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Multivariate drivers of diversity in temperate Australian native grasslands

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Supplementary tables

Table S1. Studies of fire in temperate grassy ecosystems in south-eastern Australia in relation to spatial scale of observation

PQ = point quadrat.

Sample size (m^2)	Vegetation Type	Author	Study aims
PQ	Grassy woodland	Prober *et al*. (2007)	Effects of fire frequency on tussock grasses and structure
PQ	Grassland	O'Bryan *et al.* (2009)	Effects of fire frequency on soil crusts
0.01 -1	Grassland	Morgan (1998a)	Small-scale species turnover with annual and biennial fire
0.0625	Grassland	Prober *et al*. (2004)	Effects of spring fires on exotic species
0.25	Grassland	Morgan (1999)	Response of perennial plants to fire (annual)
0.25	Grassland	Morgan & Lunt (1999)	Effects of time-since-fire on tussock grass dynamics
0.25	Grassland	Morgan (1998b)	Effects of burning history on seedbanks and floristics
0.25	Grassland	Morgan (2001)	Seedling recruitment dynamics with fire history
0.25	Grassland	Morgan (2007)	Effects of fire frequency on limitation to NPP
0.25	Grassland	Wong & Morgan (2012)	Effects of a fire event on species composition and species density
1	Grassland	Lunt & Morgan (1999b)	Effect of fire frequency on plant composition
1	Grassland	McDougall (1989)	Effects of tree halos on vegetation patterns
1	Grassland	Lunt (1994)	Variation in flower production with time-since-fire
1	Grassland	Sinclair *et al.* (2014)	Effect of fire on long unburnt dominant native grasses
1-100	Grassland	Bryant *et al.* (2017)	Effect of re-introduction of fire into native grasslands; population response of native and exotic species

4-200	Grassy woodland	Watson *et al.* (2009)	Fire frequency effects on composition and structure of the shrub layer
8	Grassland	Stuwe & Parsons (1977)	Floristics and management effects
9	Grassland	Groves (1974)	Growth of *Themeda* after fire and mowing
15	Grassland	Lunt (1990)	Regeneration after fire - floristics and seedlings
15	Grassland	Lunt & Morgan (1999a)	Vegetation change after 10yrs of grazing exclusion and intermittent fire
20	Grassy woodland	Lunt (1997)	Effects of management on floristics

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Table S2. Summary of evidence of grassland structure preferences of south east Australian grassland fauna.

Included are fauna that are grassland specialists confined to treeless vegetation, or species that have populations restricted to treeless grassland habitats. The table does not include taxa or species groups that rely on nearby woodland (e.g. kangaroos, bats, parrots, birds of prey, some reptiles) or ephemeral wetlands (e.g. frogs, waterbirds); for these species, existing evidence suggests that the nearby woodlands or ephemeral wetlands, respectively, are the strongest predictor of habitat suitability, and there is little evidence that grassland structure is an important predictor. We include some species for which we could only find observational evidence, but for which we consider the certainty of the structural preference to be high—these species are marked with an asterisk (*).

Taxa or species group	Is structure a key predictor of habitat suitability?	Key predictor of habitat suitability	References
Reptiles			
Striped legless lizard (*Delma impar*)	Yes	Intermediate structure	Dorrough and Ash (1999), Howland *et al.* (2014, 2016), Coulson (1990), Hadden (1995)
Olive legless lizard (*Delma inornata*)	Yes	Intermediate structure	Howland *et al.* (2014)
Curl snake (*Suta suta*)	Yes	Open grassland structure; also associated with surface rocks, fallen timber, ant nests and deep cracks	Antos (2018), Parker (2009), Swan *et al.* (2004)
Tussock skink (*Pseudemoia pagenstecheri*)	Yes	Intermediate grass structure, plus presence of surface stones	Turner (2012)
Eastern three-toe earless skink (*Hemiergis talbingoensis*)	Yes	Closed structure (but more common in woodlands than grasslands)	Howland *et al*. (2014)
Hooded scaly foot (*Pygopus schraderi*)	No	Presence of spider holes	Brown and Scroggie (2012)
Earless dragon (*Tympanocryptis pinguicolla*)	No	Presence of arthropod burrows	Stevens *et al.* (2010)
Mammals			
Fat-tailed dunnart (*Sminthopsis crassicaudata*)	Yes	Lightly grazed, open grassland structure	Hadden (2002), Homan (2012), Antos (2018)
Eastern barred bandicoot	Possibly	Historically, grassland structure may have determined habitat, but became dependent on habitat refuges due to predation	Reading *et al*. (1996), Dufty (1994)
Birds			
Plains-wanderer (*Pedionomus torquatus*)	Yes	Open/intermediate structure	Baker Gabb *et al*. (1990, 2016), Baker Gabb (1998)
Stubble quail (*Coturnix pectoralis*)	Yes	Dense and closed structure	Neave and Tanton (1989), Antos (2018)
Little button-quail (*Turnix velox*)	Yes	Intermediate structure	Antos (2018), Antos and Williams (2015)

Red-chested button-quail (*Turnix pyrrhothorax*)	Yes	Intermediate structure	Antos and Williams (2015)
Banded lapwing (*Vanellus tricolor*)	Yes	Short and sparse structure	Antos (2018), Antos and Williams (2015)
Brown songlark	Yes	Dense and closed structure	Antos (2018), Antos and Williams (2015)
Singing bushlark	Yes	Intermediate structure	Antos and Schultz (in prep)
Richard's pipit (*Anthus richardi*)	Yes	Intermediate to dense structure	Neave and Tanton (1989), Antos (2018), Antos and Williams (2015)
Horsefield's bushlark (*Mirafra javanica*)*	Yes	Dense and closed structure	Blakers *et al*. (1984)
Brown quail (*Coturnix ypsilophora*)*	Yes	Dense and closed structure	Antos and Williams (2015)
Inland dotterel (*Charadrius australis)**	Yes	Short and sparse structure	Parker (2009), Antos and Williams (2015)
Australian pranticole (*Stiltia Isabella)**	Yes	Short and sparse structure	Parker (2009), Antos and Williams (2015)
Invertebrates			
Ants	Yes	Grassland structural complexity important for composition, with similar ant diversity across a range of grassland structures	New (2000)
Collembola	Yes	Species richness higher in dense and closed grassland structure	Greenslade (1997)
Litter and topsoil invertebrates	Yes	Species richness higher in dense and closed grassland structure	Hutchinson and King (1980), King and Hutchinson (1983)
Golden sun moth (*Synemon plana*)	No	Presence/abundance of food plant (*Rytidosperma* spp. roots)	ACT Government (1998), O'Dwyer and Attiwill (1999), Griffith and Nano (2011), Richter *et al.* (2013)
Morabine grasshopper (*Keyacris scurra*)	No	Presence of food plant – though frequent disturbance may help maintain food plant.	Rowell and Crawford (1995), O'Dwyer and Attiwill (1999), Griffith and Nano (2011), Richter et al. (2013)
Centipedes and beetles	No	Presence of rocks	Hadden (2002)

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