Supplementary Material

Floral biology, pollination vectors and breeding system of *Zieria granulata* (Rutaceae), an endangered shrub endemic to eastern Australia

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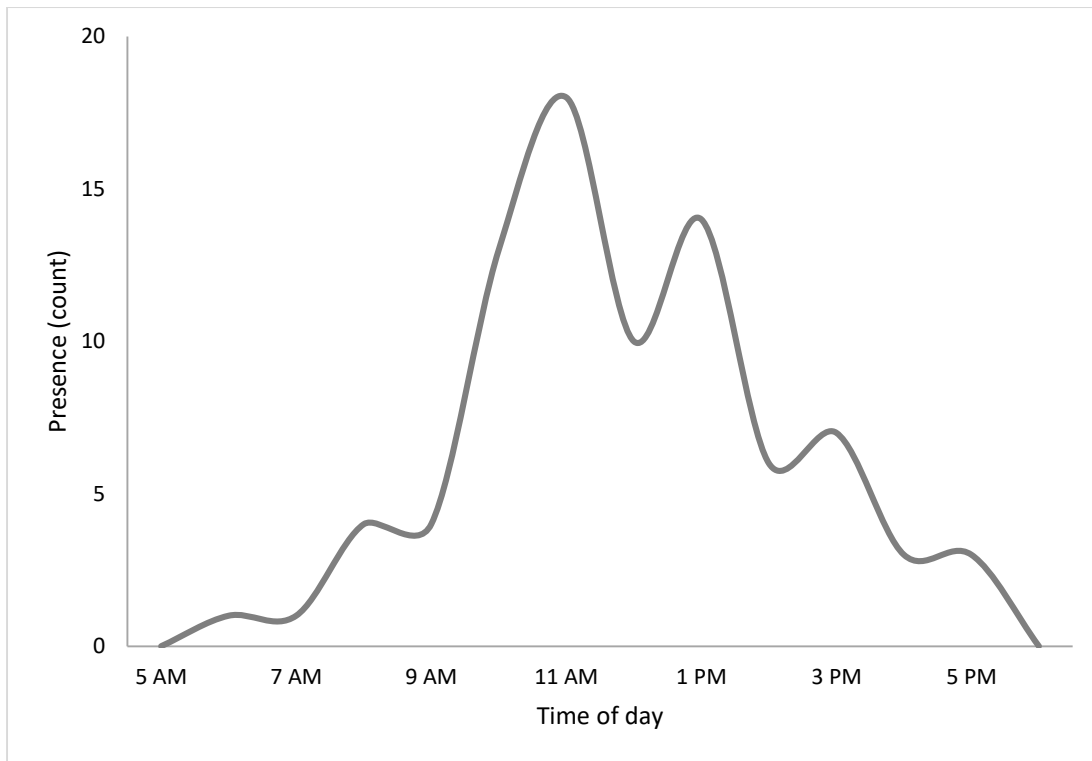
Fig. S1. Count of floral visitors foraging on *Zieria granulata* flower throughout the day, detected on time-lapse photography cameras recording between sunrise and sunset. Data is pooled across each of four sites, where three cameras were set to record on three non-consecutive days (n=144 h).

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Table S1. Survey effort to identify the floral visitors and potential pollinators of *Zieria granulata.* Values represent the total time spent observing floral visitors at each study site, and the number of shrubs observed, using each of four methods: digital video recordings [DVR], time-lapse photography [TLP], diurnal and nocturnal human observations [HO] and nocturnal infrared camera recordings [ICR].

Site	No. shrubs	DVR (h)	TLP (h)	HO (diurnal) (h)	HO (nocturnal) (h)	ICR (nocturnal) (h)
Jerrara	10	8	36	6	3	44
Kiama	3	8	36	6	3	44
Shellharbour	8	8	36	6	3	44
Wollongong	4	8	36	6	0	44
Total		32	144	24	9	176

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Table S2. Pollination treatments applied to understand the breeding system of *Zieria granulata*. Values indicate the number of replicates retrieved per shrub per treatment (of ten initially applied) following losses due to broken branches, lost pollination bags, shrub death. Shrubs were located at Austinmer, Jerrara Dam Reserve [Jerrara], Spring Creek Wetland, Kiama [Kiama], Spring Creek Wetland South, Kiama [South Kiama], and Killalea Reserve [Shellharbour] in New South Wales, Australia. Shrub ID is a unique identifier of shrubs used in the study.

Study Site	Shrub ID	Manipulative outcross	Autonomous selfing	Manipulative selfing	Open control (no bag)	Procedural control (partial bag)
Austinmer	1	3	3	3	3	0
	2	3	3	3	3	0
Jerrara	3	1	0	1	2	5
	4	0	3	0	2	0
	5	2	1	2	2	0
	6	1	5	1	2	5
	7	3	3	3	3	4
	8	3	3	3	3	0
Kiama	9	1	9	5	0	0
	10	3	6	2	2	0
	11	0	6	0	0	0
South Kiama	12	3	0	2	2	0
	13	3	0	3	3	0
	14	0	3	0	2	0
	15	0	3	0	3	0
	16	0	3	0	3	0
Shellharbour	17	0	4	0	3	0
	18	0	2	0	3	0
	19	0	2	0	3	0
	20	0	3	0	3	0
	21	0	4	0	3	0

Table S3. Analysis of deviance for GLM model fitted to the pollinator presence data in relation to pollinating taxon, sampling method and site.

Analysis of deviance summary table for the multi-factor generalized linear model (GLM) fitted to the *Zieria granulata* pollinator presence data. 'Species' (pollinating taxon), 'Site' (Jerrara, Shellharbour, Kiama and Wollongong), and 'Sampling' method (digital video recordings or human observations) were treated as fixed factors, while pollinator presence was the response variable. The reference level for species is *Apis mellifera*, Digital Video Recording for sampling, and Jerrara for site. (a) The interaction terms ('species:site' ; 'species:sampling' ; 'site:sampling') are included in the model. The presence of rarely observed species in this data set caused a high frequency of complete separation for individual species at sites. (b) The interaction terms are excluded from the model to account for the complete separation error. Significance codes: 0 '***' ; 0.001 '**' ; 0.01 '*' ; 0.05 '.' ; 0.1 ' ' .

	Source	d.f.	Likelihood Ratio (Chi^2)	*P* (Chi^2)	Significance code
a	Species	14	167.067	< 2.2e-16	***
	Site	3	31.864	5.59e-07	***
	Sampling	1	3.41	0.0648	.
	Species:Site	42	117.628	4.33e-09	***
	Species:Sampling	2	7.483	0.02372	*
	Site:Sampling	3	1.009	0.79899	
	Null	3599	1315.24		
b	Species	14	166.926	< 2.2e-16	***
	Site	3	31.691	6.08e-07	***
	Sampling	1	3.066	0.07996	.
	Null	3599	1315.24		