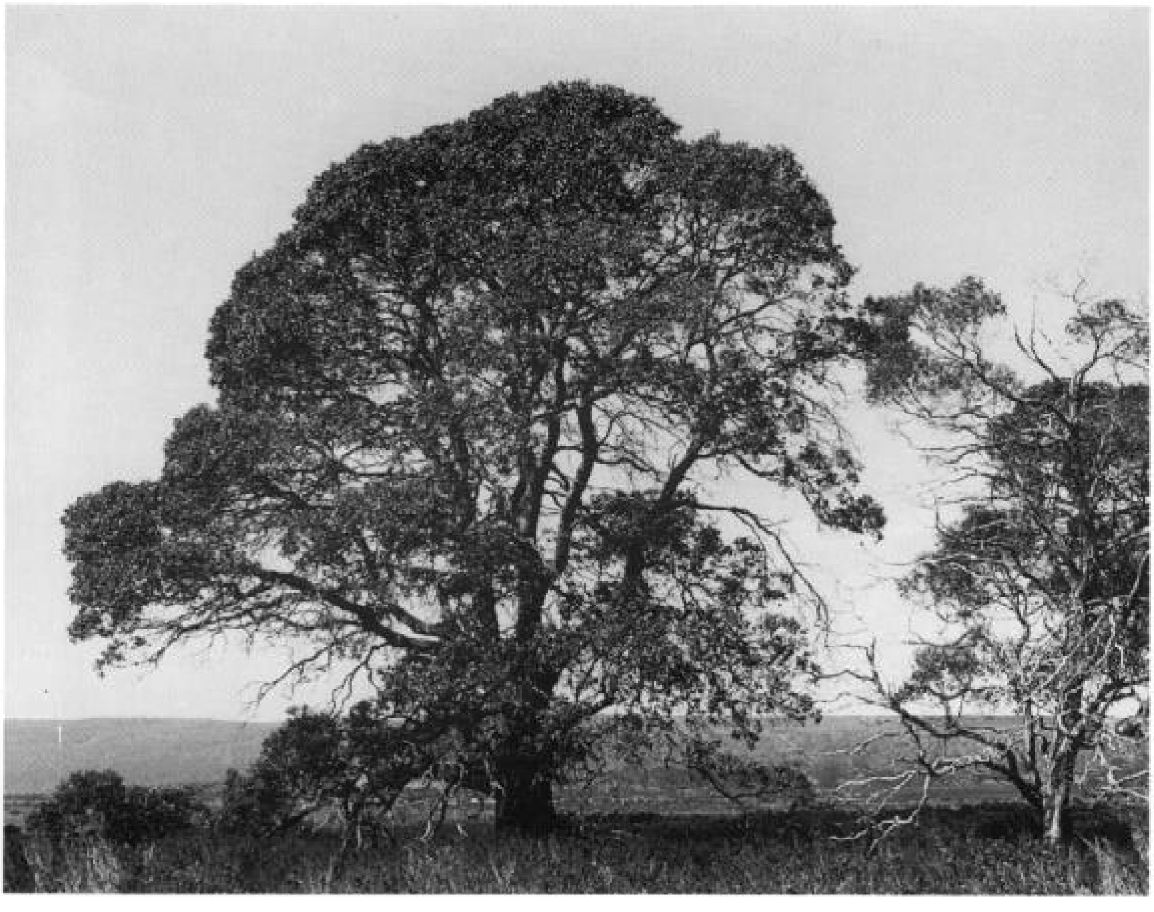


Photo 10. Eucalyptus gunnii *in a subalpine woodland.*

Eucalyptus johnstonii

SUBGENUS: *Symphyomyrtus*
SERIES: *Viminales*

Common name:
yellow gum

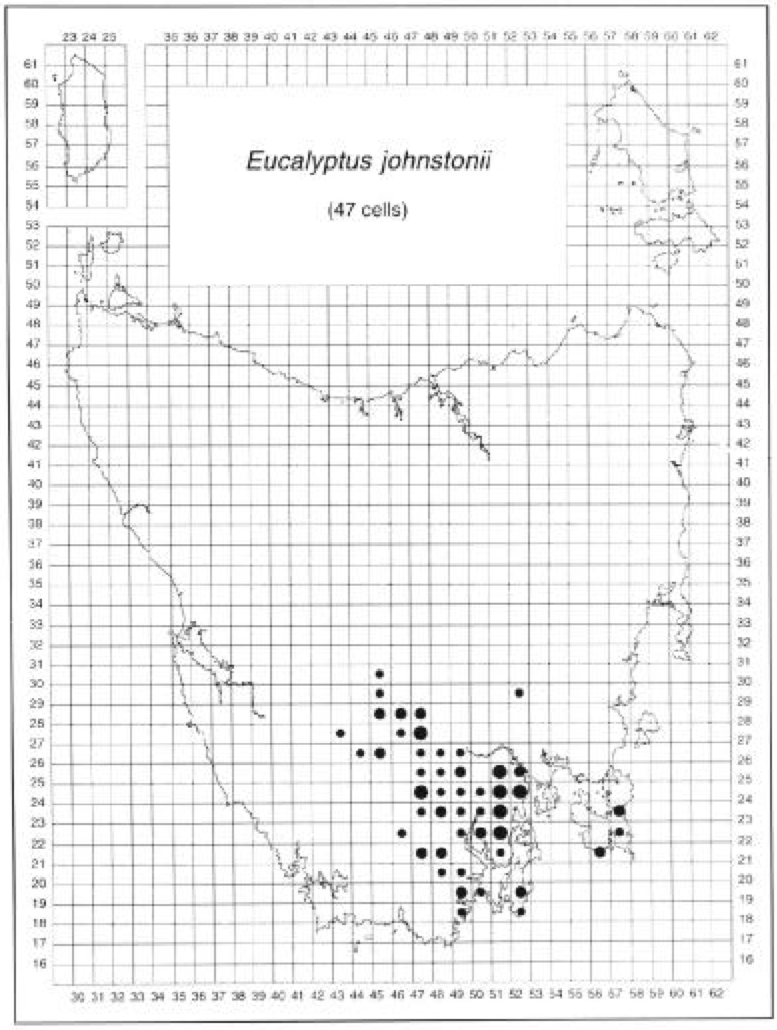


Figure 34. Distribution of E. johnstonii *in Tasmania.*

Eucalyptus johnstonii is a localised regional endemic species found on south-eastern mountains and plateaux (Figure 34). It grows on sites subject to waterlogging, where peaty soils have developed over siliceous bedrocks (e.g. sandstone) that have a relatively low nutrient status.

Eucalyptus johnstonii forms a geographic cline with *E. subcrenulata* along the western margins of its distribution. In intermediate locations, such as the Florentine and Weld Valleys, a tall forest tree with intergrading morphology occurs, reflecting the continuum between *E. subcrenulata* and *E. johnstonii*, and is locally known as the unpublished cline form *'columnaris'* (Jackson 1960).

Eucalyptus johnstonii is an upland species of mid- to high-altitude regions, occurring mostly in the range from 500 m to 800 m (Figure 35). The higher altitude records (up to 920 m on the Wellington Range) occur along the northern margins of the distribution. The lower altitude records (300–500 m, but down to 130 m) occur along the southern margins of the Southern Forests, Bruny Island and Tasman Peninsula, consistent with the location of the cooler habitat. Its flowering period is from January through April, peaking from February to April (Figure 36).

Eucalyptus johnstonii typically occurs as a tall tree of montane forest, or wet forest and open forest, where it is a dominant, or subdominant with *E. obliqua* or *E. delegatensis* over rainforest or tall shrub understoreys. On dolerite mountains, it frequently replaces *E. urnigera* and *E. coccifera* on poorly drained and frost-exposed Triassic sandstone outcrops

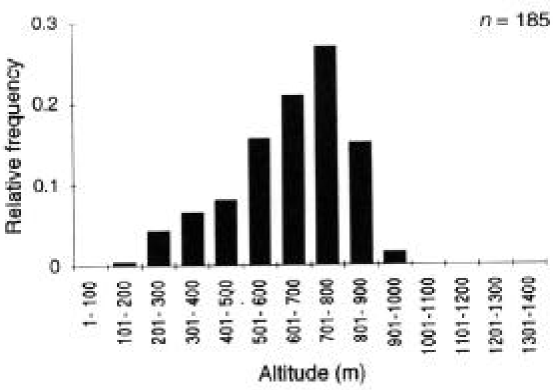


Figure 35. Altitude distribution of E. johnstonii.

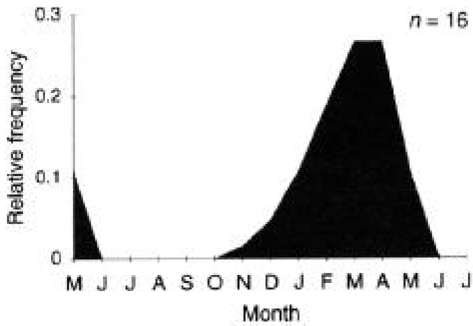


Figure 36. Flowering times for E. johnstonii.

(Davidson and Reid 1985). The growth form of yellow gums reflects the degree of exposure to alpine environments such that *E. johnstonii* tends to be a tall tree of montane forest, *E. subcrenulata* a small tree of subalpine forest or woodland, and *E. vernicosa* a mallee shrub in alpine scrub. The freshly exposed bark may be attractively streaked green-yellow or yellow-orange, being especially vivid when wet.

COMMENTS: The maps reflect the western intergrading zone between *E. subcrenulata* and *E. johnstonii* where field botanists may observe the *'columnaris'* cline form (Jackson 1960) and allocate it to either species (i.e. cells 4327, 4526, 4528, 4529, 4627, 4628, 4724, 4725, 4726, 4727, 4728). In the north of the yellow gum range, outliers of *E. johnstonii* (e.g. Brown *et al.* 1983) were treated as misidentificatons of *E. subcrenulata* (i.e. cells 4235, 4237, 4238, 4239, 4432). Conversely, in the south of the yellow gum range, outliers of *E. subcrenulata* were treated as *E. johnstonii* (i.e. cells 5024, 5122, 5123, 5125, 5229).

In the north-east, an unverified outlier from a marsh near Emu Flat (cell 5744) may be a misidentification of a white gum. In the Eastern Tiers, an unverified outlier near Snow Hill (cell 5736) may be a misidentification of *E. brookeriana.* In the south-east, putative occurrences for *E. johnstonii* near the lower Jordan River (cell 5127), near Leprena (cell 4918), in the Wielangta Forests (cells 5626, 5727) and on Forestier Peninsula (cell 5724) need verification. Other outliers, such as those at Mount Dromedary (cell 5127), Quoin Mountain (cell 5229) and Cape Raoul (cell 5621), also need verification but are presently retained in the mapping. In the far south-east at Tylers Hill (cell 4919), *E. johnstonii* hybridises with *E. urnigera* and *E. globulus* (W. D. Jackson, unpublished data).

KEY REFERENCES: Jackson (1960); Potts and Jackson (1986).

Eucalyptus morrisbyi

SUBGENUS: *Symphyomyrtus*
SERIES: *Viminales*

Common name:
Morrisby's gum

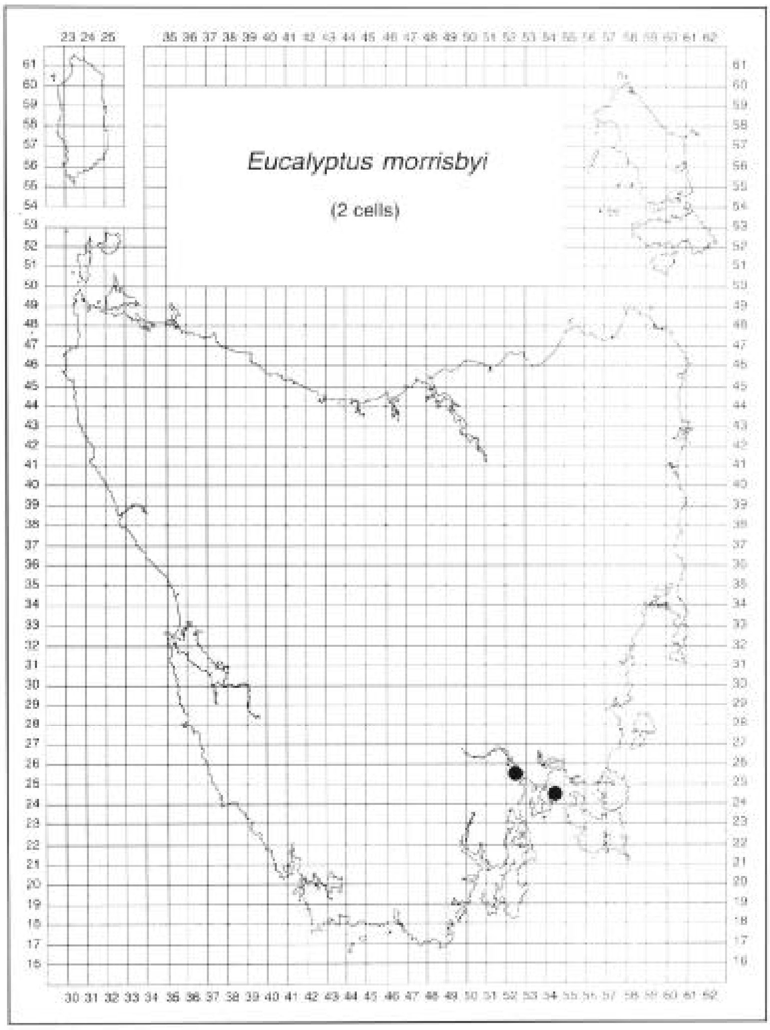


Figure 37. Distribution of E. morrisbyi *in Tasmania.*

Eucalyptus morrisbyi is a rare endemic species locally restricted to the moister aspects or undulating slopes of several coastal hills on the eastern shore of the Derwent River estuary (Figure 37). However, clearing for agricultural purposes has restricted its range considerably. It is extant in the Cremorne area and near Risdon in the Government Hills, and is regarded as one of the rarest and most endangered eucalypt species (Pryor and Briggs 1981; Wiltshire *et al.* 1991b). The largest stand comprises nearly 2000 adult trees and covers 11.5 ha on Calverts Hill (Wiltshire *et al.* 1991b).

Other remnant stands consisting of less than 20 mature individuals are known from Pipeclay Lagoon and in the Government Hills. A few minor occurrences as scattered roadside individuals occur near Lumeah Point and South Arm. The recent past distributions and conservation genetics of *E. morrisbyi* are discussed by Wiltshire *et al.* (1991b). *Eucalyptus morrisbyi* is closely related to *E. gunnii*, and Pryor and Briggs (1981) speculate on the origins of the species as 'the surviving coastal part of a population of eucalypts from which *E. gunnii* has been derived'.

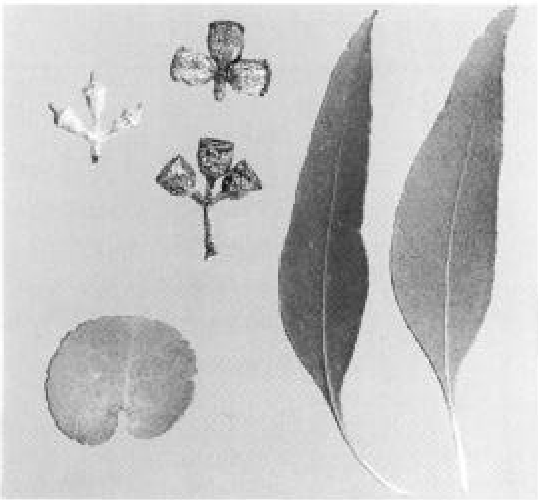


Photo 11. Buds, fruit and leaves of E. morrisbyi. *(Left, juvenile leaf; right, adult leaves.)*

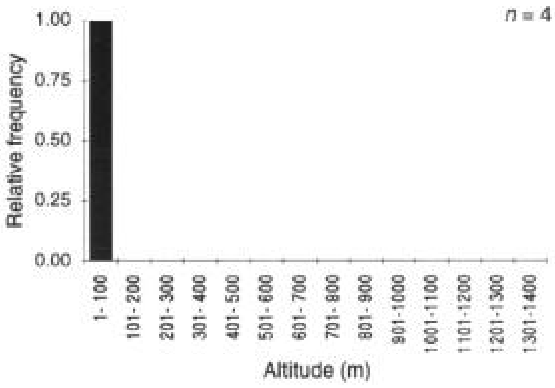


Figure 38. Altitude distribution of E. morrisbyi.

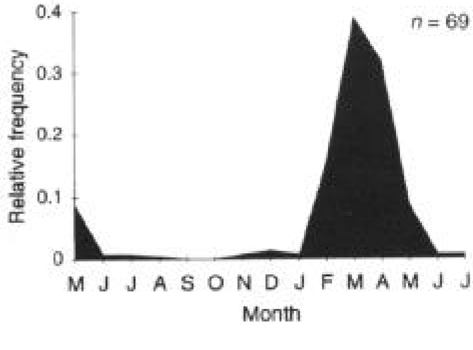


Figure 39. Flowering times for E. morrisbyi.

Eucalyptus morrisbyi occurs from near sea-level to 80 m (Figure 38) on sandy loams derived from mudstone in the Government Hills and on dolerite with a Quaternary sand influence at Calverts Hill. Its main flowering period is March to April (Figure 39).

Eucalyptus morrisbyi at Calverts Hill appears to be the remnants of a much wider distribution prior to land clearing. It dominates dry sclerophyll forest on southern to western aspects of a gently sloping hill (Wiltshire *et al.* 1991b). Surrounding forest on the north-western aspects is dominated by *E. viminalis* and *E. tenuiramis.* The small stand of *E. morrisbyi* in the Government Hills grades into *E. amygdalina* forest. At Calverts Hill and elsewhere, it is threatened by local land-use practices, and must be considered endangered.

COMMENTS: *Eucalyptus morrisbyi* (Photo 11) may have been confused with *E. gunnii* or *E. cordata* by some early collectors, and some herbarium specimens are derived from artificial plantings along roadsides and in parks or gardens. The natural distribution of *E. morrisbyi* is verified from only two grid cells. A third location comprises a single roadside tree near South Arm, which is believed to be a natural occurrence (cell 5323; F. Coates and L. Mendel, unpublished data), but further verification is needed. Wiltshire *et al.* (1991b) also report several roadside trees in the same area which may be remnants of a natural population. They consider that other isolated trees in the Cremorne area may exist which are remnants of the past distribution. An avenue of mature trees near the junction of the South Arm and Cremorne Roads is considered by Wiltshire *et al.* (1991b) to be the one reported in the original species description as having been planted by J.R. Morrisby. Other locations are derived from general descriptions and have not been verified (i.e. cells 5324, 5423). Ornamental and conservation plantings are being encouraged in the urban and rural districts where *E. morrisbyi* occurs naturally.

KEY REFERENCES: Brown and Bayly-Stark (1979b); Pryor and Briggs (1981); Wiltshire *et al.* (1989, 1991b).

Eucalyptus nitida

SUBGENUS: *Monocalyptus*
SERIES: *Piperitae*

Common name:
Smithton peppermint

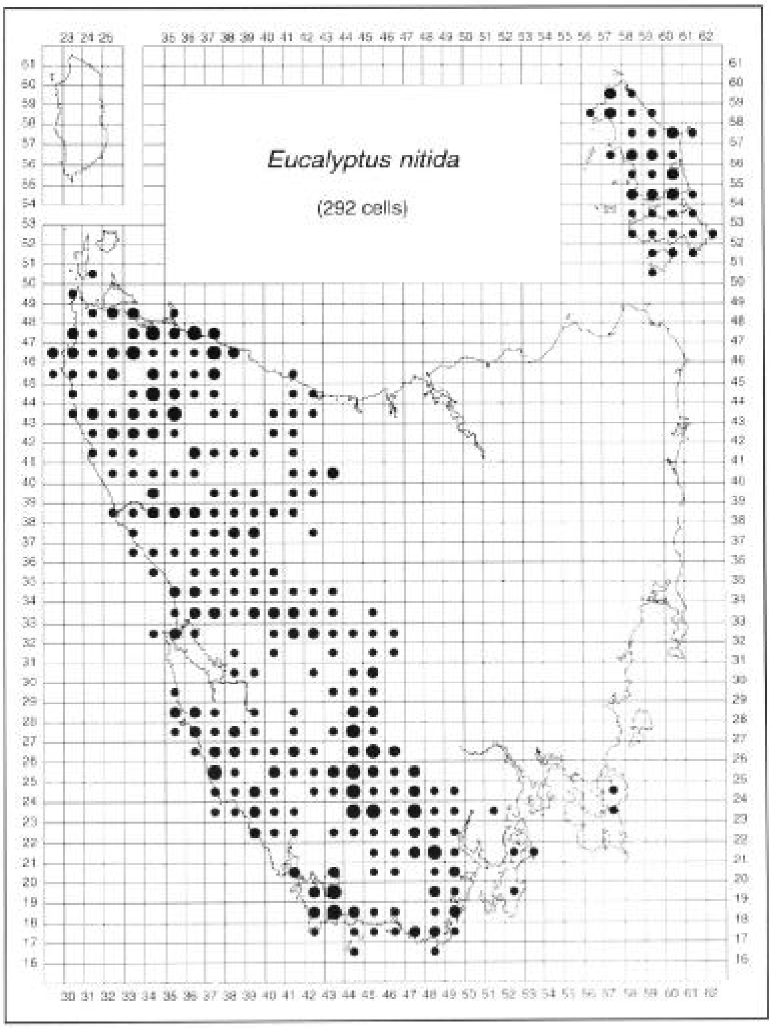


Figure 40. Distribution of E. nitida *in Tasmania.*

Eucalyptus nitida is a locally widespread endemic species in the western regions of Tasmania (Figure 40), complementing the eastern distribution of *E. amygdalina*. The two species intergrade across broad lowland contact zones, particularly in the north but also in the south. A disjunct population of *E. nitida* is also centred on the Furneaux Group of islands, where it is widespread on Flinders Island and Cape Barren Island. *Eucalyptus nitida* occupies a more-or-less continuous ecological range in the west, in various topographic situations where peats and skeletal soils develop on the oligotrophic quartzite, granite and siliceous-sedimentary substrates. In upland situations of western Tasmania, it intergrades eastward with *E. coccifera* and is replaced by that species at the tree-line where the more fertile soils occur, derived from Jurassic dolerite (Shaw *et al.* 1984). In lowland situations of the north and north-west, the eastward intergradation of *E. nitida* with *E. amygdalina* is found most frequently where a gradient of decreasing rainfall coincides with the geological divide between older and younger sedimentary substrates.

Eucalyptus nitida generally occurs from near sea-level to about 800 m (Figure 41). On Flinders Island, it occurs predominantly below 200 m and occasionally up to 500 m near Strzelecki Peaks. In the west, it ranges widely in altitude from near sea-level in coastal regions and up to 1020 m in inland regions (e.g. at Clear Hill), but is found predominantly below 700 m. The higher altitude records are generally located along the eastern margins of this western range. The main flowering period is from November to February, peaking in December and January (Figure 42). Flowering time does not appear to be a barrier to gene exchange between the intergrading forms of *E. coccifera* and *E. nitida* (Shaw *et al.* 1984).

In lowland western Tasmania, *E. nitida* usually occurs as a tree in pure stands,

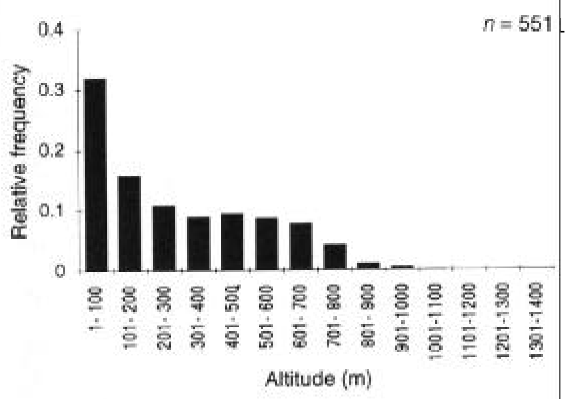


Figure 41. Altitude distribution of E. nitida.

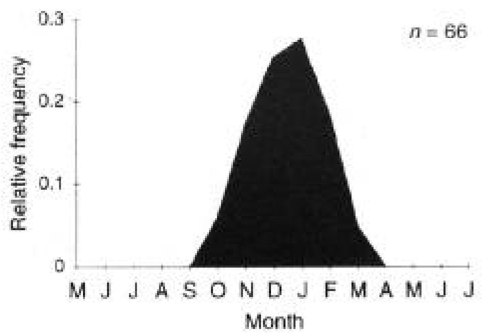


Figure 42. Flowering times for E. nitida.

dominating tall wet sclerophyll forest and mixed forest, but may also occur in mixed stands with *E. obliqua* or *E. delegatensis*. In the northern and western coastal lowlands (including Flinders Island), *E. nitida* is frequently associated with heathy forests, occurring with and eventually replaced by *E. ovata* as drainage declines and sites become seasonally waterlogged. *Eucalyptus nitida* also exists as a mallee shrub in scrub boundaries and in the small copses scattered amongst blanket moorland in the west and south-west (Jarman *et al.* 1988) (Photo 12). In the western uplands, it is a common dominant of subalpine woodlands. On Flinders Island, mallee-form *E. nitida* occurs with *E. globulus* and, to a lesser extent, *E. viminalis*, in low, open, heathy forests and woodlands on drought-prone, infertile, siliceous substrates and sites that offer some protection from the extremes of the prevailing westerly winds.

COMMENTS: There is a broad, northern geographic transition between *E. nitida* and *E. amygdalina* (e.g. cells 3447, 3646, 3647, 3745, 3746, 3747, 3846, 4043, 4340) that extends throughout the east–west contact zone for these two species (e.g. cells 4237, 4432, 4626, 5123, 5321, 5723). Field observers frequently encounter both species and intergrading forms of indeterminate identity in this region. For example, intergrading forms at Lake St Clair (cell 4333) are associated with changes in geological substrate as well as a climatic gradient. In the central intergrading zones, small populations with their closest affinities to *E. coccifera* are recorded from the Thumbs and Tim Shea (cell 4527), but the high-altitude peppermint nearby at Clear Hill (cell 4427) tends to have closer affinities with *E. nitida* (Shaw *et al.* 1984). Unverified outliers in this central intergrading zone have been treated as misidentifications of *E. coccifera* or *E. amygdalina* (cells 4635, 4727, 4728, 4736, 5224, 5225).

Biogeographically, the disjunction in the main occurrences of *E. nitida* on the Furneaux Group of islands and in western Tasmania is difficult to explain. However, recent studies by D. Rankin (pers. comm. 1995) suggest that the island peppermints are intermediate between the western *E. nitida* and populations attributable to *E. nitida* (*E.* aff. *nitida*) at Wilsons Promontory in Victoria. Whinray (1977) identified the peppermint on Cape Barren Island as *E. tenuiramis* and recent field observations confirm a large degree of variation in glaucousness amongst the peppermints there (S. Harris, pers. comm. 1993; R. Gaffney, pers. comm. 1996), which is unusual for *E. nitida*. However, in the absence of distinguishing data, all verifiable records of a peppermint on the Furneaux Group of islands were treated as *E. nitida.* The taxonomic affinity of the peppermint on these islands requires re-assessment as does the unverified extension of *E. nitida* populations into coastal northern and north-eastern Tasmania (e.g. cells 4144, 4145, 4845, 4945, 5042, 5848). Other mallee-form peppermints of indeterminate identity in eastern coastal regions associated with wet heathlands, and on exposed coastal headlands, may also have affinities with the peppermint on the Furneaux Group of islands (e.g. cells 5219, 5221, 5321, 5723, 5724, and unverified cells 5621, 5622). The occurrences of *E. nitida* from the Furneaux Group of islands contribute to the relatively high frequency of low-altitude records (Figure 41). The patchiness of the western distribution (Figure 40) is probably indicative of a paucity of sampling in the relatively inaccessible west and south-west regions.

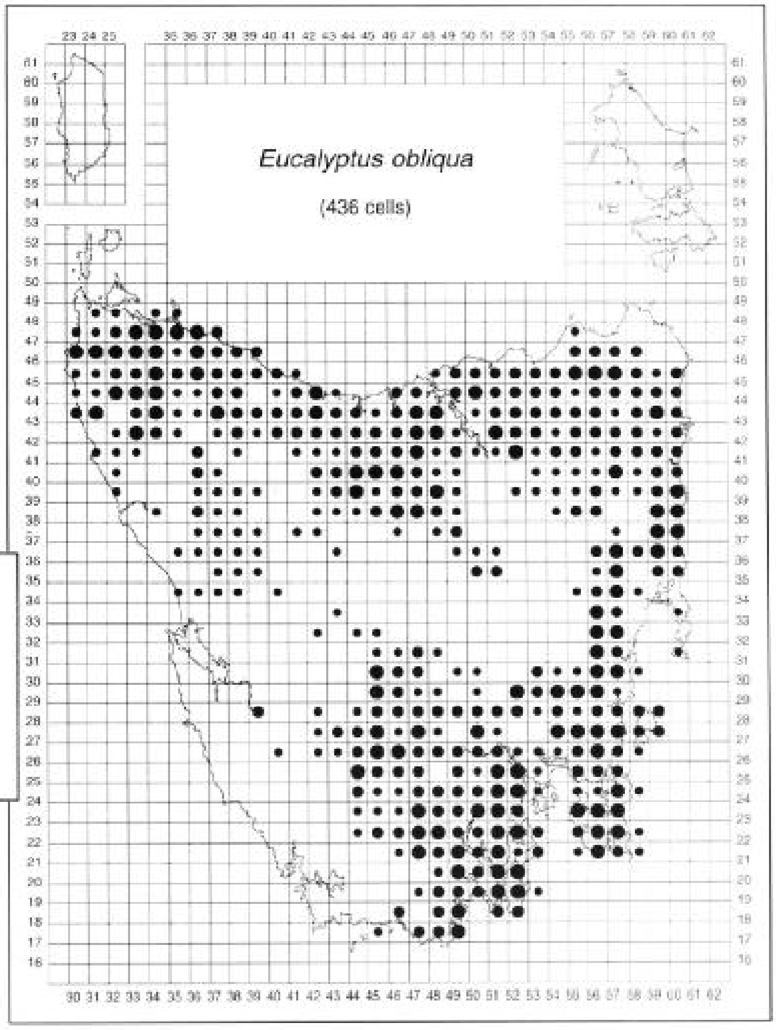
KEY REFERENCES: Ladiges *et al.* (1983); Li *et al.* (1995); Marginson and Ladiges (1982); Paton (1980); Shaw *et al.* (1984); Whinray (1977).

Photo 12. Eucalyptus nitida, *dominating small copses and gully forests in buttongrass moorland in south-western Tasmania.*

Eucalyptus obliqua

SUBGENUS: *Monocalyptus*
SERIES: *Obliquae*

Common name:
stringy bark
brown-top



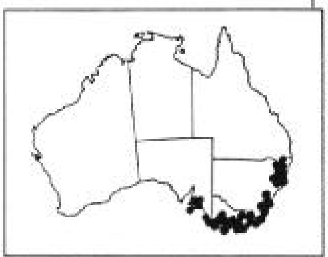


Figure 43. Distribution of E. obliqua *in Tasmania. Inset map: Distribution on mainland Australia.*

Eucalyptus obliqua is a widespread and common species found throughout Tasmania in comparatively mesic, well-drained, lowland habitats on a variety of substrates and terrain (Figure 43). It is rare or absent from the predominantly oligotrophic environments of the west and south-west, and it is not known from the Bass Strait islands. It displaces *E. regnans* on deep, well-drained soils of fertile sites with moderate to high fire frequency, and is itself replaced by *E. delegatensis* at higher altitudes at similar sites.

Eucalyptus obliqua generally occurs below about 600 m altitude throughout its range (Figure 44) and is frequently found near sea-level in coastal areas. It is found occasionally above 600 m, and up to 860 m near St Marys. These higher altitude records are predominantly from the north and north-east. Some of the higher altitude records in the more southern or central regions are likely to represent misidentifications of *E. delegatensis.* The main flowering period is January to March, peaking in January and February (Figure 45).

Eucalyptus obliqua (Figure 46) occurs as a medium to tall tree (Photo 13) in wet sclerophyll forest and, more occasionally, is emergent over rainforest. It extends into shrubby dry sclerophyll forest, upland grassy forests and drier coastal heath communities where it may be stunted or reduced to a mallee shrub (Photo 14). It occurs across a range of substrates, including dolerite, sandstone and mudstone wherever conditions are sufficiently mesic. Heathy understoreys are typical of the more siliceous substrates, and tall mesophytic shrub understoreys are well developed on the more fertile dolerite substrates. *Eucalyptus obliqua* frequently forms pure stands in wet forests but, as moisture availability declines, it typically co-exists in ecotones with peppermint species which dominate on the drier sites. *Eucalyptus viminalis* is the most frequently co-occurring minor or subdominant species, and *E. globulus* may co-occur with *E. obliqua*, particularly in the south-east.

COMMENTS: *Eucalyptus obliqua* is unknown from the Bass Strait islands, except for an unverified outlier near Pegarah on King Island (cell 2457) recorded by Gardiner and Crawford (1987). In the south-west, *E. obliqua* is recorded from the Gordon River valley (cells 3928, 4026), and may also be found in suitable habitats from other valley systems in the same region. Many of the southern forms of *E. obliqua*, particularly in coastal forests (e.g. cells 4517, 4717), appear aberrant, with rough bark on the stem and smooth bark on the major branches, but are otherwise morphologically true to the taxon (F. Duncan, pers. comm. 1994). Other patches of *E. obliqua* are likely to be found in suitable habitats in southern coastal forest areas (e.g. west of cell 4618). At higher altitudes (> 800 m) in central and southern regions, records of *E. obliqua* are

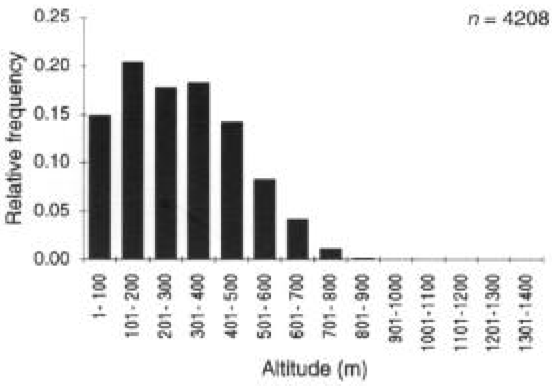


Figure 44. Altitude distribution of E. obliqua.

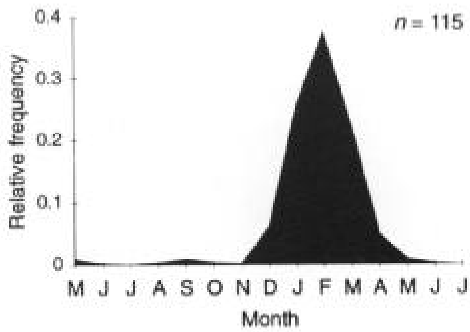


Figure 45. Flowering times for E. obliqua.

Photo 13. Eucalyptus obliqua *on fertile soils.*

Photo 14. Stunted E. obliqua *in coastal vegetation.*

treated as misidentifications of *E. delegatensis* (e.g. cells 4337, 4535, 4733, 4934, 5033).

KEY REFERENCES: Anderson and Ladiges (1982); Ashton (1981a, 1984); Ashton and Williams (1973); Blake (1976); Brown *et al.* (1975, 1976); Dess and Ashton (1982); Green (1971); Griffin and Eldridge (1980); Hamilton *et al.* (1991); Martin and Specht (1962); Pederick (1960); Podger *et al.* (1980); Potts and Reid (1983); Sinclair (1980); West (1979, 1981, 1982); Wilkinson and Jennings (1993).

Figure 46. Eucalyptus obliqua, *showing the oblique leaf base, from which the species derives its name.*

Eucalyptus ovata

SUBGENUS: *Symphyomyrtus*
SERIES: *Ovatae*

Common name:
swamp gum
black gum

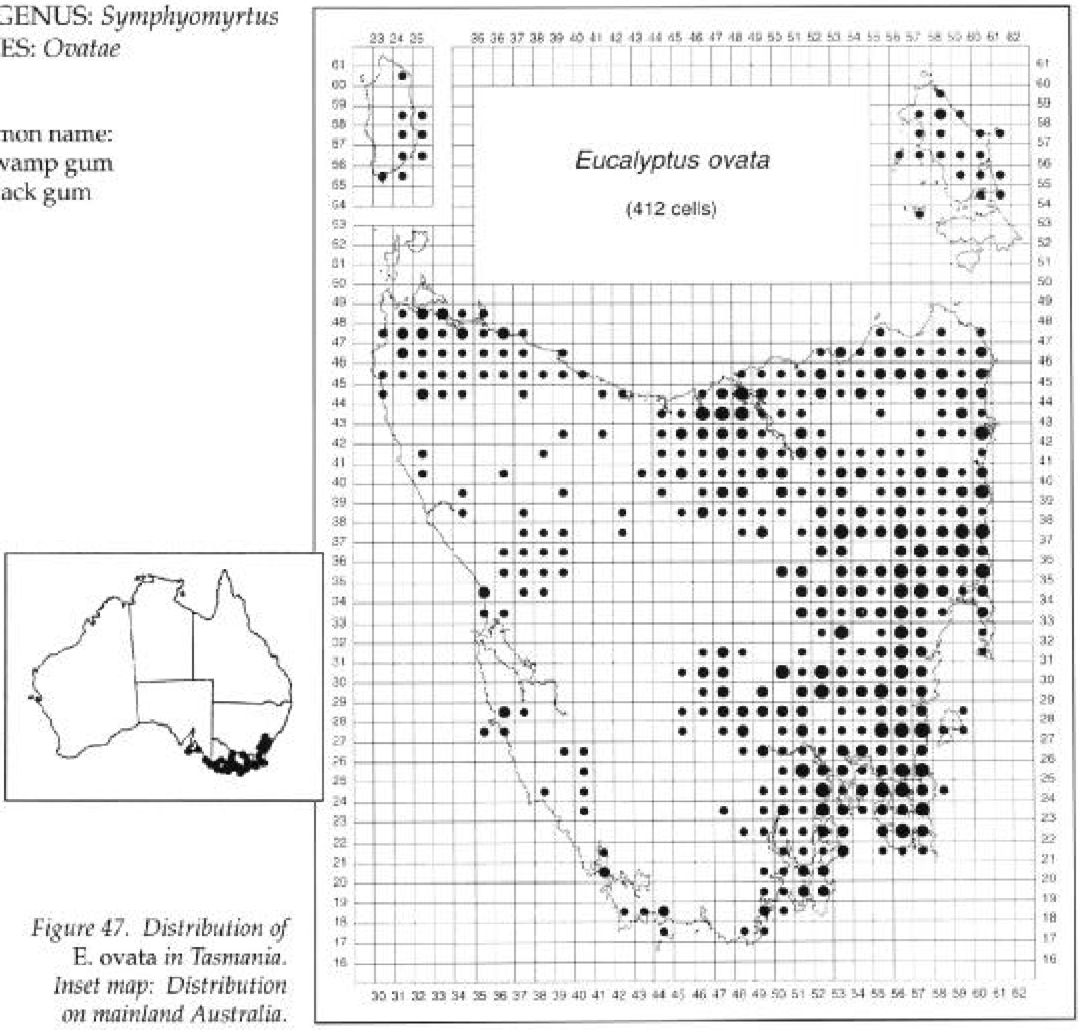


Figure 47. Distribution of E. ovata *in Tasmania. Inset map: Distribution on mainland Australia.*

Eucalyptus ovata is widespread and local throughout the lowlands of the north, east and south, extending across a wide range of substrates (Figure 47). In the drier regions, it typically occurs in topographically distinct situations that collect water into drainage basins. Such sites include the shallow to medium slopes in undulating coastal terrain, or seasonally waterlogged soaks and hollows of poorly drained valley flats and plateaux. On Flinders Island, *E. ovata* is closely associated with low-lying flats on recent marine sediments, and has a corresponding disjunct distribution. In western and south-western regions, it occurs sporadically in coastal and inland situations, where it appears to intergrade with *E. brookeriana.*

Eucalyptus ovata is a lowland species often occurring below 400 m, but also widespread in northern, central and eastern highland areas to about 700 m (Figure 48), and occasionally extends up to 830 m (e.g. near Lake Sorell on the eastern Central Plateau). In western regions, populations with affinities to *E. ovata* generally occur below 200 m. It is replaced by *E. rodwayi* on sites subject to severe frosts and cold-air drainage, particularly at the higher elevations. Its main flowering period is June to February, peaking from August to November (Figure 49).

Eucalyptus ovata is a local dominant of grassy and sedgey dry sclerophyll woodlands but, as drainage improves, it grades into peppermint-dominated forests, especially those with *E. amygdalina. Eucalyptus viminalis* may be present as a minor species. *Eucalyptus ovata* is a rare dominant or co-dominant with *E. obliqua* in wet sclerophyll forest on flats adjacent to drainage lines. Occasionally, it extends onto well-drained, wet forest sites as a subdominant with *E. obliqua* where, in the absence of juvenile foliage (Photo 15), it may be morphologically difficult to distinguish from *E. brookeriana.* In dry coastal and exposed locations, *E. ovata* occurs as a small spreading tree or mallee-form shrub (Photo 16) but, in wet forests, it assumes a taller tree form. On Flinders Island and the coastal plains of the north-east, grassy and sedgey *E. ovata* low woodlands have been cleared across much of their range and remnant stands are threatened by further clearing and other agricultural practices.

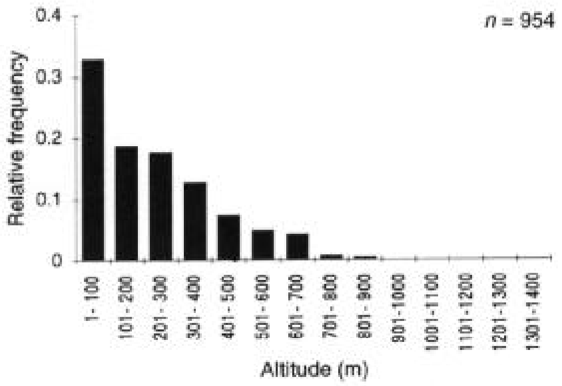


Figure 48. Altitude distribution of E. ovata.

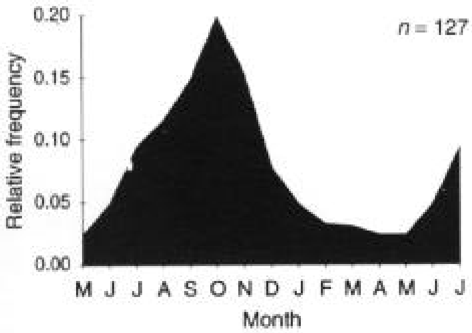


Figure 49. Flowering times for E. ovata.

COMMENTS: Jackson (1965) differentiates an east and a west coast form of *E. ovata*, the latter encompassing some populations now ascribed to *E. brookeriana* (Gray 1979). The western series *Ovatae* populations appear to have closer affinities with *E. brookeriana* according to recent work on leaf chemistry (Li *et al.* 1996). Therefore, some western and south-western occurrences ascribed to *E. ovata* may represent misidentifications of populations with closer affnities to *E. brookeriana*, but have been retained as *E. ovata* in the present mapping, being indicative of the geographic range of the black gum group in these regions. However, a detailed re-assessment of the taxonomic status of these western populations is required.

The identity of the high-altitude outliers (above 700 m) is uncertain, but may reflect misidentifications of *E. brookeriana* or *E. rodwayi*, or actual 'rare' occurrences of *E. ovata*. Further verification of these sites is

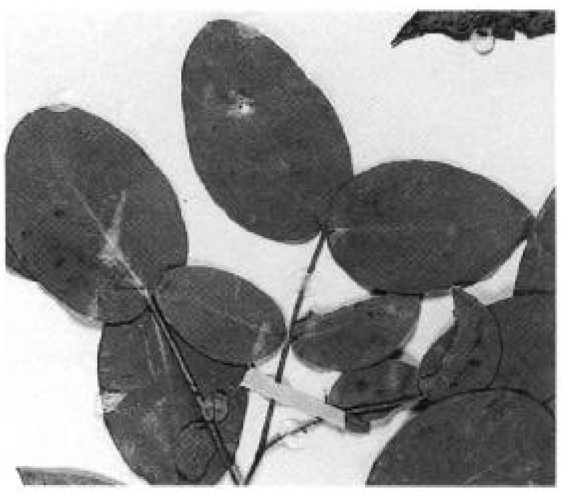


Photo 15. Juvenile leaves (pressed) of E. ovata.

needed. For example, high-altitude records in the Eastern Tiers near Snow Hill and Mount Foster (cells 5635, 5735, 5736, 5737, 5738) or the eastern Central Plateau (cell 4934) could represent intergrading forms of *E. ovata* and *E. rodwayi* with stunted stature and broader leaves, whilst the occurrences of tall trees in wet forests in the Fingal Valley near Tower Hill may be misidentifications of *E. brookeriana* (e.g. cell 5639). Although the identity of these high-altitude occurrences is uncertain, most were retained as *E. ovata,* where represented by more than one source.

Amongst the tall wet forests of the Western Tiers, *E. ovata* is known to occur in well-drained, wet forest habitats (F. Duncan, pers. comm. 1995) and may occasionally be recorded as *E. brookeriana* (e.g. cells 4638, 5035), but *E. brookeriana* is not well verified from this northern region except at Golden Valley (cell 4739; M.I.H. Brooker, pers. comm. 1996).

KEY REFERENCES: Brooker and Lassak (1981); Clucas and Ladiges (1979); Gray (1979); Ladiges *et al.* (1981, 1984); Li *et al.* 1996; McAulay (1937); Withers and Ashton (1977).

Photo 16. Eucalyptus ovata *dominating poorly drained, grassy forest.*

Eucalyptus pauciflora subsp. *pauciflora*

SUBGENUS: *Monocalyptus*
SERIES: *Obliquae*

Common name:
cabbage ash
weeping ash

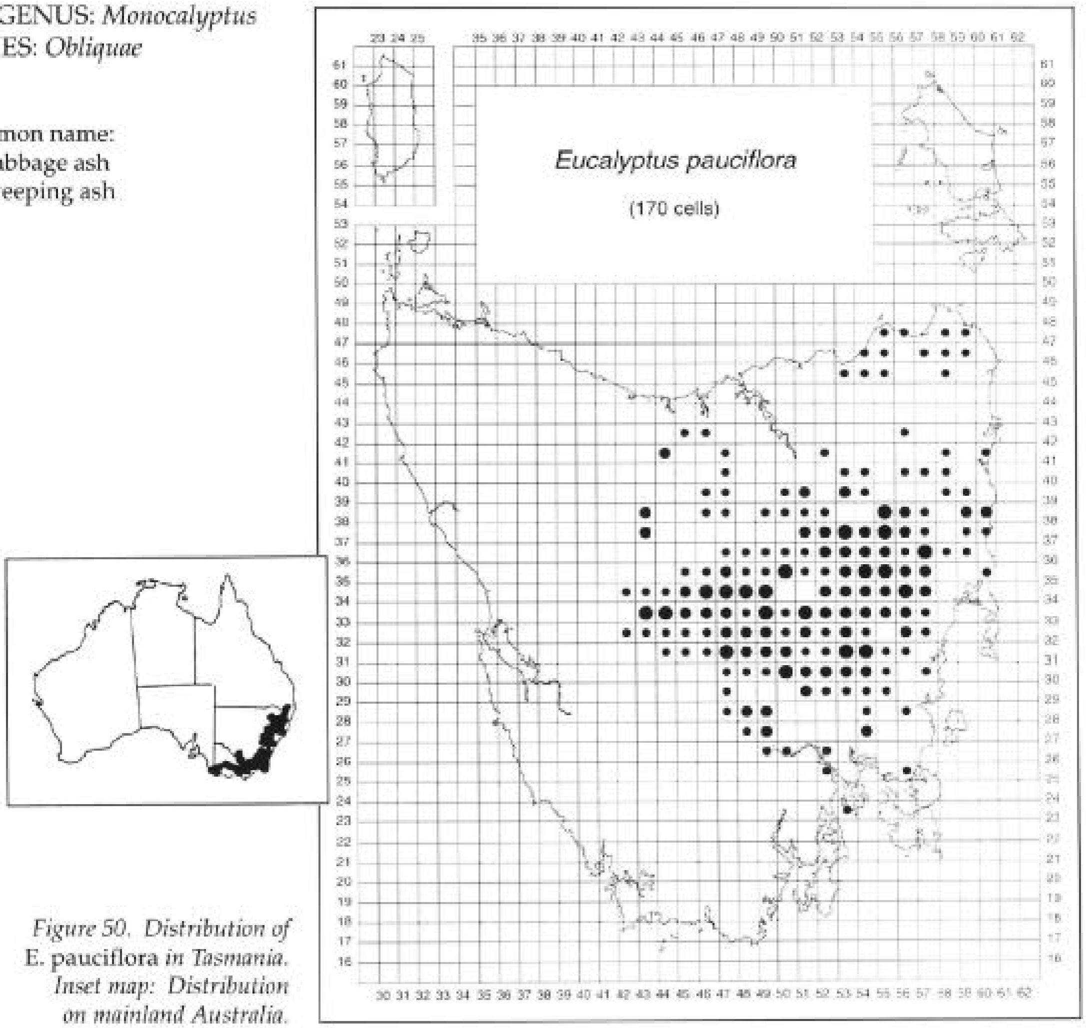


Figure 50. Distribution of E. pauciflora *in Tasmania. Inset map: Distribution on mainland Australia.*

Eucalyptus pauciflora (Photos 17, 18) is widespread throughout the Midlands and the southern Central Plateau, and it is scattered through the Eastern Tiers, northern Tasmania, and the far north-eastern coastal plains (Figure 50). In upland plateau regions, it occurs in habitats that are frequently exposed to cold, dry winds, and have a high rock cover, with the surface-water drainage being fair to impeded. Similarly, the habitat on the lowland flats is subject to sweeping winds, frosts, cold-air drainage and periodic drought, the combination of environmental stress depending on the particular location. It occurs on a wide range of substrates of both sedimentary and igneous origin, being most frequently found on Jurassic dolerite and occasionally amongst coastal sand dunes.

Eucalyptus pauciflora has a broad altitude range from near sea-level (10 m) to 1080 m, but has most occurrences between 200 m and 700 m (Figure 51). The altitude profile may be indicative of lowland and upland ecotypes, following the stepped topography in Tasmania. For example, the low-altitude records (< 300 m) reflect the coastal or inland plains and subcoastal hills of the north, north-east, east, south-east and Midlands; the mid-altitude range (300–800 m) largely reflects the Eastern Tiers and lower Central Plateau surface; and the highest altitude records (800–1080 m) are largely located on the southern to south-eastern Central Plateau such as in the vicinity of Great Lake to Lake St Clair. The main flowering period is December to February, peaking in January (Figure 52).

Eucalyptus pauciflora is a local dominant of dry forests and low woodlands with a variable understorey of heathy, shrubby, sedgey or grassy elements, reflecting the wide environmental range. The tree form similarly varies in response to the prevailing conditions, from a small forest tree to a twisted, wind-pruned and stunted woodland tree (Photo 18). *Eucalyptus pauciflora* usually forms mixed stands with other eucalypt species. In lowland regions, it may co-exist with *E. ovata* where drainage is slightly impeded, or with *E. rubida* where inland sites are subject to frost and cold air. In upland regions, *E. delegatensis* may co-exist ecotonally with *E. pauciflora* on the wet sites with deep soils and protected aspects (e.g. Jackson 1973), but is replaced by *E. amygdalina* as the co-existing species on the well-drained, mid slopes with northern aspects. *Eucalyptus dalrympleana* is a subdominant or minor co-occurring species on the better drained upland sites and *E. rodwayi* co-occurs where drainage becomes impeded.

COMMENTS: Occurrences of *E. pauciflora* in the far north-eastern coastal plains and the Midlands may be relicts of a distribution across the cold, dry and windy glacial Bassian Plain, as similar low-altitude occurrences are

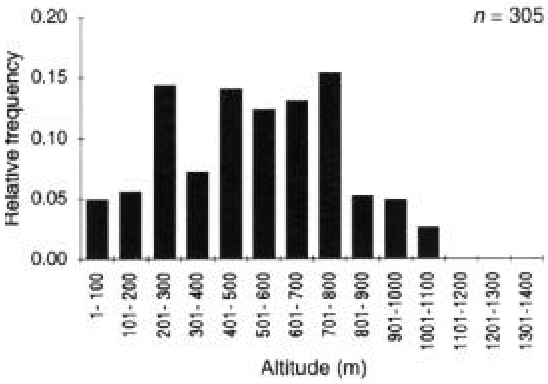


Figure 51. Altitude distribution of E. pauciflora.

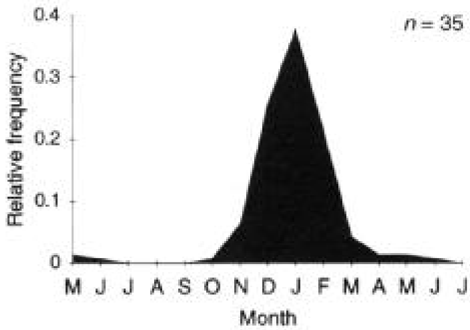


Figure 52. Flowering times for E. pauciflora.

Photo 17. A weeping form of E. pauciflora, *growing as a remnant in paddocks of the Midlands.*

found in Gippsland (Williams and Ladiges 1985; Rule 1994). The numerous marginal or outlier records (e.g. cells 4925, 5323, 5625, 5642, 6041) may be indicative of scattered populations that are yet to be discovered between these verified records (e.g. Apsley Marshes, cell 6035, S. Harris, J. Kirkpatrick, pers. comm. 1996). Old herbarium records near Mole Creek (cell 4439) and Chudleigh (cell 4540) may represent occurrences of *E. pauciflora* that have since been cleared for farmland. Field checking of remnant trees is needed to verify the locations, although these are not inconsistent with observations from the Western Tiers (e.g. cells 4638, 4738). In the north-west, an unverified outlier near Middlesex Plains (cell 4139) would, if verified, represent a significant range extension. Other unverified or doubtful records include a location near Port Dalrymple (e.g. cell 4844) and several possibilities in the north-eastern highlands (cells 5444, 5539, 5541). Along the Lyell Highway, a single tree of *E. pauciflora* (cell 4132) occurs in a patch of apparently undisturbed vegetation and may be an example of long-distance seed dispersal. This outlier is presently omitted from the natural distribution.

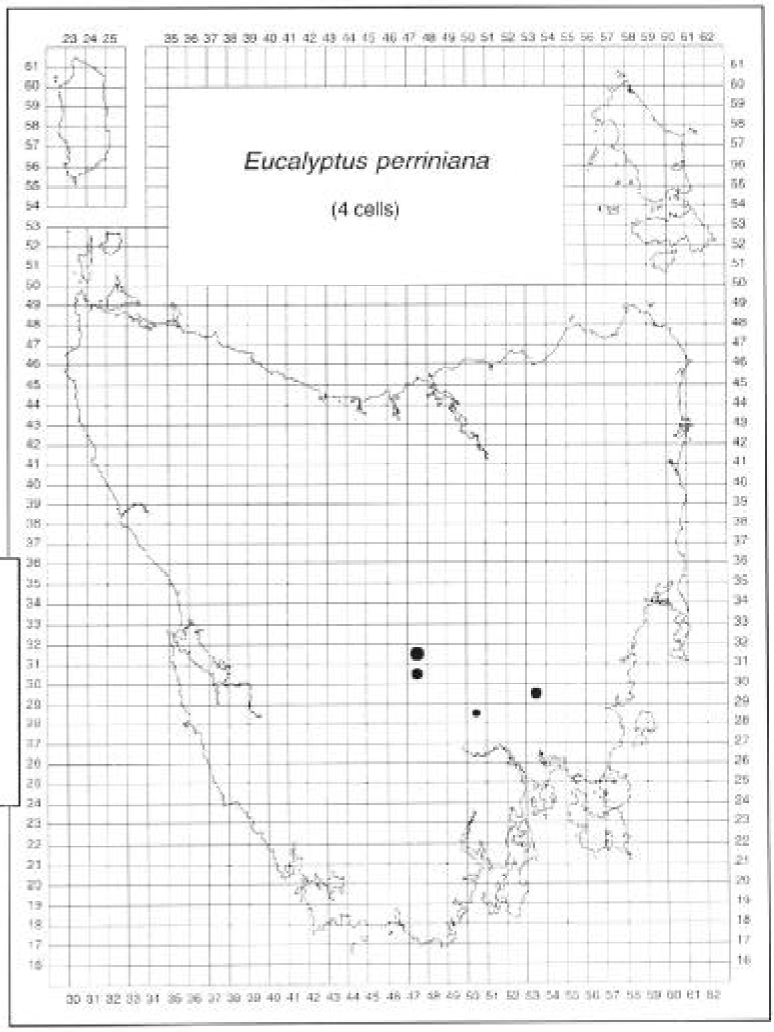
KEY REFERENCES: Austin *et al.* (1983); Barker (1988); Battaglia (1990b); Burden and Chilvers (1974); Green (1969a, b); Howard and Ashton (1967); Jackson (1973); Noble (1984); Phillips and Brown (1977); Pryor (1957); Rule (1994); Slatyer (1977a, b, c); Slatyer and Ferrar (1977); Slatyer and Morrow (1977); Whiffin (1981); Williams and Ladiges (1985).

Photo 18. Grassy E. pauciflora – E. viminalis *woodland.*

Eucalyptus perriniana

SUBGENUS: *Symphyomyrtus*
SERIES: *Viminales*

Common name:
spinning gum



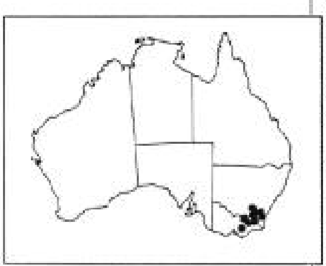


Figure 53. Distribution of E. perriniana *in Tasmania. Inset map: Distribution on mainland Australia.*

Eucalyptus perriniana is a rare species in Tasmania known from three small, isolated populations in the south-east and southern Midlands (Figure 53). It is restricted to a specialised habitat on mid-altitude plateaux where drought-prone, sandy, skeletal soils over sedimentary rock are seasonally inundated in localised, marshy hollows. The limited size and isolation of *E. perriniana* populations suggests a relict distribution, confined to the marginal habitats of its former ecological range (Wiltshire and Reid 1987). In this harsh environment, the distinct, connate, juvenile leaf form often persists after reproductive maturity. On older stems, when the leaf tissue dies at the centre around the twig, the joined pair of leaves becomes detached and spins in the wind (Wiltshire and Reid 1987).

Eucalyptus perriniana is found at intermediate altitudes in a narrow range between about 500 m and 620 m (Figure 54). It occurs on sites exposed to severe frosts, with extended cold-air pooling in winter contrasting with the summer drought. In the south-east at Hungry Flats, the altitude range is between 540 m and

560 m and, in the southern Midlands near Strickland, it is from 500 m to 560 m. The highest altitude occurrence (620 m) reflects a poorly verified site from Pelham Tier in the southern Midlands. The main flowering period for *E. perriniana* is poorly defined but appears to be from January to March (Figure 55).

Eucalyptus perriniana forms a bushy mallee or small straggly tree in sedgey dry sclerophyll low woodland where it may co-exist ecotonally and hybridise with *E. rodwayi* in the wetter depressions. As drainage improves and soil depths increase on the slightly elevated margins of hollows, it occurs as an understorey shrub with scattered *E. rubida* or *E. viminalis* in *E. tenuiramis* open forest. The mallee form of *E. perriniana* is reinforced by frequent low-intensity fires, with refoliation occurring as slender, vegetative sprouts from lignotubers that may be hundreds of years old (Wiltshire and Reid 1987). These small populations and their surrounding peppermint forest habitat are vulnerable to disturbances associated with human activities.

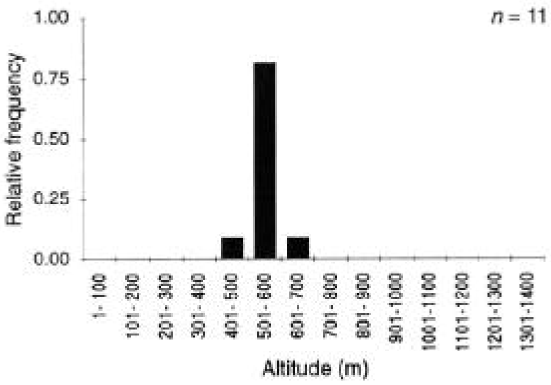


Figure 54. Altitude distribution of E. perriniana.

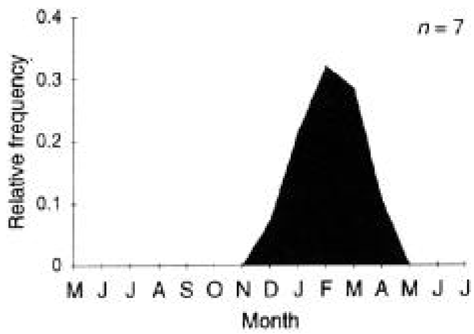


Figure 55. Flowering times for E. perriniana.

The Tasmanian populations of *E. perriniana* are distinct from mainland ones and are important for maintenance of the species' genetic variability (Wiltshire and Reid 1987). This distinction is consistent with the longer period of isolation from the more widespread occurrences on the Australian mainland, which are in similarly specialised, albeit subalpine, habitats (e.g. Harris 1975; Hall and Brooker 1973). The species is used for garden and amenity plantings, and the attractive juvenile leaves of the slender coppice branches are used widely by florists.

COMMENTS: There are only three verified locations for *E. perriniana* in Tasmania, represented by Hungry Flats (cell 5329), Strickland (cell 4730) and Duckholes Lagoons (cell 4731). A fourth location near Espies Craig (Pelham Tier, cell 5028; A. Mount, pers. comm. 1995) has been included in the mapping but requires verification of the population condition and ecology.

Old herbarium records from places such as River Dee (cell 4630; collected by R.G. Brett in 1934), the Dee (cell 4631; collected by J.H. Maiden in 1918), Ouse (cell 4729; collected by L. Rodway in 1912), or Macquarie (cell 4927; collected by J.H. Maiden in 1918) could not be verified in the present study and are most likely to represent mis-locations of known occurrences, or sites that have since been cleared. These records may also account for the additional sites for *E. perriniana* mapped by Jackson (1965). An herbarium record from Summerleas Road, Hobart (cell 5224), is probably *E. cordata*.

KEY REFERENCES: Hall and Brooker (1973); Paton (1980); Sheppard (1979); Steane *et al.* (1991); Wiltshire and Reid (1987).

Eucalyptus pulchella

SUBGENUS: *Monocalyptus*
SERIES: *Piperitae*

Common name:
white peppermint

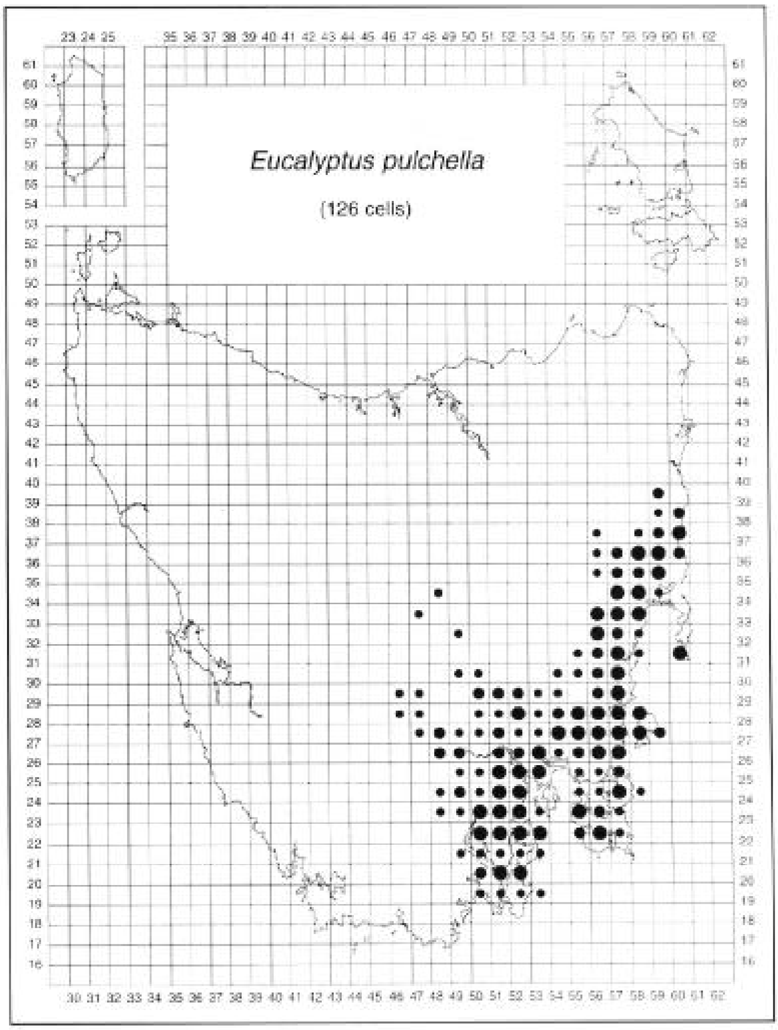


Figure 56. Distribution of E. pulchella *in Tasmania.*

Eucalyptus pulchella (Photo 19) is a locally widespread endemic species on the undulating to hilly terrain of lowland south-eastern Tasmania (Figure 56). It typically occurs on the upper hill-slopes and knolls where the free-draining, Jurassic dolerite substrates have a high surface rock cover. Such sites are usually topographically exposed, being very sunny with a north- to west-facing aspect and subject to periodic drought stress. *Eucalyptus pulchella* extends eastward where it intergrades morphologically with *E. amygdalina,* and the distinction between the two species becomes unclear on dolerite substrates throughout the Eastern Tiers.

Eucalyptus pulchella is predominantly a lowland species of the mid-altitude range between 100 m and 500 m but extends from near sea-level (10 m) to about 740 m (Figure 57), where it may hybridise with *E. coccifera* (Davidson *et al.* 1987). The altitude range and topographic position are likely to coincide, to some extent, with the availability of suitable habitats on lowland dolerite substrates. The higher altitude occurrences