

## A review of *Eucalyptus erythronema* (Myrtaceae) from the wheatbelt of south-western Australia

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### Abstract

Nicolle, D. & French, M.E. A review of *Eucalyptus erythronema* (Myrtaceae) from the wheatbelt of south-western Australia. *Nuytsia* 22(6): 455–463 (2012). Three taxa are recognised within the previously-accepted concept of *E. erythronema* Turcz. The taxon previously known as *E. erythronema* var. *marginata* (Benth.) Domin is regarded as specifically distinct and is here described as *E. armillata* D.Nicolle & M.E.French. The taxon previously known as *E. erythronema* var. *erythronema* has two variants: a north-eastern variant with conspicuously waxy branchlets and usually red flowers, which we recognise as *E. erythronema* subsp. *erythronema*, and a south-western variant with non-waxy branchlets and consistently pale creamy yellow flowers, which we describe as *E. erythronema* subsp. *inornata* D.Nicolle & M.E.French. A distribution map for the three taxa previously included in *E. erythronema* and a key to *E. ser. Elongatae* Blakely (in which the three taxa treated here are included) are provided.

### Introduction

Extensive field observations and collections of *Eucalyptus erythronema* Turcz. throughout its range, in conjunction with cultivation studies and the study of herbarium specimens in PERTH and AD, have revealed that it consists of three entities worthy of taxonomic recognition. In the present study, we review *E. erythronema* and describe these taxa in anticipation of the publication of a field guide to the eucalypts of the wheatbelt of Western Australia (which includes all three taxa), which is currently being prepared by one of us (MEF).

Historically, *E. erythronema* has been treated as two varieties: var. *erythronema*, representative of more southerly-distributed populations with non-flared flower buds and fruits, and var. *marginata* (Benth.) Domin, representative of more northerly-distributed populations with distinctly flared flower buds and fruits (Chippendale 1988; Brooker & Kleinig 2001). Our studies indicate that var. *marginata* is specifically distinct from var. *erythronema*, and we therefore raise it to specific status as *E. armillata* D.Nicolle & M.E.French. Our studies also indicate that *E. erythronema* var. *erythronema* consists of two variants which we consider are worthy of subspecific recognition. The ‘typical’ variant occurs in the north-east of the range of *E. erythronema* and has distinctly white-waxy branchlets and usually red flowers; it has been commonly cultivated as an ornamental plant. A variant with non-waxy branchlets and consistently pale creamy yellow flowers occurring in the west of the range is here described as

*E. erythronema* subsp. *inornata* D.Nicolle & M.E.French. All three taxa are relatively widespread in the wheatbelt region of south-western Australia, but all occur in a highly fragmented landscape, with most populations on roadsides, in small reserves and as small, uncleared patches in agricultural landscapes.

These taxa are part of *E.* subg. *Symphyomyrtus* (Schauer) Brooker sect. *Bisectae* Maiden ex Brooker ser. *Elongatae* (following Brooker 2000), a series of six species endemic to the south-western transitional rainfall zone of Western Australia.

### Key to the taxa of *Eucalyptus* series *Elongatae*

1. Fruits cupular to cylindrical or urceolate
  2. Bud and fruit umbellasters held erect; flowers white ..... **E. cylindriflora**
  - 2: Bud and fruit umbellasters held down-curved (pendulous); flowers greenish yellow
    3. Obligate seeder (mallet); lignotuber absent; fruits cupular ..... **E. dielsii**
    - 3: Resprouter (mallee); lignotuber present; fruits urceolate ..... **E. cerasiformis**
- 1: Fruits obconic
  4. Flower bud hypanthia and fruits conspicuously flared near rim ..... **E. armillata**
  - 4: Flower bud hypanthia and fruits lacking a conspicuous flare near the rim
    5. Branchlets conspicuously waxy, flowers usually red ..... **E. erythronema** subsp. **erythronema**
    - 5: Branchlets not waxy, flowers pale creamy yellow ..... **E. erythronema** subsp. **inornata**

### Taxonomy

***Eucalyptus armillata*** D.Nicolle & M.E.French, *sp. nov.*

*Typus*: approach to Kalguddering Rock from west [south of Wongan Hills], Western Australia, 2 January 1980, *M.I.H. Brooker* 6759 (*holo*: PERTH 01350846; *iso*: CANB, DNA *n.v.*).

*Eucalyptus conoidea* var. *marginata* Benth., *Fl. Austral.* 3: 227 (1867). *Eucalyptus erythronema* var. *marginata* (Benth.) Domin, *Repert. Spec. Nov. Regni Veg.* 12: 389 (1913). *Type*: Swan River, [Western Australia], *J. Drummond* 3: 56 (*holo*: K 000279658 image seen).

*Mallee* to 7 m tall; lignotuber present (resprouter). *Bark* smooth throughout, powdery and pale grey to white or pale yellow turning to rosy pink to dark reddish purple, decorticating in short strips and flakes. *Branchlets* not waxy. *Seedling leaves* narrow-lanceolate, dull, green. *Adult leaves* narrow-lanceolate, 55–110 mm long × 7–14 mm wide, glossy, green to olive-green. *Inflorescences* down-curved (pendulous), 3- or rarely 7-flowered; peduncles terete, 13–31 mm long; pedicels to 40 mm long. *Flower buds* double-conic, 18–23 mm long × 7–11 mm wide; hypanthia slightly to prominently ribbed and with a prominent flange just below the operculum; opercula broadly conical to beaked, smooth. *Staminal filaments* red or rarely pale creamy yellow. *Fruits* obconic, 10–14 mm long × 7–12 mm diam., slightly to prominently ribbed, with a prominent double flange up to 3 mm wide around the rim; disc level to slightly domed; valves (3) 4 or 5, around rim level or exserted. *Seeds* brown.

*Diagnostic features.* Branchlets not waxy. Umbellasters mostly 3-flowered. Bud hypanthia slightly to prominently ribbed, with a distinct flange just below the operculum. Fruits slightly to prominently ribbed, with a prominent double flange at the rim.

*Selected specimens examined* (north to south). WESTERN AUSTRALIA: Canna Nature Reserve No. 29289, Nov. 1997, *P.C. Ryan s.n.* (AD, CANB, PERTH); Thomas Rd, E of Marchagee, 8 Dec. 2011, *M.E. French* 2232 (PERTH); 1.4 miles S of Wubin, 21 Oct. 1966, *G.M. Chippendale* 61 (AD, CANB, MEL, PERTH); 7 miles N of Watheroo, 23 Apr. 1970, *M.I.H. Brooker* 2528 (AD, CANB, K, MEL, NSW, PERTH); E of Dalwallinu, 13 Dec. 1992, *D. Nicolle* 287 (AD); Petrudor Rock Reserve, SE of Dalwallinu, S boundary of reserve off Jones Rd, c. 1.2 km from SW corner, 1 Aug. 2000, *M. Hislop* 2076 (PERTH); 2.2 miles N of Piawaning, 16 Oct. 1966, *G.M. Chippendale* 12 (AD, CANB, MEL, PERTH); Cadoux–Koorda Rd, W of Koorda, 30 Nov. 2011, *M.E. French* 2210 (PERTH); SW of Wongan Hills township on Wongan Hills–Calingiri Rd, 17 Oct. 1999, *M. French* 1062 (PERTH); 12.6 km E of Carina Siding, 9 km NW of Nitty Marra [Nittymarra] Hill, 26 Aug. 1982, *S.D. Hopper* 2479 (PERTH); Uberin North Rd, N of Dowerin, 30 Nov. 2011, *M.E. French* 2209 (PERTH); corner of Old Koorda Rd and Dowerin–Kalannie Rd, NE of Dowerin, 8 July 2002, *W. O’Sullivan* WOS 1820 (AD, PERTH); NE of Goomalling on Berring East Rd, 10 Dec. 2011, *M.E. French* 2234 (PERTH).

*Distribution and habitat.* *Eucalyptus armillata* occurs mainly within the southern part of the northern wheatbelt, from near Coorow and Calingiri eastwards into the pastoral rangelands to near Beacon and north-west of Wubin (Figure 1). The species has been less frequently collected in the northern and north-eastern part of its distribution, where its distributional limits are poorly understood. An apparently disjunct population occurs in the Canna district. We have not seen the Canna population, which reportedly consists of over 1,000 individuals (specimen label of *P.C. Ryan s.n.*), despite several searches for it by one of us (MEF). The species grows in mallee vegetation on gravelly sands or red to pale grey loams, usually on level topography. Associated eucalypts include *E. arachnaea* Brooker & Hopper, *E. capillosa* Brooker & Hopper, *E. celastroides* Turcz. subsp. *virella* Hopper, *E. flocktoniae* (Maiden) Maiden subsp. *flocktoniae*, *E. horistes* L.A.S.Johnson & K.D.Hill, *E. kochii* Maiden & Blakely, *E. moderata* L.A.S.Johnson & K.D.Hill, *E. opima* D.Nicolle & M.E.French, *E. obtusiflora* DC., *E. salmonophloia* F.Muell., *E. salubris* F.Muell., *E. stowardii* Maiden, *E. subangusta* (Blakely) Brooker & Hopper subsp. *subangusta*, *E. tenera* L.A.S.Johnson & K.D.Hill, *E. wubinensis* L.A.S.Johnson & K.D.Hill and *E. yilgarnensis* (Maiden) Brooker.

*Etymology.* From the Latin *armillatus* (ornamented with a bracelet), referring to the conspicuous flare at the top of the flower bud hypanthia and at the rim of the fruits. We are unable to maintain the varietal epithet of *E. erythronema* var. *marginata* at specific status, as the name is preoccupied by the Western Australian forest-tree species *E. marginata* D.Don ex Sm. (jarrah).

*Conservation status.* Not considered to be at risk. Recorded from Petrudor Rock Nature Reserve, Charles Darwin Reserve, Buntine Nature Reserve 26837 and Wongan Hills Research Station Nature Reserve 18672. The apparently disjunct northern population occurs in Canna Nature Reserve.

*Notes.* We have only seen *E. armillata* with red flowers in the field; however, white to yellow flowers have been recorded on the label data of several specimens in PERTH and in various publications. Kelly *et al.* (1969) notably illustrate a yellow-flowered individual of the species (as *E. erythronema* var. *marginata*) while the text of the same taxon states that a white-flowered individual has been illustrated. While *E. armillata* may indeed be variable with respect to flower colour, another hypothesis is that ‘pure’ *E. armillata* is consistently red-flowered and that rare pale creamy yellow-flowered individuals represent past or contemporary genetic introgression from other species such as the pale creamy

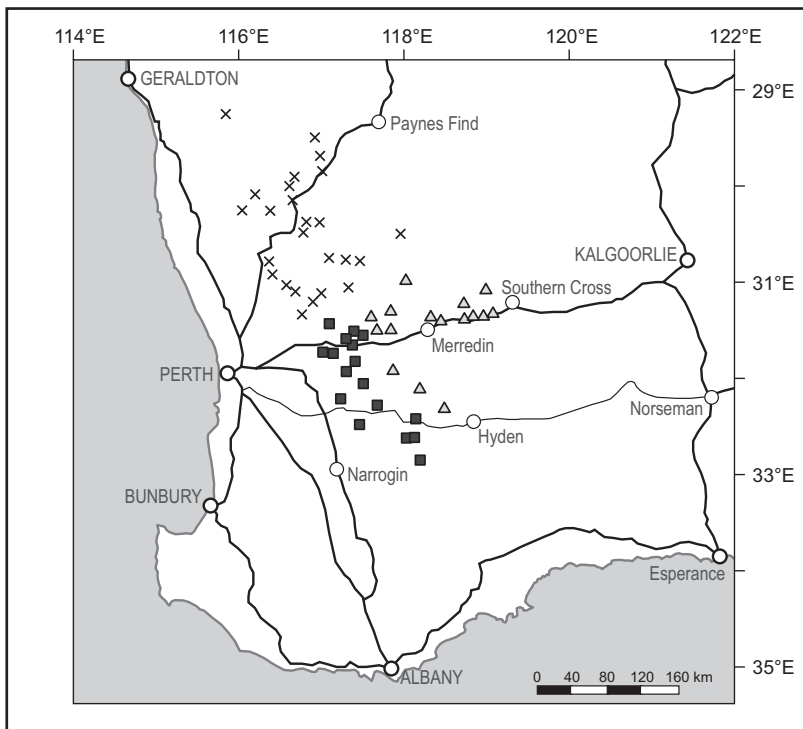


Figure 1. Distribution of *Eucalyptus armillata* (crosses), *E. erythronema* subsp. *erythronema* (triangles) and *E. erythronema* subsp. *inornata* (squares) in south-western Australia.

yellow-flowered *E. erythronema* subsp. *inornata* and the yellow-flowered *E. tenera*. A similar pattern of rare creamy yellow-flowered individuals can be seen in the normally red-flowered *E. erythronema* subsp. *erythronema*.

We consider *E. armillata* worthy of specific recognition, partly because *E. erythronema* and *E. armillata* largely maintain their morphological distinctiveness despite being geographically parapatric, but primarily to indicate a more distant relationship between *E. armillata* and *E. erythronema* than the closer relationship between the taxa recognised here as *E. erythronema* subsp. *erythronema* and *E. erythronema* subsp. *inornata*.

A specimen with non-flanged buds and fruits collected from 2 km south-west of Manmanning and within the distribution of *E. armillata* (A.S. George 14343, PERTH) has previously been determined as *E. erythronema* var. *erythronema* (G. Chippendale in 1977; subsequently confirmed by M.I.H. Brooker in 1991). We regard this specimen as an interserial hybrid between *E. armillata* and *E. tenera* (of *E. ser. Erectae* Brooker), as the specimen matches other individuals which we have attributed to this hybrid elsewhere in the field. We suspect that the earlier erroneous determination of this hybrid specimen as *E. erythronema* var. *erythronema*, while being collected from within the distribution of *E. armillata*, has contributed to precluding the earlier recognition of these varieties at subspecific or specific rank.

A few intergrading populations between *E. armillata* and *E. erythronema* subsp. *inornata* are known where their distributions overlap in the area between Wyalkatchem and Cunderdin. These intergrades are characterised by their intermediate morphology, especially with respect to the slight and variable

(between individuals within a population) degree of flanging of the buds and fruits and variable flower colour. Putative hybrids involving *E. armillata* have been recorded with *E. orthostemon* D.Nicolle & Brooker and *E. tenera*.

**Eucalyptus erythronema** Turcz., *Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg* 10: 337 (1852). *Type*: Swan River Colony, [Western Australia], *J. Drummond* 5: 37 (*holo*: KW *n.v.*; *iso*: CGE *n.v.*, E *n.v.*, FI *n.v.*, G *n.v.*, K 00027965454–7 images seen, MEL *n.v.*, NSW image seen, W *n.v.*).

*Eucalyptus conoidea* Benth., *Fl. Austral.* 3: 227 (1867). *Type*: Swan River Colony, [Western Australia], *J. Drummond* 5: 37 (*syn*: CGE *n.v.*, E *n.v.*, FI *n.v.*, G *n.v.*, K 00027965454–7 images seen, KW *n.v.*, MEL *n.v.*, NSW image seen, W *n.v.*).

*Mallee* to 7 m tall; lignotuber present (resprouter). *Bark* smooth throughout, powdery and pale grey to white or pale yellow turning to rosy pink to dark reddish purple, decorticating in short strips and flakes. *Branchlets* waxy or not waxy. *Seedling leaves* narrow-lanceolate, dull, green. *Adult leaves* narrow-lanceolate, 55–95 mm long × 8–17 mm wide, glossy, green to olive-green. *Inflorescences* down-curved (pendulous), 3- or 7-flowered; peduncles terete, 15–27 mm long; pedicels 10–28 mm long. *Flower buds* double-conic, 16–18 mm long × 7–8 mm diam., sometimes waxy; hypanthia smooth; opercula broadly-conical to bluntly-beaked, smooth. *Staminal filaments* red or pale creamy yellow. *Fruits* obconic, 8–14 mm long × 8–10 mm diam., smooth to faintly ribbed, sometimes with a slight flange up to 0.5 mm wide around the rim; disc ±level; valves (3) 4 or 5, to rim level or slightly exserted. *Seeds* brown.

*Diagnostic features*. Branchlets waxy or not waxy. Umbellasters 3- or 7-flowered. Bud hypanthia lacking a distinct flange. Fruits smooth to faintly ribbed, lacking a prominent flange at the rim.

*Notes*. Two subspecies are recognised, forming a geographical replacement pattern (Figure 1) and differentiated primarily on the presence or absence of white wax on the branchlets and flower buds and in the colour of the staminal filaments.

Populations which we have interpreted as intergrades between the two subspecies are scattered in a narrow north-south band between the distribution of the two subspecies, from north of Kellerberrin to near Kondinin, and especially in the area from east of Corrigin to north of Kondinin. These intergrades are characterised by their intermediate and variable (between individuals within a population) morphology, noticeable in the slightly or variably waxy branchlets and mixed red- and yellow-flowered individuals within a population.

### **Eucalyptus erythronema** subsp. **erythronema**

*Branchlets* covered with conspicuous white wax (glaucous or pruinose). *Flower buds* usually with white wax; *staminal filaments* usually red, very rarely cream.

*Selected specimens examined* (north to south). WESTERN AUSTRALIA: Westonia, 26 Nov. 1920, C.A. Gardner 597 (PERTH); Burracoppin, 26 Aug. 1964, Dr F.G. Smith 1769 (PERTH); 2 miles E of Noongar (209 mile peg), 19 Dec. 1955, N.T. Burbidge 4926 (CANB, PERTH); between Walgoolan and Bodallin on Great Eastern Hwy, 30 Sep. 2000, D. Nicolle & M. French DN 3458 (CANB, PERTH); Yerbillion, 29 Mar. 1951, C.A. Gardner 10326 (PERTH); E side of Carrabin South Rd, 3.5 km N of Henderson Rd, Carrabin Nature Reserve, c. 5 km SSW of Yerbillion, 29 Sep. 1997, G.J. Keighery &

*N. Gibson* 3277 (AD, PERTH); North Baandee Rd [Baandee North Rd], 4 June 2000, *M.E. French* 1210 (AD, PERTH); 29 miles NE of Kellerberrin, 20 July 1980, *R.J. Cranfield* 1521 (PERTH); S side of Maley Rd, 2.35 km E of Bencubbin–Kellerberrin Rd, Koji Koji Nature Reserve, c. 30 km N of Kellerberrin, 1 Oct. 1997, *G.J. Keighery & N. Gibson* 3736 (AD, CANB, PERTH); c. 250 m W of Morrison Rd, on Stone-Giles Rd, SE of Doodlakine, 1 Sep. 1999, *W. O'Sullivan* WOS 686 (PERTH); 12 km E of Nangeen Hill, 21 Nov. 1995, *R. Davis* 349 (PERTH); on W side of railway track, 400 m S of Billericay West Rd [Billericay Rd West], Billericay Nature Reserve, c. 23 km SSW of Naremben, 24 Sep. 1997, *G.J. Keighery & N. Gibson* 3278 (PERTH).

*Distribution and habitat.* Common in the central wheatbelt of Western Australia from east of Wyalkatchem and the Hyden area eastwards to the Mukinbudin area and near Bullfinch. The subspecies has been poorly collected in the north-eastern part of its known distribution. The subspecies grows in mallee or mixed woodland-mallee vegetation on sites including rises of hard, white sand in a variety of landscapes, usually in sites of good drainage, from lateritic and sandy gravel rises to slight slopes of pale red to grey loamy soils. It often occurs as an understorey species in *E. salmonophloia* and *E. longicornis* (F.Muell.) F.Muell. ex Maiden woodland across its distribution. Associated eucalypts include *E. capillosa*, *E. kochii* subsp. *plenissima* (C.A.Gardner) Brooker, *E. loxophleba* Benth. subsp. *lissophloia* L.A.S.Johnson & K.D.Hill, *E. moderata*, *E. salmonophloia*, *E. salubris*, *E. sheathiana* Maiden, *E. subangusta* subsp. *subangusta* and subsp. *cerina* Brooker & Hopper, *E. tenera*, *E. tephroclada* L.A.S.Johnson & K.D.Hill and *E. yilgarnensis*.

*Conservation status.* The distribution is wholly within the highly cleared wheatbelt area of Western Australia; however, the subspecies is relatively common and well-conserved in nature reserves, and it is not considered to be at immediate risk. Recorded from Carrabin, Koji Koji and Billericay Nature Reserves.

*Notes.* *Eucalyptus erythronema* subsp. *erythronema* almost always has red flowers, although rare pale creamy yellow-flowered individuals are sometimes recorded in populations of otherwise red-flowered individuals (e.g. *D. Nicolle* 3458 & *M.E. French*). While *E. erythronema* subsp. *erythronema* may be variable with respect to flower colour, another hypothesis is that subsp. *erythronema* is consistently red-flowered and that rare pale creamy yellow-flowered individuals represent past or contemporary genetic introgression from other species such as the pale yellow-flowered *E. tenera* and *E. tephroclada*. A similar pattern of rare creamy yellow-flowered individuals can be seen in the normally red-flowered *E. armillata*. Conversely, *E. erythronema* subsp. *inornata* is consistently pale creamy yellow-flowered.

Natural hybrids are recorded with *E. salubris*, *E. tenera* and *E. tephroclada*. The subspecies is commonly cultivated as an ornamental in the drier regions of southern Australia, and is known to readily hybridise with other cultivated species. Two notable cultivars have originated from cultivated *E. erythronema* subsp. *erythronema* in South Australia, and are presumed to be of hybrid origin, viz: *E.* ‘Urrbrae Gem’ (from seed collected from a cultivated *E. erythronema* subsp. *erythronema* in the Waite Arboretum, with *E. stricklandii* Maiden most likely the pollen parent; Delaporte *et al.* 2001) and *E.* ‘Augusta Wonder’ (originated from seed collected from a cultivated *E. erythronema* subsp. *erythronema* in Port Augusta; pollen parent unknown).



***Eucalyptus erythronema* subsp. *inornata*** D.Nicolle & M.E.French, *subsp. nov.*

*Typus*: south of the York to Quairading Road, Western Australia [precise locality withheld for conservation reasons], 12 November 2000, *D. Nicolle & M. French* DN 3685 (*holo*: PERTH05783283; *iso*: CANB).

*Branchlets* lacking white wax, or if present only slight. *Flower buds* lacking white wax; *staminal filaments* pale creamy yellow.

*Selected specimens examined* (north to south). WESTERN AUSTRALIA [localities withheld for conservation reasons]: Dec. 1935, *C.A. Gardner s.n.* (PERTH); 3 Dec. 2001, *M.E. French* 2214 (PERTH); 17 Aug. 1991, *B.G. Briggs* 8926 & *L.A.S. Johnson* (CANB, NSW, PERTH); 6 Oct. 1914, *C.H. Ostenfeld* 517 (PERTH); 3 Dec. 2001, *M.E. French* 2216 (PERTH); 3 Dec. 2001, *M.E. French* 2217 (PERTH); 3 Dec. 2001, *M.E. French* 2218 (PERTH); 3 Dec. 2001, *M.E. French* 2220 (PERTH); 27 Sep. 1979, *M.D. Crisp* 6195, *J. Taylor & R. Jackson* (CANB, PERTH); 3 Nov. 1999, *G.J. Keighery & N. Gibson* 4880b (PERTH); 21 Sep. 1997, *P.J. White* 1026 (CANB, PERTH); 11 Dec. 1992, *D. Nicolle* 245 (AD); 13 Apr. 2001, *M.E. French* 1284 (PERTH); 13 Oct. 1999, *K. Kershaw* KK 2036 (PERTH); 13 July 1970, *M.I.H. Brooker* 2655 (CANB, MEL, NSW, PERTH).

*Distribution and habitat*. Restricted to the central wheatbelt of Western Australia, where it is distributed in a crescent from south of Wyalkatchem southwards and then south-east to south of Kulin and Pingaring. The subspecies grows in a variety of landscapes, usually in sites of good drainage, from lateritic and sandy gravel rises to slight slopes of pale red to grey loams. Often occurs as an understorey species in *E. salmonophloia* and/or *E. wandoo* Blakely woodland across its distribution. Associated eucalypts include *E. capillosa*, *E. celastroides* subsp. *virella*, *E. falcata* Turcz., *E. loxophleba* subsp. *loxophleba*, *E. moderata*, *E. opima*, *E. phenax* Brooker & Slee, *E. salubris*, *E. sheathiana*, *E. subangusta* subsp. *subangusta* and *E. urna* D.Nicolle.

*Etymology*. From the Latin *inornatus* (unadorned), referring to the lack of white wax on the branchlets. This taxon is less ornamentally appealing than subsp. *erythronema* due to the lack of wax and its pale creamy yellow flowers.

*Conservation status*. *Eucalyptus erythronema* subsp. *inornata* is distributed wholly within a highly cleared and fragmented area of the central wheatbelt area of Western Australia. Most populations occur as small remnants on roadsides although it has been recorded from Charles Gardner and Corrigin Reserves. To be listed as Priority Three under Department of Environment and Conservation (DEC) Conservation Codes for Western Australian Flora (M. Smith pers. comm.).

*Notes*. *Eucalyptus erythronema* subsp. *inornata* is rarely cultivated, with the apparent selection of *E. erythronema* for garden cultivation having been restricted to the more ornamental, waxy and usually red-flowering subsp. *erythronema*.

Within populations across its distribution, some individual plants of subsp. *inornata* produce buds with a slight flange (to 0.5 mm wide), however, this is a very minor variation as all other characteristics fit clearly with subsp. *inornata*.

A few intergrading populations between *E. erythronema* subsp. *inornata* and *E. armillata* are known where their distributions overlap in the area between Wyalkatchem and Cunderdin. These intergrades are characterised by their intermediate morphology, especially with respect to the slight and variable (between individuals within a population) degree of flanging of the buds and fruits and variable flower colour. Natural hybrids are recorded with *E. loxophleba* subsp. *loxophleba*, *E. salubris* and *E. tenera*.

### Hybrids and intergrades involving *E. armillata* and/or *E. erythronema*

Intergrades and hybrids listed below are recognised according to the criteria defined in Nicolle and French (2012).

#### ***Eucalyptus armillata* – *E. erythronema* subsp. *inornata* intergrades**

*Selected specimens examined* (north to south). WESTERN AUSTRALIA: site 23, W side of Metcalf Rd between Metcalf East Rd and Twenty Six Gate Rd, c. 17.5 km SW of Wyalkatchem, 18 Oct. 2000, *R. Davis* WW 23-23 (PERTH); quadrat 17 Hutchy's Block, Cardiff Pastoral Co, Hammond Rd, c. 24 km ESE of the Wyalkatchem townsite, 16 Sep. 2000, *C. Keating et al.* WYCH 17/40 (PERTH); between Cunderdin and Tammin, 2 June 1969, *M.I.H. Brooker* 1776 (CANB, PERTH).

#### ***Eucalyptus armillata* × *E. orthostemon***

*Specimens examined* (north to south). WESTERN AUSTRALIA: 0.95 miles E of Manmanning, 11 Mar. 1989, *B.H. Smith* 1158 (AD, BRI, CANB, MEL, NSW, PERTH); NE of Calingiri, 13 Jan. 2001, *D. Nicolle & M. French* 3692 (CANB, PERTH).

#### ***Eucalyptus armillata* × *E. tenera***

*Specimens examined* (north to south). WESTERN AUSTRALIA: 3 miles from Smith property, Manmanning, 17 Nov. 1970, *B. Smith s.n.* (PERTH); c. 2 km SW of Manmanning, 31 Aug. 1976, *A.S. George* 14343 (PERTH); Wyenning East Rd, E of township, 24 July 2000, *N. McQuoid* 557 (PERTH).

#### ***Eucalyptus erythronema* subsp. *erythronema* – subsp. *inornata* intergrades**

*Selected specimens examined* (north to south). WESTERNAUSTRALIA: site 17, at junction of Higginson Rd and Deep Well Rd, c. 15 km N of Kellerberrin, 12 Oct. 2000, *R. Davis* WW 17-58 (PERTH); Bruce Rock Rd Shire Reserve, near Lake Kurrenkutten, Corrigin, 25 Nov. 1996, *R. Campbell* 242A (PERTH); on E side of Bonds Rd, 330 m S of the northern boundary of the reserve. Loc 21840, c. 15 km NW of Kondinin, 30 June 1999, *G.J. Keighery & N. Gibson* 6660 (PERTH); 8.1 km from Bending Rd on Bonds Rd, E of Corrigin, 15 July 2001, *D. Nicolle & M. French* 3808 (AD, CANB, PERTH).

#### ***Eucalyptus erythronema* subsp. *erythronema* × *E. salubris***

*Specimen examined*. WESTERN AUSTRALIA: between Walgoolan and Bodallin on Great Eastern Hwy, 30 Sep. 2000, *D. Nicolle & M. French* 3459 (CANB, PERTH).



***Eucalyptus erythronema* subsp. *erythronema* × *E. tenera***

*Specimen examined.* WESTERN AUSTRALIA: ‘Oxendale’ farm, Barnes Rd, SE of Yelbeni, 23 July 1987, M.I.H. Brooker 9735 (CANB, NSW, PERTH).

***Eucalyptus erythronema* subsp. *erythronema* × *E. tephroclada***

*Specimen examined.* WESTERN AUSTRALIA: Noongar, 13 Aug. 1967, G.M. Chippendale 286 (CANB, NSW, PERTH).

***Eucalyptus erythronema* subsp. *inornata* × *E. loxophleba* subsp. *loxophleba***

*Specimen examined.* WESTERN AUSTRALIA: North Bungulla Nature Reserve, 23 July 1987, M.I.H. Brooker 9729 (CANB, MEL, NSW, PERTH).

***Eucalyptus erythronema* subsp. *inornata* × *E. salubris***

*Specimen examined.* WESTERN AUSTRALIA: 3 km S of Tammin town, off Tammin South Rd, 1 Nov. 2000, N. McQuoid 560 (PERTH).

***Eucalyptus erythronema* subsp. *inornata* × *E. tenera***

*Specimen examined.* WESTERN AUSTRALIA: Airstrip Rd, Kulin, 4 Dec. 1994, S. Murray s.n. (PERTH).

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