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Pultenaea rubescens (Fabaceae: Mirbelieae), a new species from north-eastern New South Wales

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Abstract

Pultenaea rubescens R.L.Barrett, Clugston & Jobson (Fabaceae, Faboideae, Mirbelieae) is described as a new species allied to *P. parrisiae* J.D.Briggs & Crisp. It is endemic to the Northern Tablelands and North Coast Districts, New South Wales, Australia. A discussion of its habitat and conservation status is provided, along with an identification key and photographs.

Introduction

Paul Rossington collected what he considered to be a new species of *Pultenaea* Sm. near Carrai, on the eastern fall of the New England Tableland, south-east of Armidale, New South Wales, in January 2022. The specimen was sent to NSW and identified as allied to *P. parrisiae* J.D.Briggs & Crisp by J. Clugston but noted to be disjunct from known populations of that species by 700 km (see Briggs & Crisp 1994; Figure 1). Further searching of specimens at NE and NSW identified one additional collection from Werrikimbe National Park, collected by Lachlan Copeland in 2010. Once it was recognised as a distinct taxon, dedicated surveys of suitable habitat, particularly in the Carrai State Conservation Area and Carrai National Park, resulted in additional collections being made from the Carrai and Werrikimbe areas, with all new populations being relatively close to known locations.

No other specimens have been located, meaning that no material was available for the revision of de Kok and West (2004), and it joins a growing number of new species to be recognised in the genus in recent years (Renner *et al*. 2022; Telford *et al*. 2022; Barrett *et al*. 2024a). Phylogenomic data support the placement of this entity as sister to *P. parrisiae* (Clugston *et al*., unpubl. data). This data places the entity in the core of *Pultenaea*, a genus that has now been re-circumscribed (Barrett *et al*. 2024b; see also Orthia *et al*. 2005 and Barrett *et al*. 2021 for further discussion).

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Figure 1. Distribution of *Pultenaea rubescens* (Red dots); *P. paleacea* (Blue dots) *P. elusa* (Orange dots) and *P. parrisiae* (Green dots). Adapted from data in the Atlas of Living Australia, October 2024.

Briggs & Crisp (1994) recognised *P. parrisiae* subsp. *parrisiae* and *P. parrisiae* subsp. *elusa* Briggs & Crisp. de Kok & West (2004) proposed elevating the latter subspecies to species rank, but did not validate the new combination and status, a matter corrected by Barrett *et al*. (2021). Morphological examination and comparison of *P. elusa* (J.D.Briggs & Crisp) R.L.Barrett & Clugston, *P. myrtoides* A.Cunn. ex Benth., *P. paleacea* Willd., and *P. parrisiae* at NSW found a number of consistent differences to specimens collected near Carrai and Werrikimbe National Park which we here recognise as a distinct species, *Pultenaea rubescens* R.L.Barrett, Clugston & Jobson.

Materials and Methods

The following description is based on examination of herbarium specimens at NSW. Type specimens of related species have been studied first-hand at MEL and NSW. Descriptive characters provided by Briggs & Crisp (1994) were assessed for sake of direct comparison, with additional characters added based on the descriptive formats of Renner *et al*. (2022) and Barrett *et al*. (2024).

Results and discussion

The New England plants differ from *Pultenaea parrisiae* and *P. paleacea* based on multiple morphological characters described in Table 1. In the key presented in Weston *et al*. (2024), specimens collected in the Carrai region key out as *P. parrisiae*, albeit with smaller flowers, and a revised key is also presented below.

Table 1. Comparison of selected morphological attributes that differentiate *Pultenaea rubescens* from *P. elusa*, *P. paleacea* and *P. parrisiae*.

Attribute	*P. elusa*	*P. paleacea**	*P. parrisiae*	*P. rubescens*
Stem indumentum	dense (glabrescent)	moderate to dense (glabrescent)	moderate (glabrescent)	sparse (eventually glabrescent)
Stipule length	5–9 mm long, c. 0.5 mm wide	3.8–5.2(–7.8) mm long, c. 1.2 mm wide	3–7 mm long, c. 0.5 mm wide	(4.8–)5.3–6.9 mm long, c. 0.7 mm wide
Juvenile leaves	unknown	unknown	3–10 mm long, 2–6 mm wide	8–21 mm long, 2–4 mm wide
Adult leaves	5–16 mm long, 0.6–2 mm wide	5.6–14 mm long, 0.8–1.8 mm wide	4–14(–17) mm long, 0.8–2.5(–3) mm wide	8–15(–24) mm long, 1.1–1.6(–2.4) mm wide
Petiole length	0.4–0.6 mm long	0.7–1.0 mm long	0.9–1.3 mm long	0.7–1.2 mm long
Leaf apex	strongly recurved	strongly recurved	strongly recurved	slightly recurved
Number of flowers in inflorescence	6–9	1–4(–5)	4–7	5–9
Flower bracts	6.2–7.7 mm long, 1.7–2.5 mm wide	7.1–8.3 mm long, c. 3 mm wide	4–5.5 mm long, 1.5–2 mm wide	3.1–5.7 mm long, 1.8–2.6 mm wide
Pedicels	0.4–0.7 mm long	0.9–1.1 mm long	1–1.5 mm long	0.5–1.1 mm long
Bracteole length	3–3.6 mm long	4–6 mm long	3–3.6 mm long	2.5–4.0 mm long
Bracteole position	attached 1.0–1.1 mm above base of calyx	attached c. 1.0 mm above base of calyx	attached at base of calyx	attached 0.2–0.7 mm above base of calyx
Calyx tube	2.2–3.0 mm long	2.9–3.3 mm long	2–2.7 mm long	1.4–1.9 mm long
Calyx lobes	1.3–1.8 mm long, acuminate	2.4–2.9 mm long, acuminate	1.5–3.3 mm long, acute to acuminate	1.4–2.6 mm long, acuminate
Standard	face yellow; 5.5–7 mm long, 3.6–3.8 mm wide	face yellow to orange; 8–12 mm long, 5.8–8.1 mm wide	face yellow; 5.0–6.0 mm long, 3.0–4.0 mm wide	face yellow-orange to red; 3.5–5.1 mm long, 2.4–4.8 mm wide
Wings	5.0–6.0 mm long, 1.0–1.3 mm wide	7.5–9.2 mm long, c. 2.5 mm wide	4.0–5.0 mm long, c. 1 mm wide	3.1–3.9 mm long, c. 0.9 mm wide

*Note: We here restrict the concept of *P. paleacea* to populations from the Sydney Basin north to Bulahdelah, in New South Wales (Figure 1). The treatment by de Kok and West (2004) partly confused *P. paleacea* with *P. rosmarinifolia* Lindl.

Figure 2. Field photographs of *Pultenaea rubescens* near Carrai. A, B. Habit in thick vegetation. C. Young plant after fire. D. leaves and old, terminal inflorescence. E. Old, terminal inflorescence with prominent bracteoles. F. Stipule on branchlet. G. Flowering branchlet. H, I. Inflorescence. Photos by P. Rossington, all previously posted on iNaturalist.

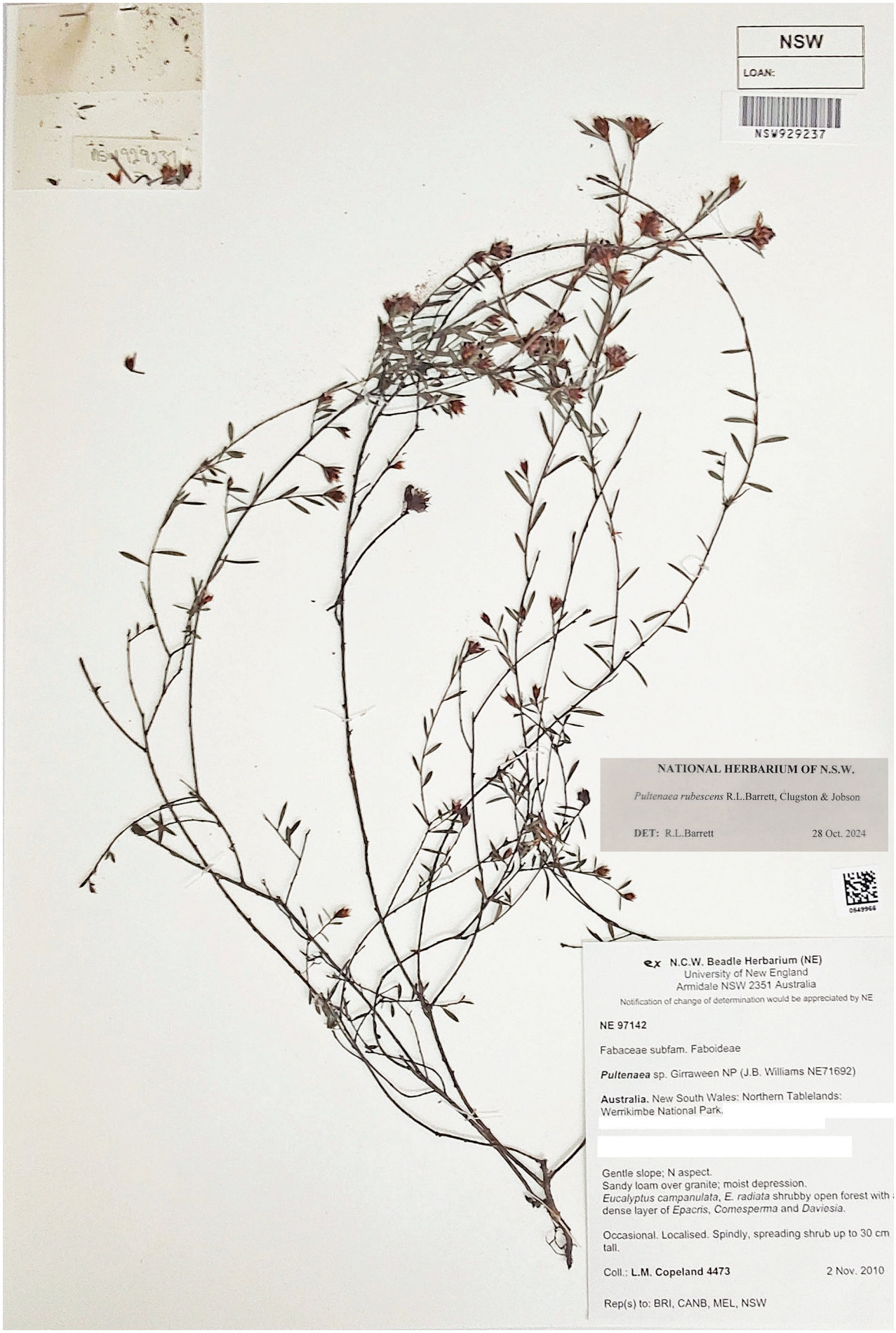

Figure 3. Herbarium specimen of *Pultenaea rubescens* (*L.M.Copeland 4473*; NSW 929237).

Modification to the New South Wales Flora Online key

The key in Weston *et al*. (2024) may be modified to accommodate the new species as follows:

12 Standard of flowers 8–12 mm long; bracteoles 4–6 mm long; small spreading shrub or subshrub ..... *Pultenaea paleacea*

12: Standard of flowers 3.5–7 mm long; bracteoles 3–4.0 mm long; diminutive, procumbent subshrub 12A

12A Stem indumentum dense; petioles 0.4–0.6 mm long; bracts on the flowers 6.2–7.7 mm long; wings of flowers 5.0–6.0 mm long..... *Pultenaea elusa*

12A: Stem indumentum sparse to moderate; petioles 0.7–1.3 mm long; bracts on the flowers 3.1–5.7 mm long; wings of flowers 3.1–5.0 mm long 12B

12B Juvenile leaves 3–10 mm long; leaf apex strongly recurved; bracts subtending flowers 1.5–2 mm wide; bracteoles attached at base of calyx; calyx tube 2–2.7 mm long; standard 5–6 mm long, face yellow; wings 4–5 mm long..... *Pultenaea parrisiae*

12B: Juvenile leaves 8–21 mm long; leaf apex moderately recurved; bracts subtending flowers 1.8–2.6 mm wide; bracteoles attached 0.2–0.7 mm above base of calyx; calyx tube 1.4–1.9 mm long; standard 3.5–5.1 mm long, face yellow-orange to red; wings 3.1–3.9 mm long ..... *Pultenaea rubescens*

Taxonomy

Pultenaea rubescens R.L.Barrett, Clugston & Jobson, *sp. nov.*

Type: NEW SOUTH WALES: North Coast: [precise locality withheld for conservation reasons] near Carrai, 11 Oct. 2022, *P.Rossington s.n.* (holo: NSW: 1224132; iso: CANB 956173).

Pultenaea sp. Girraween NP (J.B. Williams NE71692), *p.p.*, as to *Copeland 4473*.

Diminutive, procumbent *subshrub* with few, slender, trailing (or sometimes ascending over vegetation), few-branched stems 25–75(–90) cm long arising from a slender rootstock (nodulation common on fine roots). *Cotyledons* not seen. *Branchlets* spreading to ascending, 15–30 cm high; initially with a sparsely appressed silky hairs 0.6–1.6 mm long, but glabrescent on older stems; very shortly-ribbed below petioles (sometimes with a low ridge extending along the stem for up to 15 mm on dried specimens). *Stipules* lanceolate, tightly appressed to stem, fused for c. 9/10 their length (commonly tearing as they age, so appearing fused for only 1/2 their length), (4.8–)5.3–6.9 mm long, each c. 0.3 mm wide at sinus, weakly keeled, apex usually not spreading, acuminate, scarious, dark to pale brown at base, grading to translucent (except for midrib) towards apex, margins glabrous. *Seedling leaves* narrowly elliptic, 8–21 mm long, 2–4 mm wide, increasing in length as plants develop, larger than the adult form. *Adult leaves* alternate, sparse; petiole 0.7–1.2 mm long; lamina linear to narrowly oblanceolate, 8–15(–24) mm long, 1.1–1.6(–2.4) mm wide, discolorous, darker above; apex usually partly recurved, acuminate, apiculus 0.2–1.1(–1.4) mm long, dark brown to black; margins recurved, sometimes strongly so, but not hiding abaxial surface; adaxial surface distinctly concave to almost canaliculate, often with a row of simple appressed hairs along inconspicuous midrib; abaxial surface silky with persistent appressed hairs. *Inflorescence* a small, dense, terminal head of 5–9 solitary flowers; heads and individual flowers subtended by persistent, imbricate, pale-brown, scarious, enlarged stipules; stipules completely hiding pedicels, ovate to elliptic, 3.1–5.7 mm long, [fused pair] 1.8–2.6 mm wide at widest point, glabrous on face with uniformly ciliate margins, weakly keeled; reduced leaf-like bract acuminate or ±filiform, glabrous or villous, free portion 1.0–1.5(–2.1) mm long, reaching as long or longer than stipule apices. *Pedicels* 0.5–1.1 mm long, moderately hairy; floral bracteoles inserted 0.2–0.7 mm above base of calyx, 2.5–4.0 mm long, reaching 3/4–9/10 as long as calyx, lanceolate, acuminate, concave, keeled, with scattered long white hairs, particularly along outer edge of keel; floral stipules absent. *Flowers* 4.1–4.7 mm long; *calyx* tube broadly obconic, 1.4–1.9 mm long, greenish to red, moderately silky, appressed hairy; lobes 5, subequal, the upper pair shortly fused, triangular, 1.4–2.6 mm long, acuminate, greenish to reddish tinge on inside base of lobes, moderately densely silky hairy; *standard petal* hooded over keels and wings, ± circular when flattened, emarginate, 3.5–5.1 mm long including 1.3–2.0 mm claw, 2.4–4.8 mm wide, face orange-yellow to dark orange with faint to prominent reddish-orange ring near base with radiating lines reaching almost to the apex, reverse reddish orange; *wing petals* narrow-oblong, apex obtuse, 3.1–3.9 mm long including 1.8 mm claw, 0.9 mm wide, yellow with reddish-orange line along lower edge and apex; *keel petals* naviculate, ± narrow-oblong, 3.1–3.7 mm long including 1.25 mm claw, 0.8 mm wide (folded), ± equal to wings, dark red to almost purple near apex (and drying purple), grading abruptly to white at base; style and stamens reaching similar length, slightly upwardly curved near apex; *staminal filaments* 3.1–3.8 mm long; *anthers* c. 0.2 mm long, purple; *ovary* with a short stipe, 2-ovulate, 1.1–1.3 mm long, covered with densely silky with long white hairs to 0.5 mm long; *style* 2.9–3.1 mm long, slowly tapering, hairy in lower 1/3, slightly upwardly curved near apex; *stigma* inconspicuous, slightly capitate. *Fruit* ovoid, compressed, 3.8–4.3 mm long (excluding beak), 2.2–2.6 mm wide, c. 1.1 mm thick, with obtuse base, densely appressed sericeous; style partially persistent. *Seeds* released by opening of apical half of pod, dark brown, 1.6–1.8 mm long, 1.2–1.3 mm wide, aril white, c. 0.9 mm long, coralline, with long, irregular fingers. (Figures 2, 3).

Diagnostic characters: With affinities to *Pultenaea parrisiae* and *P. elusa,* differing in the sparser indument on the stems, larger juvenile leaves, distinctly petiolate adult leaves that are only moderately recurved at the apex, inflorescence bracts which are commonly shorter and broader, pedicels of intermediate length, bracteoles attached on calyx wall (as for *P. elusa*), and smaller calyx and corolla, as detailed in Table 1.

Distribution and habitat: *Pultenaea rubescens* occurs on the eastern fall of the New England Tableland near Carrai and Werrikimbe, south-east of Armidale, in the Northern Tablelands and North Coast Districts (Figure 1). The species grows in drainage depressions and the margins of usually perpetually wet sedge-dominated swamps surrounded by dry, sclerophyll eucalypt forest with a sparse canopy, occupying the interzone between these two habitats, only where this interzone is relatively extensive, and the shrub layer is not too tall or dense. It grows in wet heath with a ground layer of grasses, sedges and forbs, in sand over granite, at 900–1030 m altitude at three locations, two within 1 km of each other, and a third c. 47 km to the south. Other associated species recorded include *Asperula gunnii*, *Baloskion fimbriatum*, *Banksia marginata*, *Callistemon pallidus*, *C. pityoides*, *Comesperma* sp., Cyperaceae, *Daviesia*

sp., *Empodisma minus*, *Epacris brevifolia, E. paludosa*, *Eucalyptus campanulata*, *E. radiata*, *Gahnia* sp., *Gleichenia dicarpa*, *Gonocarpus micranthus*, *Hibbertia* spp., *Hypericum japonicum*, *Lepidosperma* sp., *Leptospermum* sp., *Pultenaea dentata*, *P. retusa*, Poaceae, *Prostanthera scutellarioides*, Restionaceae and *Sphaerolobium minus*.

Specimens examined: New South Wales [precise localities withheld for conservation reasons]: Northern Tablelands: Werrikimbe National Park, c. 60 km SE of Walcha, 2 November 2010, *L.M.Copeland 4473* (BRI, CANB 814010, MEL 2383816, NE 97142, NSW 929237); Werrikimbe National Park, 23 Nov. 2023, *T.Schmidt* (CANB, NSW); North Coast: Carrai, 21 Jan. 2022, *P.Rossington s.n.* (NSW 1119234); Carrai, 13 Oct. 2022, *P.Rossington s.n.* (CANB 956174, NSW); Carrai Plateau, 31 Oct. 2023, *P.Rossington s.n.* (NSW); Carrai Plateau, 1 Nov. 2023, *P.Rossington s.n.* (NSW); Carrai Plateau, 2 Nov. 2023, *P.Rossington s.n.* (NSW 1138182).

iNaturalist observations: 131191519, 156725273, 156725968, 159565254, 159567696.

Phenology: Flowering recorded for October–November, but probably starting in September; fruiting recorded for late November.

Etymology: From the Latin *rubescens* (becoming red), in reference to the face of the standard which can initially be yellow-orange, but quickly becomes red as the flowers mature.

Common name: Carrai Bush-pea.

Conservation Status: *Pultenaea rubescens* is currently known from 13 populations, in two localised areas less than 50 km apart. Four of these locations are primarily on private land (one extending into a conservation area). Surveys to date on the Carrai Plateau located about 283 plants at 56 observation points around 12 discrete sites over a distance of about 12 km. About 75% of individual plants located were found within existing conservation reserves. Individual populations range in size from a few plants to >50 individuals. These surveys are estimated to have examined 15–20% of the potential habitat in this area, suggesting there may be 1000–1200 plants on the Carrai plateau if habitat assessments and observed population densities are accurate estimates. These population estimates may be low due to difficulty in detection of these inconspicuous plants, and surveys being undertaken after peak flowering. No population estimates are available for the single known location in Werrikimbe National Park.

Some plants within these populations were observed to be senescing, despite good rainfall in the preceding three years. The species is thought to be relatively short-lived, with highest density post-fire, which stimulates seed germination. Specific threats have been identified in the form of grazing and trampling of swamp vegetation by escaped cattle in areas adjacent to private property with damaged fences and extensive damage to swamp vegetation by feral pigs in localised areas, which was most prominent in areas also affected by cattle grazing and historical soil disturbance. Likely Area of Extent: 1000 km^2. Known Area of Occupancy <5 km^2. As all known populations are highly restricted in extent, in very specific habitats, and population numbers are low, with ongoing threats to population size, the species warrants listing as Endangered (IUCN 2012: EN B1a,b(iii), B2a,b(iii)).

Notes: *Pultenaea* sp. Girraween NP (J.B. Williams NE71692) is superficially similar to *P. rubescens*, but differs most obviously in the prominent, broad stipules below the inflorescence. At NSW, two Copeland collections were initially ascribed to *P.* sp. Girraween NP, one of which (*L.M.Copeland 4473*) is here placed in *P. rubescens*.

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References

Barrett RL, Clugston JAR, Albrecht DE, Elkan L, Hosking JR, McCune SF, Jobson PC, Orme AE, Palsson RL, Renner MAM, Wardrop C, Weston PH (2024a) Revision of the *Pultenaea setulosa* species complex (Fabaceae: Mirbelieae) including fourteen new species. *Australian Systematic Botany* 37(SB23014): 1–105. DOI

Barrett RL, Clugston JAR, Cook LG, Crisp MD, Jobson PC, Lepschi BJ, Renner MAM, Weston PH (2021) Understanding diversity and systematics in Australian Fabaceae tribe Mirbelieae. *Diversity* 13(8): 391. DOI

Barrett, RL, Clugston, JAR, Orthia, LA, Cook, LG, Crisp, MD, Lepschi, BJ, Macfarlane, TD, Weston, PH, Wilkins, CF (2024b) East rarely meets West: a revised delimitation for *Pultenaea* (Fabaceae: Mirbelieae) with reinstatement of *Euchilus* and three new genera from south-west Western Australia. *Australian Systematic Botany* 37(SB23029): 1–31. DOI

Briggs JD, Crisp MD (1994) *Pultenaea parrisiae* (Fabaceae: Mirbelieae), a new species from south-eastern Australia. *Telopea* 5: 647–655. DOI

de Kok, RPJ, West JG (2002). A revision of *Pultenaea* (Fabaceae). 1. Species with ovaries glabrous and/or with tufted hairs. *Australian Systematic Botany* 15(1): 81–113. DOI

de Kok, RPJ, West JG (2003) A revision of the genus *Pultenaea* (Fabaceae) 2. Eastern Australian species with velutinous ovaries and incurved leaves. *Australian Systematic Botany* 16(2): 229–273. DOI

de Kok, RPJ, West JG (2004) A revision of the genus *Pultenaea* (Fabaceae). 3. The eastern species with recurved leaves. *Australian Systematic Botany* 17(3): 273–326. DOI

Department of Agriculture, Water and the Environment (2021) *Australia's bioregions (IBRA)*, IBRA7, Commonwealth of Australia. URL

IUCN (2012) *IUCN Red List Categories and Criteria. Version 3.1*. Second edn. (IUCN: Gland, Switzerland and Cambridge, UK) URL

Orthia LA, Crisp MD, Cook LG, de Kok RPJ (2005) Bush peas: a rapid radiation with no support for monophyly of *Pultenaea* (Fabaceae: Mirbelieae). *Australian Systematic Botany* 18(2): 133–147. DOI

Renner MAM, Barrett RL, Clarke S, Clugston JAR, Wilson TC, Weston PH (2022) Morphological and molecular evidence refute a broad circumscription for *Pultenaea glabra* (Fabaceae: Mirbelieae). *Australian Systematic Botany* 35(3): 225–277. DOI

Telford, I.R.H., Clugston, J.A.R. & Barrett, R.L. (2022) *Pultenaea williamsii* (Fabaceae: Mirbelieae), a new species endemic to the New England Tableland Bioregion of New South Wales. *Telopea* 25: 165–171. DOI

Weston PH, de Kok RPJ (2002) *Pultenaea,* Pp. 549–565 in Harden, GJ (ed.) *Flora of New South Wales* Vol. 2, revised edn (University of New South Wales Press: Kensington)

Weston PH, de Kok RPJ, Barrett RL, Renner, MAM (2024) *Pultenaea*. New South Wales Flora Online. URL (accessed 4 July 2024)