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Lepidosperma prospectum (Cyperaceae), a new species from Sydney coastal heath and notes on usage of sword sedges

Russell L. Barrett[1,2,3], George T. Plunkett[4,5], Jeremy J. Bruhl[4] and Karen L. Wilson[1]

[1]*National Herbarium of New South Wales, Australian Institute of Botanical Science, Australian Botanic Garden, Locked Bag 6002, Mount Annan, New South Wales 2567, Australia*
[2]*School of Plant Biology, Faculty of Science, The University of Western Australia, Crawley, Western Australia 6009*
[4]*Botany, School of Environmental and Rural Science, University of New England, Armidale, New South Wales 2351, Australia*
[5]*Travers Bushfire & Ecology, 38a The Avenue, Mt Penang Parklands, Central Coast Highway, Kariong, New South Wales, 2250, Australia*
[3]*Author for Correspondence:* russell.barrett@botanicgardens.nsw.gov.au

Abstract

Lepidosperma prospectum G.T.Plunkett & R.L.Barrett (Cyperaceae tribe Schoeneae) is here described as a new species from the Sydney region of New South Wales. It is highly restricted in distribution, occurring at Manly (Sydney Harbour National Park), Kamay Botany Bay National Park and Royal National Park in dense coastal shrublands behind coastal cliffs. These locations are within the traditional lands of the *Gamaragal*, *Gweagal* and *Dharawal* people respectively. Joseph Banks and Daniel Solander were the first Europeans to explore the flora of New South Wales in 1770 around Botany Bay but they did not collect this species. *Lepidosperma prospectum* is superficially similar to *L. sieberi* Kunth, which occurs in adjacent habitats, but molecular data have shown that it is more closely allied to Western Australian species. A brief review of recorded indigenous and European knowledge and utilisation of the genus *Lepidosperma* Labill. is presented to highlight the varied uses of the genus.

Keywords: biodiversity; indigenous knowledge; Cyperaceae; sword sedge; taxonomy; Sydney; Joseph Banks; Daniel Solander; sandstone flora; taxonomy.

Introduction

Lepidosperma Labill. (sword and rapier sedges; Cyperaceae) is one of the largest genera in the Australian flora when putative undescribed species are included. Eighty species are currently named, but up to three times this number await description (Barrett 2012b; Barrett and Wilson 2012, 2013; Barrett, 2013; Plunkett et al. 2013, 2018; Barrett & Barrett, 2015; Plunkett 2016). New species are still being discovered even in close proximity to major population centres, as exemplified by the description of three new species from Kings Park, beside the

Perth central business district, Western Australia (Barrett and Wilson 2013; Barrett and Barrett 2015). While a number of new *Lepidosperma* species have been described in the last few decades (Wilson and Morris 1993; Wilson 1993; Barrett 2007a, 2007b; Barrett and Wilson 2013; Plunkett *et al*. 2013, 2018; Barrett and Barrett 2015), significant historical misapplication of names has led to great confusion over species concepts, especially in Western Australia (e.g. Barrett 2012a). Several studies have highlighted the difficulty in establishing species limits in complex groups such as *L. laterale* R.Br. (Gray 1994; Hodgon *et al*. 2006). A detailed nomenclatural review has resolved the application of published names (Barrett and Wilson 2012), paving the way for the description of new species. Two PhD projects have created a very detailed phylogeny for the genus based primarily on nuclear ETS DNA sequence data (Barrett 2012b; Plunkett 2016).

During fieldwork by K.L. Wilson and R.L. Barrett in Sydney Harbour National Park at Manly in 2009, a sedge population was located in tall shrubland that was thought at the time to be a tall form of *Lepidosperma sieberi* Kunth, but atypical in inflorescence form, with typical *L. sieberi* occurring nearby in more open habitats. Subsequent sequencing of the nuclear ETS region showed that despite superficial similarities to *L. sieberi*, the taxon was placed with Western Australian taxa, near *L. resinosum* (Lehm.) F.Muell. ex Benth., well-removed from *L. sieberi* (Barrett *et al*. 2012). A check of collections at NSW located one previous collection, made by K.L. Wilson, from Royal National Park in 1992. This collection had been confused with *L. concavum* R.Br. which occurs near all known locations of *L. prospectum*. This taxon was subsequently given the informal phrase name *Lepidosperma* sp. Blue Fish Point (R.L. Barrett & K.L. Wilson RLB 5554). The phylogenetic position resolved by Barrett *et al*. (2012) was confirmed by Plunkett (2016) with a broader sampling of eastern Australian *Lepidosperma* taxa, and a description was drafted in DELTA. Following additional field observations by R.L. Barrett in Kamay Botany Bay National Park (2019) and at a second location in Royal National Park (2020), we here describe the taxon as a new species, *Lepidosperma prospectum* G.T.Plunkett & R.L.Barrett.

Lepidosperma prospectum occurs in tall coastal heath or low woodland ('Sydney Coastal Heaths'; Keith 1994 or 'heath on the dunes'; Bear 2010) behind the sandstone sea-cliffs, in relatively dense vegetation that provides a high degree of shading. This contrasts with the two species that *L. prospectum* has been confused with, *L. concavum* and *L. sieberi*, which both occur nearby, but in low, open heath. Many coastal vegetation communities in New South Wales have been impacted by extensive clearing for urban and agricultural development (Benson and Howell 1990; Fairley 2004), but all known populations of *L. prospectum* are in National Parks where the native vegetation remains in very good condition.

Traditional knowledge and utilisation of *Lepidosperma*

Lepidosperma species are critical components of many southern Australian ecosystems and play a key role in community ecology (Barrett 2013). A global review of economic usage of Cyperaceae has been provided by Simpson and Inglis (2001). However, there are numerous uses of *Lepidosperma* recorded in more obscure literature sources and more recent literature that were not available to them (Table 1). Most usage involves the leaves or culms for weaving or fibre production, often for quite elaborate purposes, but some species were also used for food by both indigenous and European Australians (who presumably gained their knowledge from local indigenous people; see Clarke 2008; Olsen and Russell 2019), and these records are summarised in Table 1. Use as a fibre plant and in weaving was very widespread prior to the introduction of alternative materials by Europeans, but identifying records in the European literature is hampered greatly by the fact that most European observers did not identify the plants beyond 'rush' or 'sedge'; a taxonomic impediment at a community level that remains common today. A reference to grass 'with edible parts' (Andrews *et al*. 2017) is more likely a reference to a sedge (or possibly a *Lomandra*), but quite possibly to *Lepidosperma*, which is very 'grass-like' in appearance. Aboriginal people often had quite detailed taxonomies for plants, based on functional groups (Waddy 1988 and see the classification of eucalypts in Bodkin and Robertson 2013), but often only communicated the top-level taxonomy until they were confident the listener had understood them. Most identifiable observations relate to the most widespread and recognisable species, *L. gladiatum* and *L. laterale s. lat*. (e.g. Gott 1993; Cahir *et al*. 2018).

Table 1. Human utilisation of *Lepidosperma* species.

Species	Part used	Usage	People	Region	Name	Refs
L. avium K.L.Wilson	culms	probably basketry	*Yankunytjatjara*	Everard Ranges	*puta-puta*	1
L. calcicola R.L.Barrett & K.L.Wilson	plants	soil stabilisation	Europeans	coastal WA		2
L. canescens Boeckeler	culms	eel trap, fish trap, yabbie trap, turtle-form basket	*Ngarrindjeri*	lower Murray River, SA	*pinki-moranyi*	3, 4
L. canescens, L. viscidum R.Br.	culms	mats, craft items	Aboriginal	SE Australia		5
L. elatius Labill.	culms	basketry	Aboriginal	Vic.		6
L. elatius, L. laterale R.Br. *s. lat.*	culms	fibre	Aboriginal	dry rainforests in NSW	-	7
L. elatius	culms	paper	European			8
L. filiforme Labill.	culms	basketry	Aboriginal	Wimmera, Vic.	-	9
L. filiforme	culms	basketry	Aboriginal	Tas.		11
L. ensiforme (Rodway) D.I.Morris, *L. gladiatum* Labill., *L. sieberi* Kunth (as *L. concavum* R.Br.)	culms	basketry	*Nueonne*	Bruny Island, Tas.	-	13
L. gladiatum	culm base, culms	food, basketry	Aboriginal	Tas.	-	6, 11, 12
L. gladiatum	culm base	food	Aboriginal	SA	-	6
L. gladiatum	culms	paper	European	Vic.	-	8, 9, 13–15
L. gladiatum	leaves, culms, rhizomes	food, basketry, rope, string, treating colds	*Nyoongar*	coastal WA	*kerbein*	16, 17, 18
L. gladiatum	culms	vegetable	European	southern WA		19
L. gladiatum	plants	soil stabilisation	Europeans	coastal WA		2
L. gladiatum	culms	mats, basketry, food, moisture	*Ngarrindjeri*	Coorong, SA	*ngrakani, thyuk, wingi, winggi*	4, 20–23
L. gladiatum	culms	paper	European	Coorong, SA		20
L. gladiatum	culms	hats	European	NSW		24
L. laterale s. lat.	culms	basketry	*Kulin*	Vic.	-	6, 12
L. longitudinale Labill.	culms	mat weaving	*Minjerribah Moorgumpin*	North Stradbroke Island, Qld	-	25
L. longitudinale	culms	paper	European			8
L. sieberi (as *L. squamatum* Labill.)	culms	table mat	Aboriginal	Wimmera, Vic.	-	9, 13
L. viscidum R.Br.	culms	basketry	*Ngarrindheri*	Coorong, SA	*kikandu*	4

References: 1. Everard *et al.* (2002). 2. Dixon (2011). 3. MAAS (2020). 4. Clarke (2003). 5. Clarke (2007). 6. Gott (1993). 7. Beck and Balme (2003). 8. Guilfoyle (1894). 9. Anonymous (1895). 10. Gough (2009). 11. Plomley (1962). 12. Scott *et al.* (2002). 13. Simpson and Inglis (2001). 14. Corbett (1861). 15. Maiden (1889). 16. Abbott (1983). 17. Hansen and Horsfall (2016, 2019). 18. NACC (2017). 19. Low (1991). 20. Bonney (2004). 21. Campbell *et al.* (1946). 22. Clarke (1986; 1999, 2015). 23. McCourt and Mincham (1987). 24. Maiden (1902). 25. Stephens and Sharp (2009).

European interpretations of the nature and usage of manufactured items reflect commonly held assumptions that the designers were part of a 'primitive' society rather than members of the oldest surviving civilisation, influencing the way in which these items are recorded. Examination of some of the specific items made using sedge fibres provides insights into the complexity and nature of the civilisation that produced them. The *Ngarrindjeri* people along the lower Murray River in South Australia used *pinki-moranyi* (*Lepidosperma canescens* Boeckeler) to make a range of complex traps for catching fish, eels and yabbies, as well as highly artistic baskets including in the form of a turtle (Clarke 2003; MAAS 2020). Across southern Australian indigenous communities, woven items, including table mats, basketry items, crafts and toys, were commonly

made from flat-leaved *Lepidosperma* species, or from derived fibres, as they were very durable (Anonymous 1895; Campbell *et al*. 1946; Clarke 1986, 1999, 2003, 2007, 2015; McCourt and Mincham 1987; Bonney 2004; Stephens and Sharp 2009).

The known locations for *Lepidosperma prospectum* are within the traditional lands of the *Gamaragal*, *Gweagal* and *Dharawal* people (Tindale 1974; Mulvaney and White 1987; Troy 1994). While no specific records of utilisation have been found (e.g. Bodkin and Robertson 2013; Andrews *et al*. 2017), it is likely that *Lepidosperma prospectum* was utilised for fibre and weaving, similarly to *Lomandra longifolia* Labill., and the leaf bases may have been chewed when fresh water was scarce. Fishing was a very important source of food for Indigenous people in coastal regions around Sydney. *Dharawal* women made hand fishing lines using hair or plant fibres including twine made from *Livistona australis* (R.Br.) Mart. (Bursill *et al*. 2007), the stringybark *Eucalyptus agglomerata* Maiden or *Ficus rubiginosa* Desf. ex Vent. (Andrews *et al*. 2017), and fibre from *Lepidosperma* may well have been used for this purpose also.

Bees are known to collect resin (to make propolis) from *Lepidosperma* sp. Montebello (aff. *viscidum*) on Kangaroo Island and this contains novel chemical compounds with potential medicinal values (Duke *et al*. 2017). Similar chemical properties are probably widespread in the genus, particularly in species producing copious amounts of resin at the base of the plant, and may have been utilised by indigenous people as traditional medicines. R.L. Barrett has heard verbal reports of the bases of *Lepidosperma gladiatum* being chewed to treat colds in southern Western Australia, similar to noted use of boiled bases to treat colds (NACC 2017). Backhouse (1843) and Irvine (1957) record that the base of the inner leaves of *L. gladiatum* are edible, with a nutty flavour. They were eaten by Aboriginal people (Abbott 1983; Hansen and Horsfall 2016, 2019) and had some use as a vegetable by early colonists in southern Western Australia (Low 1991). While specific usage is not currently recorded, *L. avium* (as *L. canescens*) is included under a traditional name for sedges, *puṯa-puṯa*, in the Everard Ranges area of central Australia and may have been used for weaving basketry in the past by the *Yankunytjatjara* people (Everard *et al*. 2002).

As a genus, *Lepidosperma* attracted considerable interest as a fibre plant during the first century of European colonisation. Several tons of *L. gladiatum* were exported from South Australia to England for paper-making trials in the 19th century (Bonney 2004). Interest was sufficiently strong that a patent application for the use of fibres from *L. gladiatum* was made in South Australia. It is noteworthy that a select committee of the Legislative Council of South Australia refused the application for exclusive rights in recognition of similar traditional usage by Aboriginal people in the region (Corbett 1861). The vigorous clonal spread of *Lepidosperma gladiatum* in coastal areas may make it amenable to cultivation and harvest as a perennial fibre crop, in addition to being valuable for dune stabilisation (though harvesting from wild populations could have similarly negative impacts). The potential of *Lepidosperma* for fibre use has been known for some time (e.g. Christy 1882, Maiden 1892, Hannan 1902); however, commercial utilisation is yet to become a reality, possibly due to challenges in cultivating plants due to seed dormancy (Panaia *et al*. 2009; Kodym *et al*. 2010; Turner *et al*. 2014) and a generally poor understanding of the ecology of the genus, despite its widespread use by Aboriginal people.

Methods

The description of the new species is based on specimens examined at NSW and in the field. Measurements and terminology follow Bruhl (1995), Barrett (2007b) and Plunkett *et al*. (2013).

Taxonomy

Lepidosperma prospectum G.T.Plunkett & R.L.Barrett, *sp. nov*.

Type: Royal National Park, Jibbon Trail, near Jibbon Head, New South Wales, 15 September 2020, *R.L. Barrett RLB 9330* (holo: NSW 1119251; iso: BM, CANB, MEL).

Lepidosperma sp. Blue Fish Point (R.L. Barrett & K.L. Wilson RLB 5554)

Large caespitose perennial 0.6–1.2 m high, 0.4–1.5 m across. *Rhizomes* spreading, to at least 30 cm long. *Culms* 65–115 cm long, 5.3–7.9 mm wide; 0.9–2.2 mm thick, biconvex to planoconvex, striate or smooth, not grooved, margins scabrous, marginal hairs continuous along blade, antrorse, evenly spaced, not resinous, faces glabrous. *Culms* longer than leaves, culm to leaf ratio ± 0.9. *Leaves* equitant, spreading at 10–20 degrees in individual ramets, 44–98 cm long. *Leaf sheath* 6–13 cm long, mid-brown, or dark brown to almost black, not conspicuously resinous, leaf sheath margins translucent, glabrous, smooth or scabrous, face glabrous. *Ligule* with a free limb, acuminate, glabrous or scabrous. *Leaf lamina* well-developed, (25–)38–87 cm long, 3.8–7.4 mm wide, 0.3–0.7 mm thick, linear, biconvex to concavo-convex, coarsely or finely striate, not deeply grooved, leaf lamina margins concolorous, not resinous, scabrous, marginal hairs continuous along blade (not interrupted), antrorse, evenly spaced, leaf lamina faces glabrous. *Involucral bract* 5–17 cm long, sheath 12–48 mm long, green, yellow-brown, pale to dark brown, or grey, not resinous, sheath apex scabrous or puberulous, lamina 38–112 mm long, 2.3–3.3 mm wide, isobilaterally flattened along entire length, or triangular in section at bract lamina apex, scabrous, not resinous, apex acuminate. *Inflorescence* narrowly ovate, or narrowly elliptic, panicle-like; 8–17 cm long, 28–34 mm wide, with 3–4 orders of branching, primary axis 7–14-noded, lowest internode 30–47 mm long, lateral branches 1 per node, spikelets somewhat distanced near the base of the inflorescence, but contracted above primary or secondary branches, lowest lateral branch 40–91 mm long, 10–30 mm wide (including spikelets). *Spikelet prophyll* emarginate, margin, keel and abaxial face puberulous. *Spikelets* 35–90 per lowest lateral branch, 7.1–9.8 mm long; 1.7–3.1 mm diam., all flowers bisexual, fertile, rachilla straight. *Sterile floral bracts* 4 per spikelet, basal bracts 3.2–4.2 mm long, apex aristate, midrib raised, mucronate, abaxial face puberulous, margins puberulous. *Fertile floral bracts* 3 per spikelet, 6.9–8.3 mm long, 1.2–1.5 mm wide, apex subulate, not mucronate, midrib apparent, abaxial face puberulous, adaxial face glabrous, margins puberulous. *Stamens* 3, filaments 4.1–6.8 mm long; anthers 2.5–3.2 mm long, 0.4–0.5 mm wide, with a glabrous apical appendage 0.9–1.1 mm long. *Style* 3-branched, undivided part 2.6–3.7 mm long, glabrous, branches 1.9–2.7 mm long, hairy. *Perianth scales* 6, 1.2–1.8 mm long, 0.4–0.7 mm wide, narrow-ovate or ovate, apex caudate or subulate with antrorse hairs, base glabrous. *Nutlet* 3.7–4.5 mm long, 2.0–2.2 mm diam., ovate to elliptical in outline, ribs raised or almost flush, whitish, pale yellow to pale yellow-brown, glabrous, style base persistent, *c*. 0.15 mm long, 0.3 mm wide. (Figs 1–4)

Diagnostic characters: Differs from *Lepidosperma concavum* in the finely scabrous and non-viscid culm margins (culm margins of *L. concavum* are puberulous and viscid). Differs from *L. sieberi* in the larger habit (0.6–1.2 *vs* 0.2–0.6 m high), and longer (8–17 *vs* 3–10(–15) cm long) but more-slender inflorescence that is less branched.

Lepidosperma sieberi is generally smaller and notably has culms 3–6 (rarely to 7.5) (*vs* 5.3–7.9) mm wide, spikelets 7.1–9.8 (*vs* 5–8) mm long, fertile floral bracts 6.9–8.3 (*vs* 6–7) mm long and nutlets 1.4–1.9 (*vs* 2.0–2.2) mm wide.

Lepidosperma latens K.L.Wilson is superficially similar, but can readily be distinguished by the fine, harsh scabrous margins that easily cut the skin when attempting to pull out leaves or culms.

Distribution and abundance: Known from three locations in the Sydney region, from Manly (Blue Fish Point, Sydney Harbour National Park), Kamay Botany Bay National Park, on the southern side of Botany Bay, and near Bundeena in the north-eastern part of Royal National Park. Although it is locally common at this latter location, the actual number of individuals (a few hundred to a few thousand) may be low once extensive clonality is accounted for. Populations near Blue Fish Point and in Kamay Botany Bay National Park appear to be relatively small (10–100 individuals).

Habitat: Dense shrubland or heath, often windswept being not far behind the sea-cliffs, dominated by Coast Teatree (*Leptospermum laevigatum*) or mallee eucalypts that provide heavy shade, on pale grey sand over sandstone. The population at Manly appears be in what is classified by Tozer *et al*. (2010) as Sandstone Headland Scrub (their map unit HL p. 127), but the scale of their map is such as not to show small areas of vegetation units. This unit is described as occurring 'on coastal headlands formed by Hawkesbury Sandstone between Bouddi and Otford including Sydney Heads, Cape Banks and Royal National Park. Outlying stands occur further south on Beecroft Peninsula at Jervis Bay.'

The populations at Kurnell and in Royal National Park fall within a mapped mosaic of this unit and Coastal Sandplain Heath (unit HL p. 139 on the map of Tozer *et al*. 2010). The latter is described by them as 'on podsolised sand dunes, usually perched on coastal sandstone plateaux up to 150 m ASL' and has a broadly similar species composition to their HL p. 127. They regard HL p. 139 as restricted to small patches at Kurnell (which are not shown on their map of the region), Jibbon (NE Royal National Park) and Jervis Bay (Beecroft and Booderee).

Fig. 1. *Lepidosperma prospectum*, from Jibbon Trail, Royal National Park. A. Plant habit including spreading rhizomes. B. Inflorescence branchlet and spikelets. C. Inflorescence. D. Nutlet with perianth attached. E. Perianth scales with scabrous hairs at apex. Voucher: *R.L. Barrett RLB 9330* (NSW). Illustration by Lesley Elkan. Scale = : a = 20 cm, b = 1.5 cm, c = 5 cm, d = 0.5 cm, e = 0.3 cm.

Fig. 2. *Lepidosperma prospectum*, herbarium specimen from Bundeena Coastal Walk, Royal National Park. Voucher: *G.T. Plunkett 171 & K.L. Wilson* (NSW).

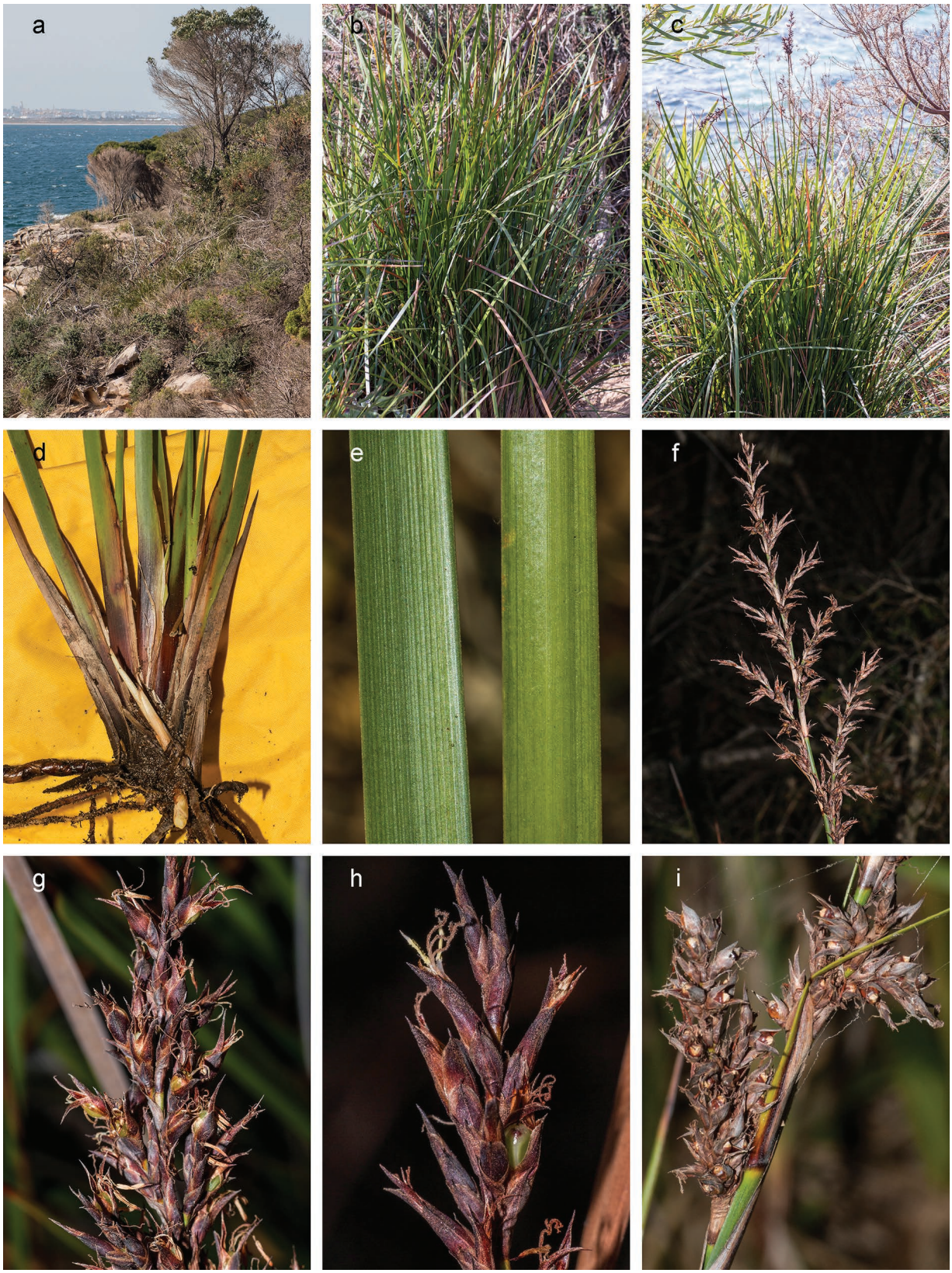

Fig. 3. *Lepidosperma prospectum*, from Jibbon Trail, Royal National Park. A. Habitat with Cronulla in the background. B, C. Plant habit. D. Plant base with rhizomes and sand-binding roots . E. Leaf (left) and culm (right) faces. F. Inflorescence. G. Spikelet with anthers. H. Spikelet with style. I. Fruiting spikelet. Voucher: *R.L. Barrett RLB 9330* (NSW). Photos by R.L. Barrett.

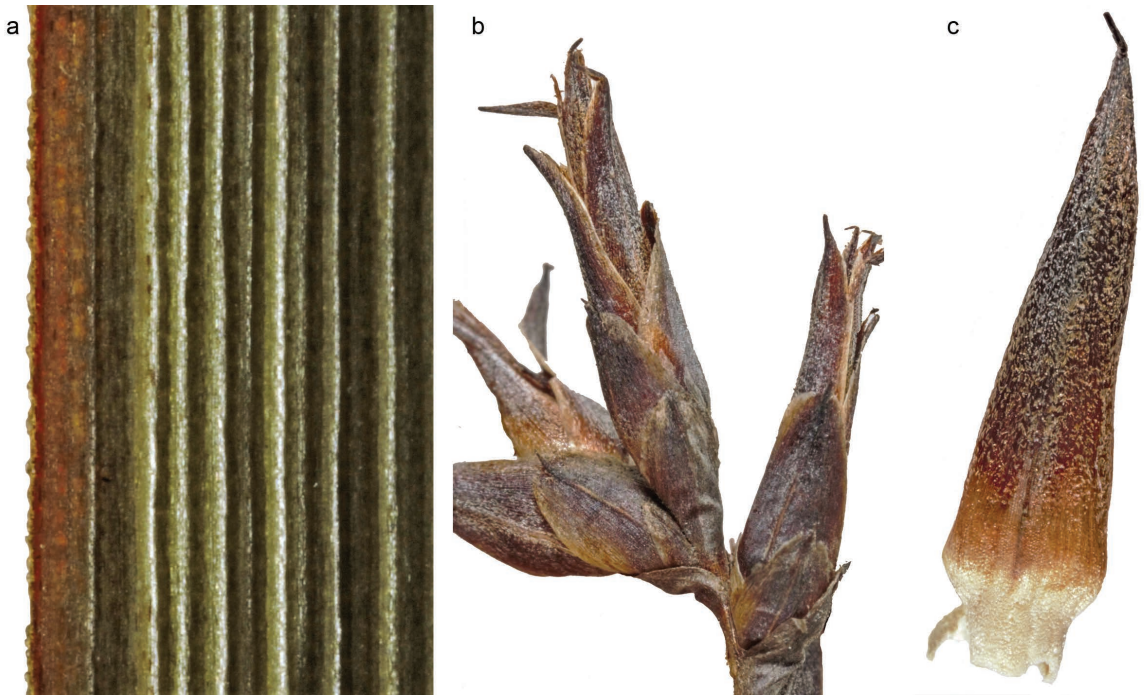

Fig. 4. *Lepidosperma prospectum*, microphotographs. A. Leaf (left) margin. B. Spikelets. C. Fertile glume indumentum. Voucher: *R.L. Barrett RLB 9330* (NSW). Photos by R.L. Barrett.

This species is recorded in association with *Acacia myrtifolia*, *A. suaveolens*, *Allocasuarina distyla*, *Banksia ericifolia*, *B. integrifolia*, *B. serrata*, *Boronia floribunda*, *Bossiaea ensata*, *Caustis pentandra*, *Corymbia gummifera*, *Dampiera stricta*, *Dianella revoluta*., *Dichondra repens*, *Eriostemon australasius*, *Eucalyptus burgessiana*, *E. oblonga*, *Ficinia nodosa*, *Gahnia clarkei*, *Glycine clandestina*, *Gompholobium glabratum*, *Gonocarpus tetragynus*, *Goodenia heterophylla*, *Hakea laevipes*, *H. propinqua*, *Hibbertia scandens*, *Hypolaena fastigiata*, *Isopogon anethifolius*, *Lambertia formosa*, *Lepidosperma concavum sens. strict.*, *L. sieberi*, *Leptospermum laevigatum*, *Leucopogon microphyllus*, *Lomandra glauca*, *L. longifolia*, *Melaleuca armillaris*, *M. nodosa*, *Mirbelia rubiifolia*, *Oxylobium cordifolium*, *Patersonia glabrata*, *Phebalium squamulosum* subsp. *argenteum*, *Pultenaea stipularis*, *Schoenus brevifolius, S. ericetorum, S. pachylepis* and *Westringia fruticosa*.

Phenology: Flowers recorded for September–October. Fruit probably maturing November–December.

Specimens examined: NEW SOUTH WALES: SW corner of pollution control facility near fence, *c*. 700 m SW of Blue Fish Point, Manly, Sydney, 78 m alt., 28 Jan. 2009, *R.L. Barrett & K.L. Wilson RLB 5554* (NE, NSW, PERTH); Royal National Park, *c*. 100 m SE along Coast Walk Track from Beachcomber Ave, Bundeena, 12 Sept. 2013, *G.T. Plunkett 171 & K.L. Wilson* (NE, NSW); Royal National Park, *c*. 0.5 km SE of Bundeena on sea-front track to Marley, 25 Jan. 1992, *K.L. Wilson 7975* (NSW).

Conservation: *Lepidosperma prospectum* is currently known from three small populations. Due to the severe impacts of urbanisation on coastal vegetation in the Sydney Basin (Benson and Howell 1990; Keith 1994; Fairley 2004; Bear 2010), it is highly likely that some populations of this species have been destroyed. Fortunately, it is protected in Kamay Botany Bay National Park, Royal National Park and Sydney Harbour National Park, where the surrounding vegetation is largely intact. Based on available information and observations, *Lepidosperma prospectum* is classified as Vulnerable (VU B2a+C2a) according to IUCN (2012) criteria.

Given the threat status, searching for additional populations in suitable habitat in the Sydney Basin should be prioritised. Recent fieldwork in similar coastal environments farther south (around Jervis Bay and Cape Dromedary) has not found any other populations. Based on the presence of similar vegetation types on coastal sandstone plateaux, further surveys are recommended around Bouddi Peninsula (described by McRae 1990 and Bell 2004), on Middle Head in Sydney Harbour, along the coast south of Bundeena in Royal National Park, and around Jervis Bay (all described by Tozer *et al.* 2010) is warranted.

Etymology: The epithet is from the Latin verb *prospicio, -ere, -exi, prospectum* (to look into the distance, have a view), in reference to the coastal and somewhat elevated habitat of this species behind the sea-cliffs. It is from such vantage points that the *Gamaragal*, *Gweagal* and *Dharawal* people would have observed the first Europeans arriving by boat some 250 years ago. The epithet is chosen to acknowledge the deep historical and living indigenous knowledge of the Australian environments gained through careful observation. In contrast,

the recent recognition of this species highlights a gap in the documented European knowledge of the Sydney region since Joseph Banks and Daniel Solander first collected plants (but not this species) around Botany Bay 250 years ago.

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References

Abbott I (1983) Aboriginal names for plant species in south-western Australia. *Forests Department of Western Australia Technical Paper* 5: 1–28. https://library.dbca.wa.gov.au/static/Journals/080074/080074-05.pdf

Andrews G, Bodkin F, Bodkin-Andrews G (2017) *D'harawal dictionary. Dictionary of the D'harawal Language with grammatical notes*. https://dharawalstories.com/dharawal-dictionary/

Anonymous (1895) *Official guide to the Museums of Economic Botany. No. 2. Monocotyledons and Cryptogams*. (Royal Gardens, Kew: London) https://doi.org/10.5962/bhl.title.33561

Backhouse J (1843) *A narrative of a visit to the Australian colonies*. (Hamilton, Adams & Co.: London) https://downloads.newcastle.edu.au/library/cultural%20collections/pdf/backhouse.pdf

Barrett RL (2007a) New species of *Lepidosperma* (Cyperaceae) associated with banded ironstone in southern Western Australia. *Nuytsia* 17: 37–60. https://florabase.dpaw.wa.gov.au/science/nuytsia/490.pdf

Barrett RL (2007b) *Lepidosperma gahnioides*, a new species of Cyperaceae from the Ravensthorpe region, Western Australia. *Nuytsia* 17: 61–66. https://florabase.dpaw.wa.gov.au/science/nuytsia/489.pdf

Barrett, RL (2012a) Description of six *Lepidosperma* species (Cyperaceae) based on type specimens. *Nuytsia* 22: 295–322. https://florabase.dpaw.wa.gov.au/science/nuytsia/626.pdf

Barrett RL (2012b) *Systematic studies in Cyperaceae tribe Schoeneae*: Lepidosperma *and allied genera*. Unpublished PhD thesis, The University of Western Australia.

Barrett RL (2013) Ecological importance of sedges: a survey of the Australasian Cyperaceae genus *Lepidosperma*. *Annals of Botany* 111: 499–529. https://doi.org/10.1093/aob/mct008

Barrett RL, Barrett MD (2015) Twenty-seven new species of vascular plants from Western Australia. *Nuytsia* 26: 21–87. https://florabase.dpaw.wa.gov.au/science/nuytsia/730.pdf

Barrett RL, Barrett MD, Wallace M, Bruhl JJ, Wilson KL (2012) Massive radiation of dryland sedges revealed by ETS nrDNA variation in a poorly know sedge genus (*Lepidosperma*: Schoeneae: Cyperaceae). In: Barrett RL. *Systematic studies in Cyperaceae tribe Schoeneae*: Lepidosperma *and allied genera*. Unpublished PhD thesis, The University of Western Australia.

Barrett RL, Wilson KL (2012). A review of the genus *Lepidosperma* Labill. (Cyperaceae: Schoeneae). *Australian Systematic Botany* 25: 225–294. https://doi.org/10.1071/SB11037

Barrett RL, Wilson KL (2013) Two new species of *Lepidosperma* (Cyperaceae) occurring in the Perth area of Western Australia. *Nuytsia* 23: 173–187. https://florabase.dpaw.wa.gov.au/science/nuytsia/674.pdf

Bear V (2010) *Kurnell Peninsula: a guide to the plants, animals, ecology & landscapes*. (Sydney Metropolitan Catchment Authority: Parramatta, NSW)

Beck W, Balme J (2003) Dry rainforests: a productive habitat for Australian hunter-gatherers. *Australian Aboriginal Studies* 2003: 4–20.

Bell SAJ (2004) *The natural vegetation of the Gosford Local Government Area, Central Coast, New South Wales – Vegetation community profiles.* (Final report to Gosford City Council, vn 2)

Benson D, Howell J (1990) *Taken for granted: the bushland of Sydney and its suburbs*. (Kangaroo Press: NSW)

Bodkin F, Robertson L (2013) *D'harawal climate and natural resources*. (Envirobook: Sussex Inlet, NSW)

Bonney N (2004) *Common native plants of the Coorong region*. (Australian Plants Society (SA Region): Unley, South Australia)

Bruhl JJ (1995) Sedge genera of the world: relationships and a new classification of the Cyperaceae. *Australian Systematic Botany* 8: 125–305. https://doi.org/10.1071/SB9950125
Bursill L, Jacobs M, Lennis D, Timbery-Beller B, Ryan M (2007) *Dharawal. The story of the Dharawal speaking people of Southern Sydney*. (Kurranulla Aboriginal Corporation: Sydney)
Cahir F, Clarke ID, Clarke PA (2018) *Aboriginal biocultural knowledge in South-eastern Australia. Perspectives of early colonists*. (CSIRO Publishing: Clayton South, Victoria)
Campbell TD, Cleland JB, Hossfeld PS (1946) Aborigines of the lower south east of South Australia. *Records of the South Australian Museum* 8: 445–502. https://www.biodiversitylibrary.org/item/127414#page/468/mode/1up
Christy T (1882) *New commercial plants: with directions how to grow them to the best advantage*. (Harvard University)
Clarke PA (1986) Aboriginal use of plant exudates, foliage and fungi as food and water sources in southern South Australia. *Journal of the Anthropological Society of South Australia* 24: 3–18.
Clarke PA (1999) Spirit beings of the Lower Murray, South Australia. *Records of the South Australian Museum* 31: 149–163.
Clarke PA (2003) Twentieth-century Aboriginal harvesting practices in the rural landscape of the Lower Murray, South Australia. *Records of the South Australian Museum* 36: 83–107. https://www.biodiversitylibrary.org/item/125955#page/93/mode/1up
Clarke PA (2007) *Aboriginal people and their plants*. (Rosenberg Publishing: Dural, NSW)
Clarke PA (2008) *Aboriginal plant collectors: botanists and Australian Aboriginal people in the Nineteenth Century*. (Rosenberg Publishing: Dural, NSW)
Clarke PA (2015) The ethnobotany of the Skyworld. Part 2: plants' connections with the heavens of Aboriginal Australia. *Journal of Astronomical History and Heritage* 18: 23–37. http://www.aboriginalastronomy.com.au/wp-content/uploads/2020/02/Clarke-2015-Astronomy-Ethnobotany-Part-2.pdf
Corbett FA (1861) Indigenous fibrous plants. *Transactions of the Royal Society of Victoria* 5: 205–208. https://www.biodiversitylibrary.org/item/103981#page/235/mode/1up
Dixon KW (2011) *Coastal plants. A guide to the identification and restoration of the Perth region*. (CSIRO Publishing: Melbourne)
Duke CC, Tran VH, Duke RK, Abu-Mellal A, Plunkett GT, King DI, Hamid K, Wilson KL, Barrett RL, Bruhl JJ (2017) A sedge plant as the source of Kangaroo Island propolis rich in prenylated p-coumarate ester and stilbenes. *Phytochemistry* 134: 87–97. https://doi.org/10.1016/j.phytochem.2016.11.005
Everard P, Everard M, Murika, Tjampu T, Kanytji, Pumani S, Milatjari, Goddard C, Kalotas A (2002) *Punu: Yankunytjatjara plant use. Traditional methods of preparing foods, medicines, utensils and weapons from native plants*. Revised edn. (Jukurrpa Books: Alice Springs)
Fairley A (2004) *Seldom seen: rare plants of greater Sydney*. (Reed New Holland: Sydney)
Gott B (1993) Use of Victorian plants by Koories. In *Flora of Victoria. Volume 1. Introduction*. (Eds DB Foreman and NG Walsh) pp. 195–211. (Inkata Press: North Ryde)
Gough J (2009) *Tayenebe: Tasmanian Aboriginal women's fibre work*. (Tasmanian Museum and Art Gallery: Hobart)
Gray M (1994) *Systematic studies in* Lepidosperma (*Schoeneae: Cyperaceae*). Graduate Diploma of Science thesis, University of New England, Australia.
Guilfoyle WR (1894) *Fibres from plants, indigenous and introduced: eligible for industrial culture and experiment in Victoria*. (Government Printer: Melbourne)
Hannan WI (1902) *The textile fibres of commerce: a handbook on the occurrence, distribution, preparation, and uses of the animal, vegetable, and mineral fibres used in cotton, woollen, paper, silk, brush, and hat manufactures*. (C. Griffin & Co.: London)
Hansen V, Horsfall J (2016) *Noongar Bush Medicine: Medicinal Plants of the South-west of Western Australia*. (UWA Publishing: Crawley)
Hansen V, Horsfall J (2019) *Noongar Bush Tucker: Bush Food Plants and Fungi of the South-West of Western Australia*. (UWA Publishing: Crawley)
Hodgon J, Bruhl JJ, Wilson KL (2006) Systematic studies in *Lepidosperma* (Cyperaceae : Schoeneae) with particular reference to *L. laterale*. *Australian Systematic Botany* 19: 273–288. https://doi.org/10.1071/SB06007
Irvine FR (1957) Wild and emergency foods of Australia and Tasmanian Aborigines. *Oceania* 28: 113–142. https://www.jstor.org/stable/40329092
IUCN (2012) *IUCN Red List Categories and Criteria: Version 3.1*. Second Edition. (IUCN Species Survival Commission: Gland and Cambridge)
Keith DA (1994) *Ocean shores to desert dunes: the native vegetation of New South Wales and the ACT*. (Department of Environment and Conservation: Hurstville, NSW)

Kodym A, Turner SR, Delpratt J (2010) *In situ* seed development and *in vitro* regeneration of three difficult-to-propagate *Lepidosperma* species (Cyperaceae). *Australian Journal of Botany* 58: 107–114. https://doi.org/10.1071/BT09183

Low T (1991) *Wild Food Plants of Australia*. Revised edn. (Angus & Robertson: Pymble)

Maiden JH (1892) *A bibliography of Australian economic botany*. (Government Printer)

Maiden JH (1889) *The useful native plants of Australia* (*including Tasmania*). (Technological Museum of New South Wales: Sydney) https://www.biodiversitylibrary.org/item/45057#page/7/mode/1up

Maiden JH (1902) Useful Australian plants. *The Agricultural Gazette of New South Wales* 13: 172–182.

McCourt T, Mincham H (1987) *The Coorong and lakes of the Lower Murray River*. (National Trust: Beachport, South Australia)

McRae RHD (1990) Vegetation of Bouddi Peninsula, New South Wales. *Cunninghamia* 2: 263–293. https://www.biodiversitylibrary.org/item/299253#page/279/mode/1up

Mulvaney DJ, White JP (eds) (1987) *Australians to 1788*. (Fairfax, Syme & Weldon Associates: Broadway, NSW)

Museum of Applied Arts and Sciences (MAAS), Sydney (2020) *Collections search*. https://collection.maas.museum/search?q=sedge&has_media=true&terms[0]=Baskets

Northern Agricultural Catchments Council (NACC) (2017) Coastal Plant Pocket Guide, Northern Agricultural Region, Western Australia. Second Edition. APP: https://play.google.com/store/apps/details?id=com.appiphany.coastalplants&hl=en%20

Olsen P, Russell L (2019) *Australia's first naturalists. Indigenous peoples' contribution to early zoology*. (NLA Publishing: Canberra)

Panaia M, Bunn, Turner SR, McComb J (2009) Incubation temperature critical to successful stimulation of in vitro zygotic embryo growth in four Australian native Cyperaceae species. *Plant Cell, Tissue and Organ Culture* 97: 197–202. https://doi.org/10.1007/s11240-009-9515-0

Plomley NJB (1962) A list of Tasmanian aboriginal material in collections in Europe. *Records of the Queen Victoria Museum Launceston* (new series) 11: 1–18. https://www.biodiversitylibrary.org/page/55513233#page/270/mode/1up

Plunkett GT (2016) *Systematics, evolution and ecology of eastern Australian species of* Lepidosperma *Labill.* (*Cyperaceae*). PhD thesis, University of New England, Armidale, NSW, Australia.

Plunkett GT, Bruhl JJ, Wilson KL (2018) A new species of *Lepidosperma* (Cyperaceae) allied to *L. congestum* of southern Australia. *Australian Systematic Botany* 31: 357–372. https://doi.org/10.1071/SB17055

Plunkett GT, Wilson KL, Bruhl JJ (2013) Sedges in the mist: A new species of *Lepidosperma* (Cyperaceae, Schoeneae) from the mountains of Tasmania. *PhytoKeys* 28: 19–59. https://doi.org/10.3897/phytokeys.28.5592

Scott R, Blake N, Campbell J, Evans D, Williams N (2002) *Indigenous plants of the sandbelt. A gardening guide for South-eastern Melbourne*. (Earthcare St Kilda: Melbourne)

Simpson DA, Inglis CA (2001) Cyperaceae of economic, ethnobotanical and horticultural importance: a checklist. *Kew Bulletin* 56: 257–360. https://doi.org/10.2307/4110962

Stephens KM, Sharp D (2009) *The flora of North Stradbroke Island*. (Queensland Herbarium, Environmental Protection Agency: Brisbane)

Tindale NB (1974) *Aboriginal tribes of Australia: their terrain, environmental controls, distribution, limits, and proper names*. (Australian National University Press: Canberra)

Tozer MG, Turner K, Keith DA, Tindall D, Pennay C, Simpson C, MacKenzie B, Beukers P, Cox S (2010) Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands. *Cunninghamia* 11: 359–406. [Maps and data on accompanying CD]

Troy, J (1994) *The Sydney language*. (Panther Publishing and Printing: Canberra)

Turner SR (2014) Seed ecology of *Lepidosperma scabrum* (Cyperaceae), a dryland sedge from Western Australia with physiological seed dormancy. *Australian Journal of Botany* 61: 643–653 https://doi.org/10.1071/BT13137

Waddy JA (1988) *Classification of plants and animals from a Groote Eylandt Aboriginal point of view*. (ANU North Australia Research Unit: Darwin)

Wilson KL (1993) Cyperaceae. In: Harden, G ed. *Flora of New South Wales*. Volume 4. pp. 293–396. Sydney: University of New South Wales Press.

Wilson KL, Morris DI (1993) *Lepidosperma curtisiae* (Cyperaceae), a new Australian species. *Telopea* 5: 423–425. https://www.biodiversitylibrary.org/page/57840954

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