

# *Drosera buubugujin* M.T.Mathieson (Droseraceae, *Drosera* section *Prolifera* C.T.White), a spectacular new species of sundew from the Cape York Peninsula bioregion

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## Summary

Mathieson, M.T. & Thompson, S.L. (2020). *Drosera buubugujin* M.T.Mathieson (Droseraceae, *Drosera* section *Prolifera* C.T.White), a spectacular new species of sundew from the Cape York Peninsula bioregion. *Austrobaileya* 10(4): 549–557. *Drosera buubugujin* is described as new. It is a terrestrial herb known only from Muundhi and Juunju Daarrba Nhirrpan National Parks (Cape York Peninsula Aboriginal Land - CYPAL) in northern Queensland and is readily distinguished from any other members of the genus by its unique combination of characters. The species is illustrated and diagnosed herein. A key is provided to the species of *Drosera* section *Prolifera*. Its conservation status is assessed and a status of Critically Endangered is recommended.

Key Words: Droseraceae; *Drosera*; *Drosera buubugujin*; Australia flora; Queensland flora; new species; taxonomy; identification key; conservation status

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## Introduction

Queensland's Wet Tropics bioregion hosts a multitude of unique flora including the three species of sundew comprising *Drosera* section *Prolifera* C.T.White (White 1940; Schlauer 1996; Lowrie *et al.* 2017a,b), *viz.* *Drosera adelae* F.Muell., *D. prolifera* C.T.White and *D. schizandra* Diels. These species are commonly known amongst sundew enthusiasts as “The Three Sisters” (Nunn & Bourke 2017) and “the rainforest *Drosera*” (Lavarack 1979; Lowrie 2013).

During surveys of the south-eastern areas of the Cape York Peninsula bioregion, a distinctive, unnamed, fourth species of this section was discovered and is described here. The initial collections of this *Drosera* were made by Muundhi and Juunju People in conjunction with CYPTRP botanist Simon Thompson and consultant botanist David Fell

during biodiversity assessments of Muundhi, Juunju Daarrba Nhirrpan and Biniir National Parks (CYPAL). Discoveries like this highlight the importance of CYPTRP support and the exciting biodiversity within the Buubu Gujin Aboriginal Corporation lands. The engagement with the Traditional Owners in the field work and the naming of the plant provides confidence to indigenous people that their knowledge, skills and biodiversity are respected and secure within the CYPTRP program, and has value for the science community as a whole.

## Materials and methods

This research is based on a study of herbarium specimens and associated spirit collection at BRI, and field studies at the type and single other currently known locality. All measurements have been made from live material or material preserved in spirit. Dimensions of measurements are inclusive, *viz.* 1.0–1.7 is given as 1–1.7.

Field work was conducted in conjunction with the Department of Aboriginal and Torres Strait Islander Partnerships' Cape York Peninsula Tenure Resolution Program (CYPTRP) which has handed back over 3.7 million hectares of Cape York Peninsula to the Traditional Owners of the land. This area includes over 2.1 million hectares of National Park (Cape York Peninsula Aboriginal Land) (NP (CYPAL)). The program provides post handback support to Land Trusts and Aboriginal Corporations involved. Support projects include governance, natural resource management and biodiversity assessment.

Electron microscopy (Queensland University of Technology–Gardens Point, Brisbane, Qld, Australia) was performed and images captured by MTM using Zeiss Sigma VP Field Emission scanning electron microscope with an Oxford X-Max 50 Silicon Drift (SDD) EDS detector. Extra-high tension (EHT) voltage level in all cases was 5 kV, with a working distance of between 7.5 and 9.5 mm.

### Taxonomy

**Drosera buubugujin** M.T.Mathieson **sp. nov.** with affinity to *D. schizandra*, but differing by the lateral inflorescence presentation, smaller flowers, shortly and thickly bilobed anther filaments, white to creamy white anthers and pollen, and predominantly oblanceolate to obovate leaf shape. **Typus:** Queensland. COOK DISTRICT: Muundhi National Park (CYPAL), NNW of Cooktown, 19 August 2016, *M.T. Mathieson MTM2558*, *S. Thompson & S. Chapman* (holo: BRI [4 sheets + spirit]; iso: CNS *distribuendi*). [Exact locality withheld for conservation purposes].

Perennial herb with rosettes of mature individuals (7–) 10–26 (–30) cm in diameter with 4–12 active leaves, often asymmetrically arranged. Roots fleshy, terete, sparsely branched, covered with black-brown scales. Plantlets may form from the roots if these are damaged. Stipules somewhat triangular,

lacinate, dissected, 1.5–2.5 mm long, positioned on the upper surface adnate to the leaf base. Leaves with petiole to 16 mm long when present, or sessile; lamina of mature (flowering or flowering-sized) plants semi-erect, decumbent or prostrate, oblanceolate or obovate (25–) 30–142 (–150) mm long, (10–) 12–38 (–40) mm at widest point, entire, bright dark green to yellowish-green depending on age and solar exposure. Adaxial lamina surface covered in translucent, white to pink trichomes (1.2–) 1.5–3.8 (–4.1) mm long, each with a distal, ellipsoid, red gland 0.2–0.5 mm long, producing copious quantities of mucilaginous digestive fluid when active; surface veins with extremely sparse (sometimes absent) eglandular or minutely glandular red hairs 0.1–0.3 mm long; mid vein prominent on both surfaces but more so on the abaxial surface; secondary venation more prominently raised on abaxial surface. Abaxial lamina surface veins with sparse, red, eglandular or minutely glandular hairs 0.2–1 mm long. Damaged or detached leaves may produce plantlets from the margins before decaying if somewhat adpressed to the substrate surface. Juvenile leaves, referring to the first few new leaves of plantlets formed during vegetative reproduction or potentially a seedling, to *c.* 20 mm long, distinctly petiolate with an orbicular to broadly oval lamina with the lamina usually only slightly longer than the petiole. Inflorescence a scorpioid cyme, 1–5 per rosette, variably 110–420 mm long, arising laterally from the leaf axils near the centre of the rosette, held semi-erect to horizontal, bearing 6–38 flowers spaced 4–14 mm apart. Peduncles 65–120 mm long covered in short, eglandular or minutely glandular hairs; bracts linear 1.5–2 mm long, largely glabrous, occasionally with a few eglandular hairs on the abaxial surface; pedicels 2.5–3.5 mm long, indumentum similar to peduncles. A plantlet consistently forms at the tip of the inflorescence as flowering completes (as in *D. prolifera*), resulting in largely clonal colonies. Sepals lanceolate, 2–3 mm long, 0.5–0.8 mm wide at base, becoming slightly wider at the

centre before tapering to an acuminate apex, margins entire, occasionally slightly undulate and, rarely, minutely ragged towards the apex, adaxial surface glabrous, abaxial surface with short hairs. Petals obovate, 2–2.5 mm long, 1.6–1.8 mm at widest point towards the apex, deep red-purple, margins entire, rarely a little undulate, apex minutely crenate to entire, often retuse to emarginate, becoming reflexed with age. Stamens 5 (–6), 1.2–1.5 mm long, reflexed; filaments red, widening in upper half becoming shortly and thickly bilobed; anthers and pollen white to creamy-white. Ovary obovoid, 0.65–0.8 mm long, 0.7–0.8 mm diameter at anthesis, yellowish-green to yellowish-pink. Styles 3 (–4), 0.2–0.25 mm long, bilobed, occasionally trilobed near apex, arms 0.15–0.2 mm long; pinkish-red lower half, white to yellowish white nearing truncate apex. Stigmas papillose. Seed<sup>1</sup> ovoid, tapered at the apices, c. 0.6 mm long and 0.4 mm wide, black, surface reticulate.

**Figs. 1–3.**

**Additional specimens examined: Queensland.** COOK DISTRICT: Juunju Daarrba Nhirrpan NP (CYPAL), NNW of Cooktown, Dec 2015, *Thompson SLT15151 et al.* (BRI); *ibid.*, Aug 2016, *Mathieson MTM2561 et al.* (BRI); Muundhi NP (CYPAL), NNW of Cooktown, Aug 2014, *Thompson SLT14659 & Fell* (BRI); *ibid.*, Dec 2015, *Thompson SLT15127 et al.* (BRI).

**Distribution and habitat:** *Drosera buubugujin* is endemic to the sandstone mesas and escarpments of Muundhi and Juunju Dhaarrba Nhirrpan National Parks (CYPAL), north north-west of Cooktown, north Queensland. The species grows on the banks of streams in gallery forest (**Fig. 4**) through

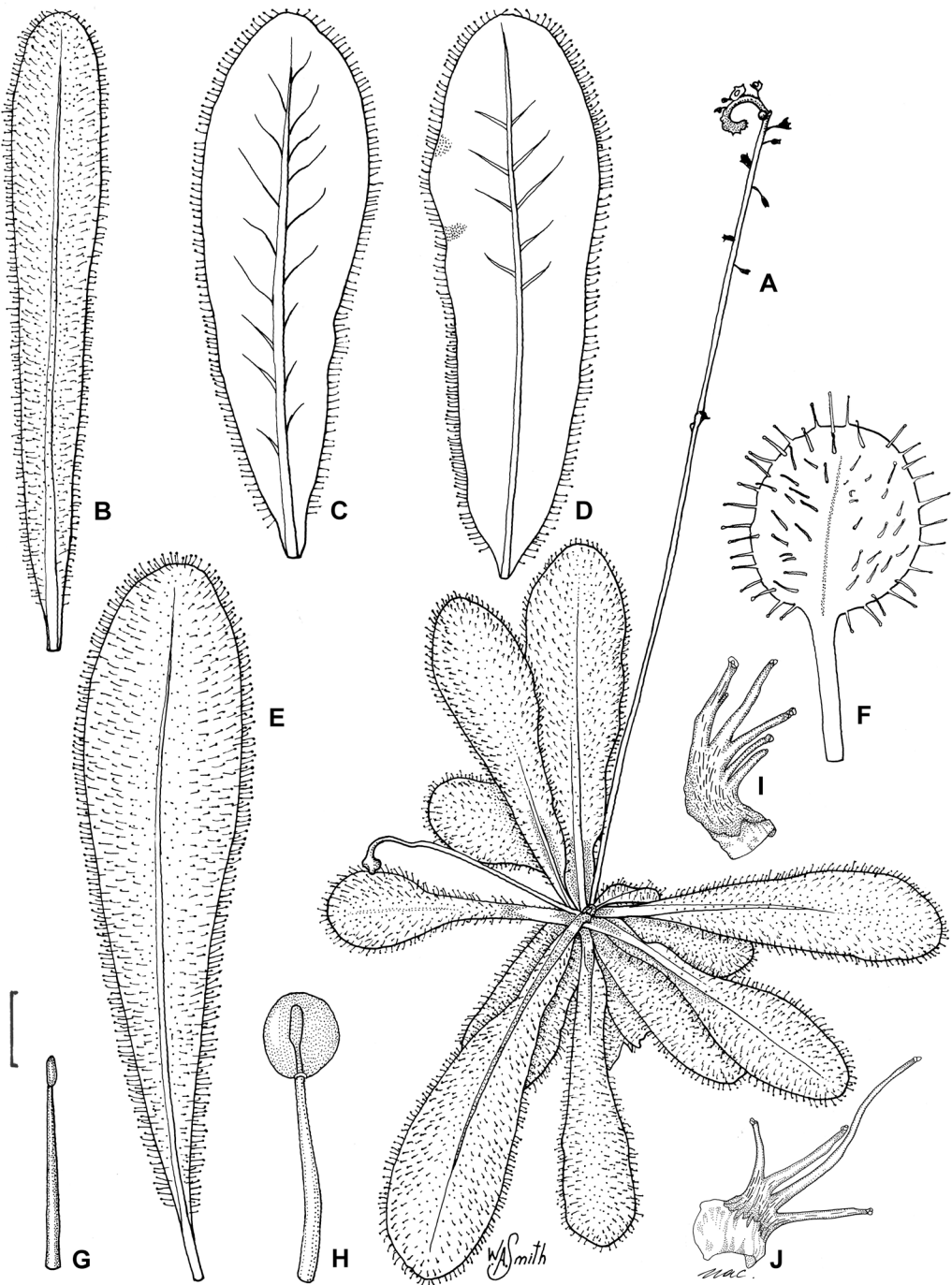
sandstone gullies and ravines on sand and humus, generally amongst mosses. It has also been observed growing on sandstone cliffs and ledges where springs and seeps provide a constant water source. At times during the wet season, plants adjacent to streams would be inundated by flowing water, conceivably to a depth well above the height of the plant.

**Phenology:** Flowers and fruits are recorded for August through to December.

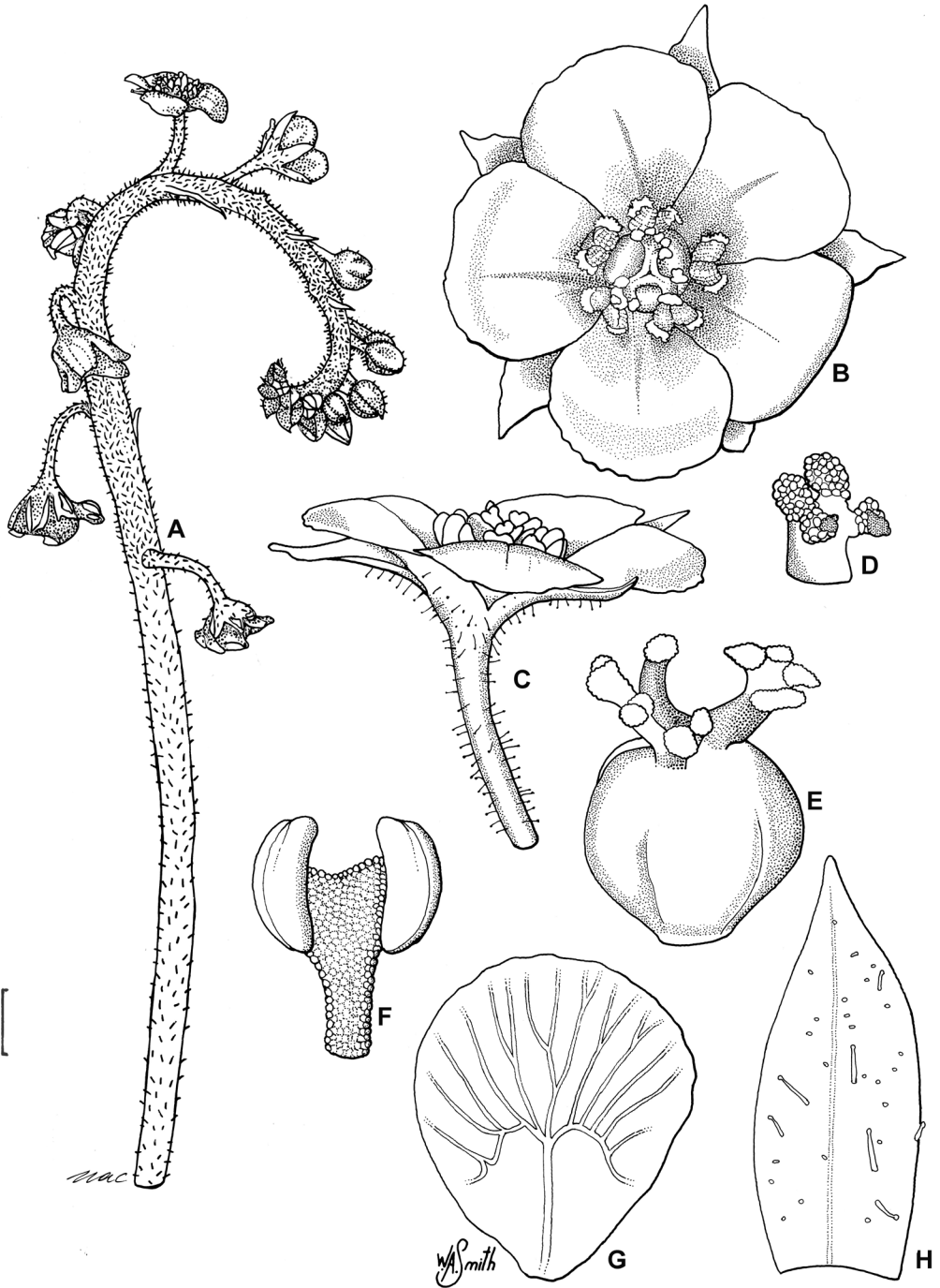
**Affinities:** *Drosera buubugujin* belongs to *Drosera* Section *Prolifera* and most closely resembles *D. schizandra*. It differs from *D. schizandra* by the following characters: Leaf shape widely variable, oblanceolate (predominantly) or obovate (vs. generally obovate in *D. schizandra*), flower diameter 4.5–5.5 mm (vs. 10–13 mm in *D. schizandra*), inflorescence emerging laterally, up to c. 400 mm long with up to 35 flowers (vs. generally erect, up to 150 mm long with up to 20 flowers in *D. schizandra*), anther filaments shortly and thickly bilobed (vs. deeply and widely bilobed (distinctly Y-shaped) in *D. schizandra*), pollen white-creamy white (vs. pollen yellow-orange in *D. schizandra*). Flowers of *D. buubugujin* and *D. schizandra* are shown in **Fig. 5** and **Fig. 6** respectively. The other species within *Drosera* section *Prolifera* are less like *D. buubugujin*, differing in the following ways: *D. prolifera* has a reniform leaf lamina with a distinct petiole at maturity while *D. adelae* has a narrowly lanceolate leaf lamina (vs. an oblanceolate, obovate or oblong-obovate leaf lamina that is barely or not petiolate in *D. buubugujin*); *D. adelae* had broadly lanceolate petals with an acuminate apex (vs. obovate petals in *D. buubugujin*).

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<sup>1</sup> Note that only a single seed was found despite searching many tens of specimens



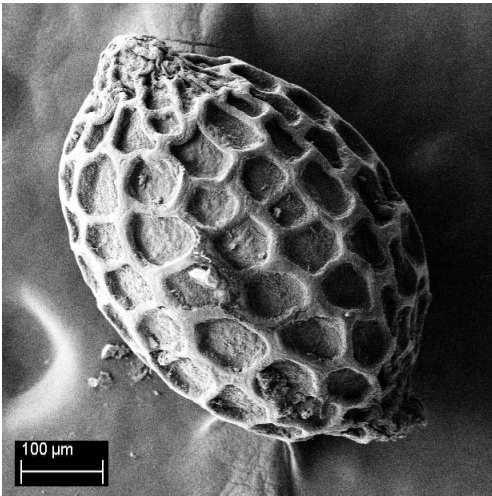
**Fig. 1.** *Drosera buubugujin*. A. whole plant  $\times 0.6$ . B–E. mature leaves  $\times 0.8$ . F. juvenile leaf  $\times 4$ . G. glandular trichome without fluid  $\times 16$ . H. glandular hair with fluid  $\times 16$ . I. & J. stipules  $\times 16$ . All from Mathieson *MTM2558 et al.* (BRI). Scale bar = 10 mm at  $\times 1$  magnification. Del. W. Smith and N. Crosswell.



**Fig. 2.** *Drosera buubugujin*. A. inflorescence (in part)  $\times 3$ . B. flower  $\times 12$ . C. flower from the side  $\times 12$ . D. style arm  $\times 60$ . E. ovary and style  $\times 36$ . F. anther  $\times 36$ . G. petal  $\times 24$ . H. sepal  $\times 24$ . All from Mathieson MTM2558 *et al.* (BRI). Scale bar = 10 mm at  $\times 1$  magnification. Del. W. Smith and N. Crosswell.

**A key to species in *Drosera* section *Prolifera*<sup>2</sup>**

- 1 Mature leaf lamina lanceolate or reniform; abaxial surface of sepals glabrous . . . . . **2**
1. Mature leaf lamina obovate, oblanceolate or oblong-obovate; abaxial surface of sepals with trichomes . . . . . **3**
- 2 Mature leaf lamina reniform, distinctly petiolate . . . . . **D. prolifera**
2. Mature leaf lamina lanceolate . . . . . **D. adalae**
- 3 Mature leaf lamina generally obovate; inflorescence generally emerging and being held erect, rarely forming a plantlet at the distal tip; flowers 10–13 mm in diameter, petals 5–6.5 mm long; anther filaments deeply and widely bilobed (distinctly Y-shaped), pollen yellow-orange. . . . . **D. schizandra**
3. Mature leaf lamina oblanceolate (predominantly) or obovate; inflorescence emerging laterally and held semi-erect or horizontally, consistently forming a plantlet at the distal tip after flowering; flowers to 4.5–5.5 mm diameter, petals to 2–2.5 mm long; anther filaments shortly and thickly bilobed, pollen white to creamy white . . . . . **D. buubugujin**



**Fig. 3.** Scanning electron microscope image of *Drosera buubugujin* seed (Mathieson MTM2558 *et al.*, BRI).

**Note:** During the study of herbarium material for this work, a single seed was found on a specimen of *Drosera schizandra*, a feature not previously reported (Lowrie *et al.* 2017b). Despite some disfiguration due to the specimen drying process, this seed closely resembles that of *D. buubugujin* in size, shape and surface morphology.

**Conservation status:** *Drosera buubugujin* is known from two locations within close proximity of one another; both within National Park (CYPAL) tenure. It has not been encountered elsewhere despite numerous further surveys in similar habitats since 2016 (H. Hines, *pers. comm.*; S.L. Thompson, *pers. obs.*). It is possible the species may occur elsewhere in the adjacent ranges given the potential extent of appropriate habitat that exists. However, all related species in the same section appear to have highly restricted ranges (Lowrie *et al.* 2017a,b). The distribution of these four species is shown in **Map 1**.

<sup>2</sup>Based on Lowrie (2013) and Lowrie *et al.* (2017a,b)



**Fig. 4.** *Drosera buubugujin* growing in habitat on a stream bank, Muundhi National Park. Photo: M.T. Mathieson.



**Fig. 5.** Flowers of *Drosera buubugujin*, Muundhi National Park, c. 5 mm in diameter. Photo: M.T. Mathieson.



**Fig. 6.** Flowers of *Drosera schizandra*, Wooroonooran National Park, c. 12 mm in diameter. Photo: M.T. Mathieson.

The population size at the type locality is difficult to estimate given the largely clonal nature of the species but is possibly between 500 and 1000 genetically distinct plants occupying an area of less than 0.5 hectare. The second population is smaller. Repeated fire events may threaten this species not only by directly destroying plants and the riparian habitat to which the species seems strictly bound, but also by encouraging the encroachment of introduced, hyperinvasive grasses (*viz.* giant rat's tail grass *Sporobolus pyramidalis* (Lam.) Hitchc., grader grass *Themeda quadrivalvis* (L.) Kuntze and gamba grass *Andropogon gayanus* Kunth), the rampant herbaceous weed *Praxelis clematidea* R.M.King & H.Rob. and lantana *Lantana camara* L. Applying criteria of the IUCN (IUCN 2012), the recommended conservation status is **Critically Endangered** (CR: **B1a, b(ii), (iii)** and **B2a, b(ii), (iii)**) due to small extent of occurrence and area of occupancy in conjunction with observed and inferred negative impacts of fire.

**Etymology:** This species is named after the Buubu Gujin Aboriginal Corporation lands, which include Muundhi and Juunju Daarra Nhirrpan National Parks (CYPAL) where it was collected.

### Acknowledgements

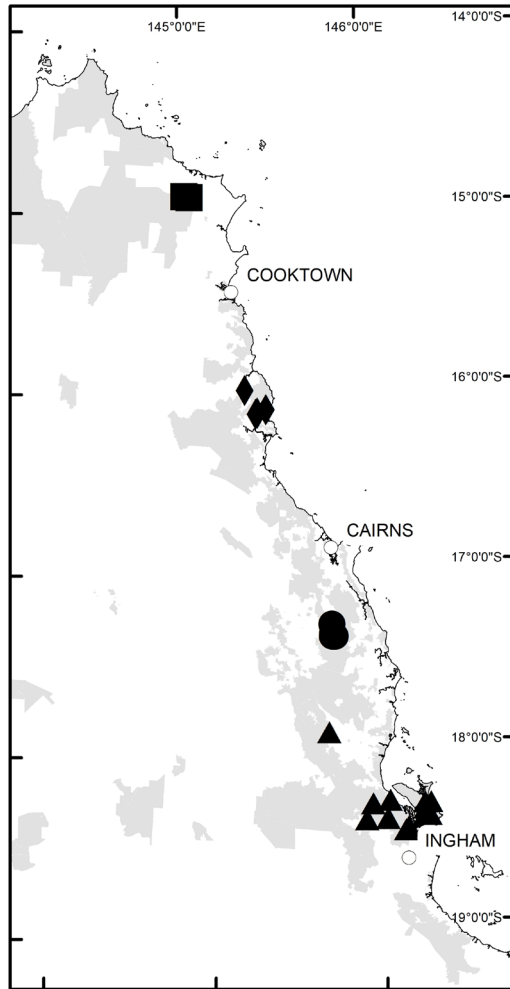
The authors would like to thank the Buubu Gujin Traditional Owners for inviting us onto their lands and providing cultural guidance as well as the Buubu Gujin Corporation Directors for approving the use of the species name at Joint Management and Corporation meetings. Collections of this species were made in conjunction with the Traditional Owners of Muundhi and Juunju Daarra Nhirrpan NPs (CYPAL). The following people and

organisations are thanked for their assistance that made the survey possible: Debbie and Sally Chapman, Kieren Henderson and the Traditional Owners of the National Parks (CYPAL) that were surveyed; Ian McConnell (Department of Environment & Science, CYPTRP); QPWS rangers Chris Wall, Andy Baker & Janine White; Will Smith and Nicole Crosswell for the illustrations; David Fell, Ian Brown & Geoff Luscombe for support during surveys; Cheyne Fendon for helicopter services; and Gordon Guymer & David Halford (BRI) for logistical and field support.

### References

- IUCN (2012). *IUCN Red List Categories and Criteria: Version 3.1*. Second edition. IUCN: Gland/Cambridge.
- LAVARACK, P.S. (1979). Rainforest *Drosera* of North Queensland. *Carnivorous Plant Newsletter* 8(2): 61–64.
- LOWRIE, A. (2013). *Carnivorous Plants of Australia Magnum Opus – Volumes 1–3*. Redfern Natural History Productions: Poole.
- LOWRIE, A., NUNN, R., ROBINSON, A., BOURKE, G., MCPHERSON, S. & FLEISHMANN, A. (2017a). *Drosera of the World, Volume 1: Oceania*. Redfern Natural History Productions: Poole.
- LOWRIE, A., ROBINSON, A., NUNN, R., RICE, B., BOURKE, G., GIBSON, R., MCPHERSON, S. & FLEISHMANN, A. (2017b). *Drosera of the World, Volume 2: Oceania, Asia, Europe, North America*. Redfern Natural History Productions: Poole.
- NUNN, R. & BOURKE, G. (2017). An account of *Drosera* Section *Prolifera*. *Carnivorous Plant Newsletter* 46(3): 92–100.
- SCHLAUER, J. (1996). A dichotomous key to the genus *Drosera* L. (Droseraceae). *Carnivorous Plant Newsletter* 25(2): 67–88.
- WHITE, C.T. (1940). A new type of sundew from North Queensland, *The Victorian Naturalist* 57: 94–95.





**Map 1.** Distribution of the four species of *Drosera* section *Prolifera*. *D. adelae* ▲, *D. buubugujin* ■, *D. prolifera* ◆, *D. schizandra* ●. Protected areas are shaded.