

# *Backhousia enata* A.J.Ford, Craven & J.Holmes (Myrtaceae), a new species from north-eastern Queensland

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## Summary

Ford, A.J., Craven, L.A. & Brophy, J.J. (2005). *Backhousia enata* A.J.Ford, Craven & J.Holmes (Myrtaceae), a new species from north-eastern Queensland. *Austrobaileya* 7(1): 121–127. *Backhousia enata* A.J.Ford, Craven & J.Holmes is described, illustrated and compared with a putatively related species. Notes on habitat, distribution, conservation status and an analysis of essential oils are provided. The oil profile of the new species is most similar to that of *B. sciadophora* F.Muell. whereas morphologically *B. enata* is very similar to *B. myrtifolia* Hook. & Harvey, to which we believe it is most closely related. A revised key to the species of *Backhousia* is presented.

Key Words: Myrtaceae, taxonomy, identification key, Australia, Queensland flora, *Backhousia enata*, essential oils.

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## Introduction

*Backhousia* is a genus of about nine species of trees and shrubs and is endemic to Australia (Guymer 1988; Bean 2003). The relationships of the genus are with another Australian endemic genus, *Choricarpia*, with which it shares a distinctive embryo type (Wilson *et al.* 2001). One of the species, *Backhousia citriodora* F.Muell., is cultivated for its essential oils that are used as flavouring in the food industry (Doran *et al.* 2001).

During routine and targeted botanical surveys for the Rainforest Co-operative Research Centre (Rainforest-CRC), an unusual member of the Myrtaceae was observed and collected along the Tully River, north-eastern Queensland. Subsequent visits yielded both flowering and fruiting specimens, examination of which indicated to us that it was a new species of *Backhousia*. Accordingly, *B. enata* is described below.

To complement a recent survey of the essential oils of *Backhousia* (Brophy *et al.* 1995), samples of *B. enata* foliage were obtained and the essential oils analysed.

## Taxonomy

*Backhousia enata* A.J.Ford, Craven & J.Holmes, **sp. nov.** A *B. myrtifolia* Hook. & Harvey ramulis 4-alatis, bracteis brevioribus (2–2.6 mm longis), lobis calycis brevioribus (1.9–2.2 mm longis), petalis complanatis usque cucullatis, stylo brevioribus (2.2–3.3 mm longo) differt. **Typus:** Queensland. NORTH KENNEDY DISTRICT: Alcock Forest Reserve, rafting access point No. 9, 5.2 km from Tully River Camping Area [NW of Tully], 14 January 2003, A. Ford 3792, G. Sankowsky & N. Sankowsky (holo: BRI; iso: CANB, K, L, MEL, MO, NE, NSW, QRS, SYD).

*Backhousia* sp. (Tully River) in Cooper & Cooper (2004: 342)

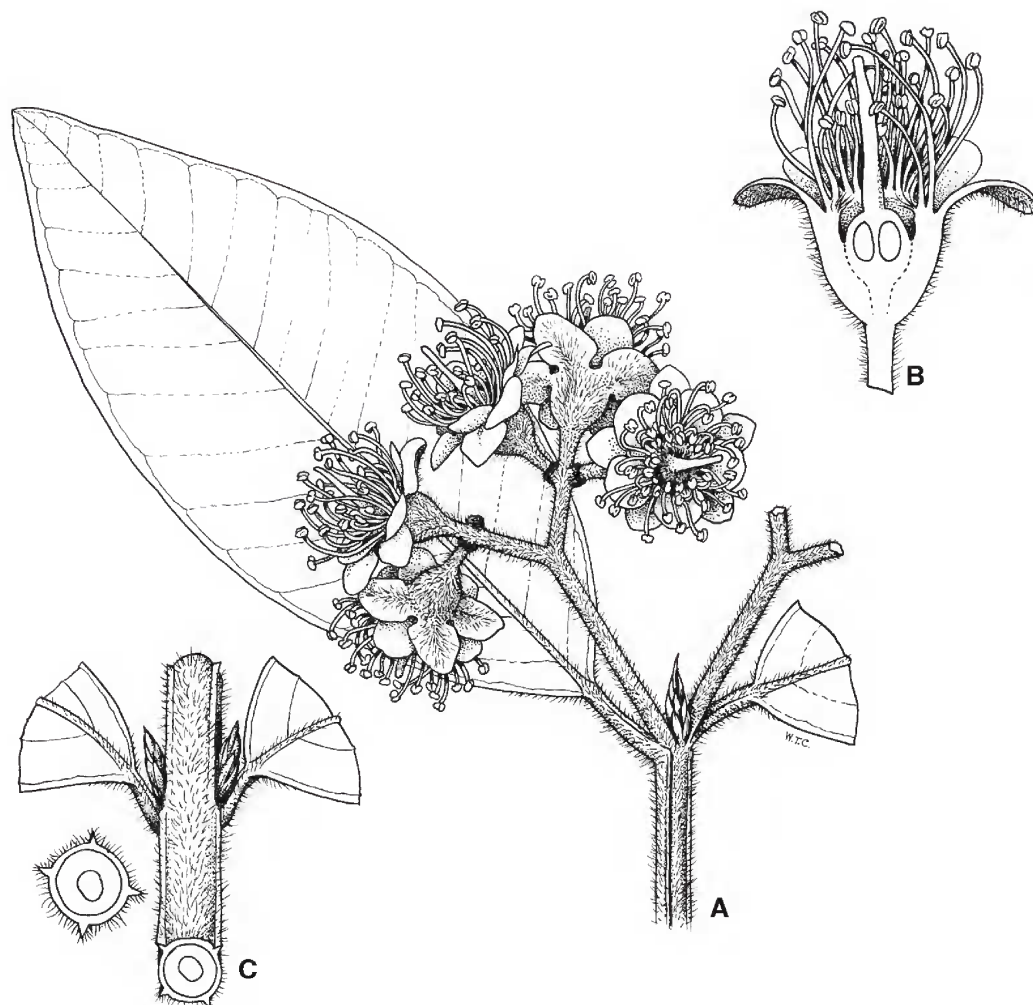
Single to multistemmed large shrubs or trees, 5–15 m high; trunk diameters to 20 cm; buttresses absent; trees usually with numerous coppice shoots and smaller juvenile plants with coppice and vegetative self-layering shoots; bark of main trunk rough, minutely fissured, more or less flaky, grey-brown; upper branches mostly smooth, developing a flaky character with increasing age; outer blaze (and wood) tan, very fibrous. Spreading to antrorse, colourless

to whitish uniseriate hairs to 0.7 mm long present on branchlets, leaves, petioles, inflorescence axes, stipe, hypanthia and calyx lobes. Branchlets conspicuously winged, the wing extending from the base of each side of the petiole to the node below; puberulent, hairs to 0.7 mm long; gland dotted; the branchlets becoming glabrous and terete with age. Stipules two or three, moderately persistent, ferruginous, setose, filiform, to 1.1 mm long. Juvenile and adult leaves similar. Cataphylls to 13 × 6 mm, usually inserted proximally on each vegetative growth unit, occasional vestigial cataphylls (lacking any lamina but inserted at a node) present amongst optimally developed leaves. Leaves opposite, petiolate, decussate, discolorous, dull on adaxial surface and shiny on abaxial surface; lamina ovate to elliptic-obovate, 24–38 × 11–18 mm, base cuneate to roundly cuneate, apex acute to acute-acuminate; margin flat or slightly recurved; both surfaces with hairs to 0.4 mm long, densest along the midvein, more or less glabrescent except for the midvein; midvein raised on each surface, more prominent on adaxial surface; oil glands moderately dense and conspicuous on each surface; venation brochidodromous, inconspicuous on adaxial surface, primary venation conspicuous on abaxial surface, secondary venation discernible, tertiary venation not discernible, 8–12 primary lateral veins on each side of midvein; intramarginal vein complete, 0.4–0.8 mm from margin, indented to slightly looping at junction with lateral veins. Petioles 1.5–4 mm long, channelled on adaxial surface, puberulent, glandular. Inflorescences in the upper leaf axils, paniculate, composed of three to (usually) six flowers, the central flower position of the inflorescence aborted and often represented by a caducous, hairy, linear and bract-like appendage *c.* 1 mm long; primary inflorescence axis 6–10 mm long, weakly 4-angled (not terete) and with shallow longitudinal grooves on the abaxial and adaxial surfaces, hairs to 0.7 mm long; secondary inflorescence axis 1.9–2.1 mm long, hairs to 0.7 mm long. Bracts elliptic-ovate, 2.0–2.6 × 1.0–1.2 mm, caducous, apex obtuse to bluntly acute, abaxial surface with hairs mostly in proximal half and on the keeled midvein, adaxial surface glabrous, margin hairy, oil glands conspicuous. Bracteoles 1.5–2.0 mm long, narrowly elliptic, abaxial surface with hairs mostly on the keeled

midvein, adaxial surface glabrous, oil glands conspicuous, red-brown to orange-brown finger-like colleters *c.* 0.15 mm long inserted between bracteoles and at the base of the bracts. Flowers white, perigynous. Hypanthium stipitate, campanulate, 2.7–3.3 mm × 2.2–2.4 mm including stipe, the outer surface with hairs, glabrous inside except for scattered hairs on the swollen disc adjacent to the calyx lobes and the filaments, stipe 1.0–1.3 × *c.* 0.7 mm. Calyx lobes 5, persistent, accrescent, flat, spreading, greenish, sub-equal (3 outer and 2 inner), ovate to triangular, 1.9–2.2 × 1.6–2.2 mm, apices obtuse (outer) or bluntly acute (inner); on abaxial surface moderately hairy more so in proximal half, glabrous to minutely puberulent on adaxial surface, oil glands conspicuous. Petals caducous, 5, white, flat to cucullate, 1.8–2.0 × 1.6–1.9 mm, shortly clawed, ovate to nearly orbicular, glabrous, obscurely veined, oil glands sparse, alternating with calyx lobes. Stamens 56–70, in two whorls; filaments free, of variable length in the same flower, 1–3.6 mm long, very slender and becoming thread-like towards the apex, glabrous; anthers dorsifixed, versatile, *c.* 0.15 × 0.2 mm, dehiscent laterally through longitudinal slits. Style 2.2–3.3 mm long, minutely hairy to ± glabrous, with sparse oil glands, straight, tapering slightly towards the apex, inserted in a shallow depression on the ovary summit, stigma punctiform; ovary *c.* 1 mm wide, summit glabrous or with scattered hairs, flat to slightly convex, with a row of hairs *c.* 0.2 mm long on the periphery of the ovary wall which extend above the ovary, adnate to the hypanthium for about half the ovary length, 2-locular, 6 or 7 ovules per locule, placentas axile. Fruit dry, indehiscent, 2–2.2 × 2–2.3 mm excluding calyx lobes; calyx lobes spreading, to 5 × 4 mm; style elongating to *c.* 5 mm following anthesis, puberulous. Seeds 5–7 per locule, *c.* 1 mm long, 3-faced with the abaxial face convex.

#### Fig. 1.

**Additional specimens examined: Queensland.** NORTH KENNEDY DISTRICT. Alcock Forest Reserve, rafting access point No. 9, 5.2 km from Tully River Camping Area, Feb 2002, *Ford 3275 & Holmes* (BRI, QRS); *loc. cit.*, Dec 2002, *Ford 3780 & Holmes* (BRI, CANB, L, MEL, NSW, QRS); *loc. cit.*, Mar 2003, *Ford 3844, Holmes & Cameron* (BRI, CANB); Tully River, Apr 2002, *Cooper & Cooper WWC1727* (QRS); near Carter Creek Falls above Carter Creek, Walter Hill Range, *c.* 20 km S of Millaa Millaa, Jul 2003, *Graham s.n.* (BRI, QRS).



**Fig. 1.** *Backhousia enata*. A. flowering branchlet  $\times 4$ . B. half flower  $\times 6$ . C. branchlet habit, showing wings  $\times 6$ . All from Ford 3792 (QRS). Del. W.T. Cooper.

**Distribution and habitat:** *Backhousia enata* is endemic to the Wet Tropics bioregion in north-eastern Queensland, where it is currently known to occur only in the Tully River catchment, north-west of Tully (**Map 1**). It inhabits notophyll vine-forest/rainforest on soils derived from rhyolite and basalt. At the type locality, which is riparian and where the substrate is rhyolite, canopy species include *Xanthostemon chrysanthus*, *Buckinghamia celsissima*, *Pseudoweinmannia lachnocarpa*, *Carnarvonia araliifolia*, *Syzygium tierneyanum* and *Carallia brachiata*. Small trees and shrubs at this locality include *Bursaria tenuifolia*, *Atractocarpus fitzalanii*,

*Chionanthus ramiflorus*, *Croton triacros*, *Codiaeum variegatum* var. *moluccanum*, *Mallotus polyadenos* and *Schefflera actinophylla*. However, in the Carter Creek area, which is on a razor ridge with a basalt substrate, *Agathis robusta* is the dominant canopy tree. Here the understorey is very sparse and consists of *Hedraianthera porphyropetala*, *Alyxia ilicifolia*, *Hoya australis* and *Peperomia blanda* var. *floribunda*. Altitudinal range, from existing specimens, is 80–310 m.

**Phenology:** Flowers have been recorded in January; fruits have been recorded in March.



**Notes:** On morphological features, *B. enata* appears to be most closely related to *B. myrtifolia*, and will key to that species in Guymr (1988). It differs in critical features highlighted in **Table 1**. In addition, *B. myrtifolia* and *B. enata* are geographically separated, using current data, by about 1,000 km.

The winged condition of adult branchlets in *B. enata* is unusual within the genus. Some species of *Backhousia*, e.g. *B. bancroftii*, *B. myrtifolia* and *B. hughesii*, exhibit winged stems but only when either at the seedling or small sapling stage, or on coppice shoots, not on adult specimens.

Special mention needs to be made of some aberrant and widely disjunct fertile specimens of *B. myrtifolia*, viz. Camira (Qld), *Bird s.n.* (BRI[AQ563613]) (BRI); Border Ranges National Park (NSW), *Forster PIF15109* (BRI); Miriam Vale (Qld), *Brushe TOI208* (BRI) and Albion Park (NSW), *Pullen 4239* (BRI). These collections have very slight ridges on the adult branchlets. Furthermore, the dimensions at the lower extremes of measurements listed in **Table 1** within *B. myrtifolia* are mostly attributable to the *Bird s.n.* specimen. The *Bird s.n.* collection vouchered an essential oil analysis reported upon by Brophy *et al.* (1995); significantly, the oils were consistent with those in other sampled populations of *B. myrtifolia*. As the aforementioned specimens lack the distinctive features of *B. enata* listed in **Table 1**, they should be regarded as merely morphologically atypical forms of *B. myrtifolia*.

The leaves of *B. enata* are recorded as being aromatic with a menthol-like smell. New growth is red-purple. Its flowers lack any distinctive odour.

The three outer calyx lobes are unusual in that they have a thickened brown-red-purple margin, whereas the two inner calyx lobes usually lack this combined feature, presumably this is a function of these tissues being exposed in the bud stage. Of all the *B. myrtifolia* specimens examined, only *Brushe TOI208* has calyx lobes with thickened margins. Although not mentioned on the label, it is possible that these thickened margins were coloured when fresh and therefore similar to the calyx lobe condition of *B. enata*. In addition to the stipules

that occur on each side of the petiole, several short, colleter-like structures are inserted between the axillary bud and the adaxial surface of the petiole. These structures appear to be homologous with similar structures discussed by Weberling (1966) for *Kania* Schltr., by Weberling (2000) for *Tepualia* Griseb. and by Craven (1987) with respect to their occurrence in *Calytrix* Labill.

The leaf oil of *B. enata* is dominated by monoterpenes and these compounds accounted for approximately 90% or more of the oil, the remainder being sesquiterpenes. Our analysis (voucher, *Ford 3792*) showed that the principal components were  $\alpha$ -pinene (14–17%) and  $\beta$ -pinene (36–42%), with terpinen-4-ol (5–8%) and p-cymene (2–5%) being the next most abundant components. The major sesquiterpene was spathulenol (3–5%), with no other sesquiterpene being greater than 1.5%. No aromatic components were detected in the oil of this species.

The composition of the oil from *B. enata* bears no similarity to that obtained from *B. myrtifolia*, the major components of which, either singly or together, are the aromatic ethers: methyl eugenol, E-methyl isoeugenol and elemicin (Brophy *et al.* 1995). The oil of *B. enata* is most similar to that obtained from *B. sciadophora* F. Muell. which contained significant amounts of  $\alpha$ -pinene (44–55%),  $\beta$ -pinene (2–8%) and limonene (6–13%). In this species too, monoterpenes accounted for greater than 90% (Brophy *et al.* 1995). No samples were analysed from the Carter Creek populations.

**Conservation Status:** All existing collections have been made within the World Heritage Area of the Wet Tropics bioregion. As this species has only recently been discovered it is premature to discuss its conservation status. Currently there are four known discrete populations, with the total number of individuals being less than 200. A preliminary search of the Tully River in adjacent, and suitable, riparian habitats failed to detect any further individuals. However, as there are an estimated 100 plants in the Carter Creek area (Graham, pers comm. 2003) it is not unexpected that several more populations may exist within the poorly known and rugged expanse of the Koolmoon, Coachable

**Table 1. Differences between *B. enata* and *B. myrtifolia*. Dimensions of floral parts refer to flowers at anthesis only, as calyx lobes and style elongate during fruit maturation.**

Character	<i>B. enata</i>	<i>B. myrtifolia</i>
Branchlet shape (on adult and fertile branchlets only)	conspicuously winged	terete (very rarely with slight ridges)
Bract shape	elliptic-ovate	narrow ovate-narrow elliptic
Bract dimensions	2.0–2.6 × 1.0–1.2 mm	3.5–6.1 × 1.1–2.0 mm
Primary inflorescence axis length	6–10 mm	14–40 mm
Calyx lobe dimensions	1.9–2.2 × 1.6–2.2 mm	3.1–11.0 × 1.6–5.0 mm
Outer calyx lobe apex	obtuse	acute
Petal dimensions	1.8–2.0 × 1.6–1.9 mm	2.1–3.8 × 1.7–3.0 mm
Style length	2.2–3.3 mm	5.0–8.1 mm

and Cannabullen Creek catchments. Therefore it is appropriate to give *B. enata* a Data Deficient (DD) status using the guidelines of the IUCN (2001).

**Etymology:** The specific epithet is from the Greek, *enatos*, ninth, and refers to the locality, Access point 9, on the Tully River. It was at this locality that the type collection was made.

The following key is based upon that given in Guymer (1988) with the addition of *Backhousia oligantha* A.R.Bean and the present species. *B. anisata* Vickery was removed by Wilson *et al.* (2000) to a new genus allied to *Syzygium* Gaertn., *Anetholea* Peter G. Wilson. However, the distinction of *Anetholea* from *Syzygium* is slight and the species has been transferred to the latter genus (Craven & Biffin 2005).

**Key to the species of *Backhousia***

1. Hypanthium stipe filiform (*c.* 0.25 mm diameter), (6–)8–18 mm long ..... 2  
 Hypanthium stipe slender (*c.* 0.5 mm diameter), 0.5–8 mm long ..... 6
2. Leaves lemon-scented, narrow ovate, apex acuminate; branchlets and inflorescences pubescent. SE Qld to NE Qld ..... **B. citriodora** F.Muell.  
 Leaves not lemon-scented, orbicular, ovate, obovate, or narrow obovate, apex obtuse; branchlets and inflorescences puberulent or glabrous ..... 3
3. Inflorescences of 3–11 dichasial clusters, 5–7 cm long; inner calyx lobes 4–5 mm long. NE Qld. .... **B. hughesii** C.T.White  
 Inflorescences of 1 or 2 (or 3) dichasial clusters, 3–5 cm long; inner calyx lobes 2–2.5 mm long ..... 4
4. Inflorescence axes and hypanthia glabrous; leaves orbicular to ovate, (4–)5–7.8 × 2.5–3.5 cm. SE Qld to NE NSW ..... **B. sciadophora** F.Muell.  
 Inflorescence axes and hypanthia puberulent ..... 5
5. Trunk bark shed in strips; leaves ovate, obovate or narrow obovate; inflorescences 8–20-flowered. CE Qld to SE Qld ..... **B. kingii** Guymer

- Trunk bark deciduous throughout; leaves elliptic or narrow ovate;  
inflorescences (1–)3–flowered. CE Qld to SE Qld . . . . . **B. oligantha** A.R.Bean
6. Trunk bark deciduous throughout. CE Qld to SE Qld . . . . . **B. oligantha** A.R.Bean  
Trunk bark rough, persistent throughout . . . . . 7
7. Inflorescences terminal and axillary. NE Qld . . . . .  
. . . . . **B. bancroftii** F.M.Bailey & F.Muell. ex F.M.Bailey  
Inflorescences axillary . . . . . 8
8. Adult branchlets conspicuously winged. NE Qld . . . . . **B. enata** A.J.Ford, Craven & J.Holmes  
Adult branchlets unwinged (rarely 4-ridged) . . . . . 9
9. Leaves ovate to narrow ovate, 2.2–6.5 × 0.9–4 cm; calyx lobes +/- equal,  
5–13 mm long in fruit. SE Qld to SE NSW . . . . . **B. myrtifolia** Hook. & Harvey  
Leaves narrow ovate to linear-oblong, 1.7–3.4 × 0.4–1 cm; inner calyx lobes  
larger than outer, 2–3 mm long in fruit. NE NSW to NE Qld . . . . . **B. angustifolia** F.Muell.

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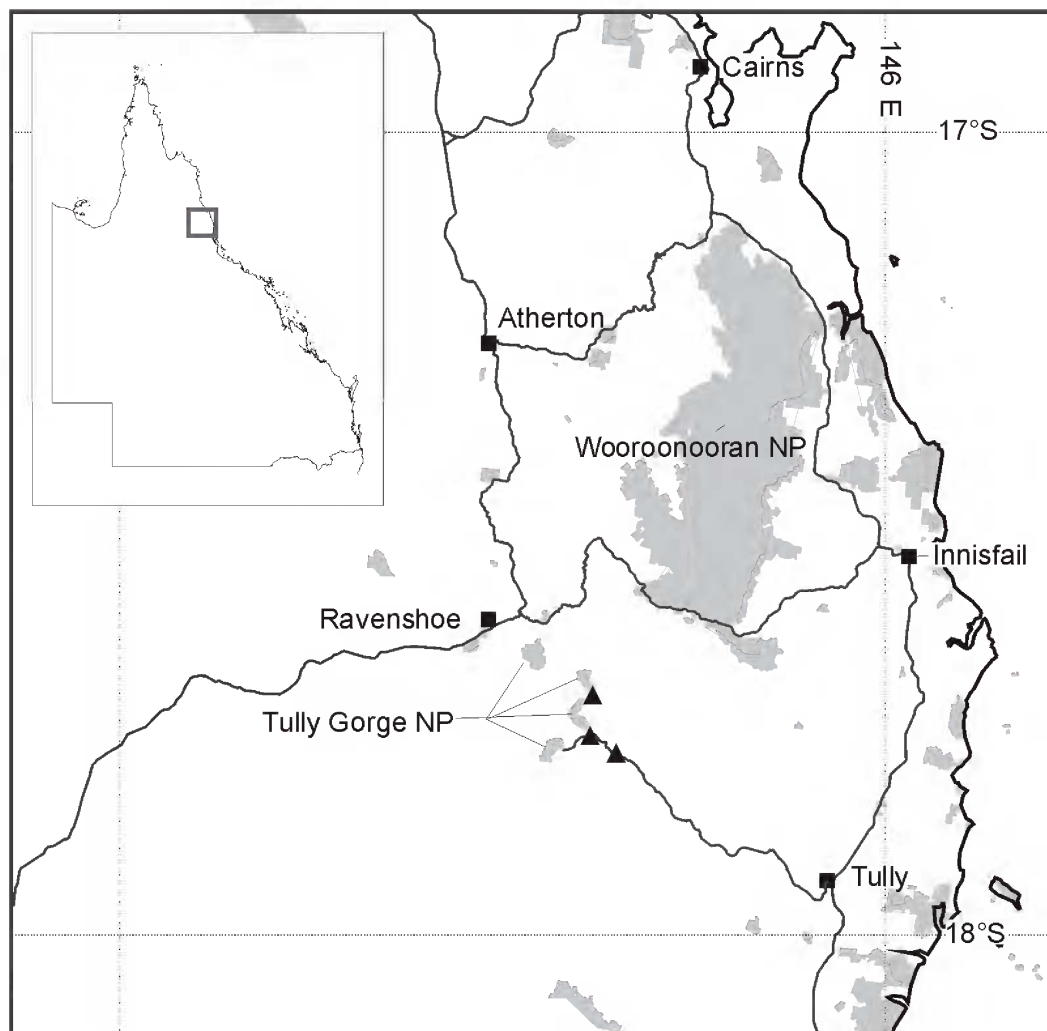
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**Map 1.** Distribution of *Backhousia enata* ▲ in the ‘Wet Tropics’ of Queensland