

# **Rungulla National Park Bush Blitz**

***Acari (mites) – Tenuipalpidae (flat mites), Tetranychidae (spider mites), Tuckerellidae (peacock mites), Phytoseiidae (predators)***

*02–13 May 2022*

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Nomenclature and taxonomy used in this report is consistent with:

The Australian Faunal Directory (AFD)

<http://www.environment.gov.au/biodiversity/abrs/online-resources/fauna/afd/home>

The Australian Plant Name Index (APNI)

<http://www.anbg.gov.au/databases/apni-about/index.html>

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## List of contributors

List of contributors to this report.			
Name	Institution/affiliation	Qualifications/area of expertise	Level/form of contribution
<i>Jenny Beard</i>	<i>Queensland Museum</i>	<i>Collection Manager (Acari) - mites</i>	<i>Principal author; survey participant; field collecting; mite identification; specimen preparation and labelling; databasing</i>

## Abstract

The Rungulla National Park Bush Blitz generated 677 registered mite specimens for Queensland Museum, and these records will be added to publicly accessible databases.

Plant associated mites were sampled at 13 different broad-based sites (Table 1), and each plant sampled for mites at these broad-based sites was individually georeferenced.

A total of 677 specimens representing at least 35 species of mite were collected from 72 samples of plant from 27 different species in 13 families. Just over half of the plant samples (43) had individuals of at least one of the four target mite families present.

Of the 35 mite species collected, only one could be identified to a known species, *Tetranychus bunda* Flechtmann & Knihinicki (a species of spider mite: Tetranychidae). There were (at least) 22 confirmed new species and three new genera discovered. Several species require further research to confirm if they are putative new species or known described species. The remaining specimens could be identified to genus, but species-level identification could not be determined due to varying reasons, for example the required sex was not collected or only immatures were collected.

There were no confirmed exotic or pest mite species collected on this trip. However, some species in known pest genera were collected, for example the flat mite genus *Brevipalpus*.

One significant range extension was recorded for the one known species collected – *T. bunda*. This species was originally recorded and described from “Florida beggar-weed” *Desmodium tortuosum* (Fabaceae) collected in Darwin (1,500 km from Rungulla NP). Here, it was collected from a host plant in the same genus, “large tick trefoil” *Desmodium brachypodum*.

## 1. Introduction

The Queensland Museum was invited to collaborate with the Australian Tropical Herbarium, Queensland Herbarium and individuals from a selection of other institutions to undertake a Bush Blitz field survey of Rungulla National Park and Resources Reserve located in far north Queensland, within the lands of the Ewamian People who have an ongoing connection with and play an active role in caring for Country. The survey was undertaken 02–13 May 2022.

Rungulla is located approximately 116 km south-west of Forsayth, was relatively recently acquired as a national park in 1997 and was formally gazetted on 27 November 2015. Rungulla National Park is 118,500 hectares in size, and the Resources Reserve is a further 11,007 hectares. The area contains rugged sandstone country, dissected by the Gilbert River and straddles 2 bioregions: the Gulf Plains and Einasleigh Uplands. Rungulla has significant natural values including springs and spring-fed watercourses, plateau lagoons, and varied refugia habitats, along with a wide range of sandstone landforms. The diverse habitat types, such as woodlands with perennial grasses, provide habitat for species of conservation significance such as the Gouldian Finch and Koala. The Gilbert River is the main waterway through the park, which, along with significant wetlands and waterway areas such as sedge lagoons on plateau surfaces, contribute significantly to the biodiversity of the park.

As it was only relatively recently acquired as a national park, very little biodiversity surveys have been undertaken in the park, with little to no concerted invertebrate surveys undertaken at all. As far as plant-associated mites are concerned, there have been no collections made in this national park, and only limited opportunistic collecting of mites has been undertaken in general across the huge expanse of northern Queensland as a whole.

The Acari are an extremely understudied group in Australia, and the limited collecting undertaken so far has revealed a huge diversity of new taxa. Beard is an expert on two of the most important mite groups of economic and quarantine significance – 1. the obligate plant-

feeding spider mite superfamily Tetranychidae (5 families), and 2. the family of arboreal predators used in biocontrol programs, Phytoseiidae. Within the Tetranychoida, Beard has mostly targeted the tremendously understudied family of flat mites, the Tenuipalpidae, of which Australia has the greatest diversity of endemic genera in the world, and an inordinate diversity of taxa which have radiated on our unique endemic flora. Collecting was focussed on the 4 families Tenuipalpidae, Tetranychidae, Tuckerellidae and Phytoseiidae during this Bush Blitz expedition.

It was difficult to predict what the mite diversity would be in an entirely unsurveyed region, but it was expected that most mite taxa collected would be new to science. Because the focus was arboreal plant-associated mites, plant taxa that were known to have had mites in other regions of Australia were initially targeted for sampling, and this proved to be a very successful approach.

## 2. Methods

### 2.1 Site selection

Sites were selected based on what was already known of the various plant assemblages and specific taxa present in the park, using vegetation maps, Queensland Herbarium (BRI) records, and an earlier list of native plant species from the Department of Environment and Science Queensland (2013). Sites were selected in an effort to sample as many habitat types as possible and to cover the widest geographic range as possible, in an effort to maximise the mite diversity collected. Mites were sampled at 13 different broad-based sites (Table 1; Figs 1–2). At each of these sites, each plant sampled was individually georeferenced, or in cases where several species of plants growing in close proximity to each other were sampled, one central georeference point was recorded.

Site	Bush Blitz site name	Date	Representative Latitude	Representative Longitude
1	Marta Logo Spring	03.v.2022	-19.12588	143.50052
2	Carson's Spring (Fig. 1A)	03.v.2022	-19.05303	143.50444
3	Green Ant Spring (Fig. 2C)	03.v.2022	-19.09497	143.57300
4	Site O (Fig. 2C)	04.v.2022	-19.35975	143.54292
5	Site Q	04.v.2022	no mites collected	
6	Site D (Fig. 1B)	05.v.2022; 12.v.2022	-18.94986	143.36035
7	Site R (Fig. 1D)	06.v.2022; 07.v.2022	-19.00036	143.40649
8	Bank of Gilbert River north of base camp	07.v.2022	-19.05964	143.42575
9	Site L	08.v.2022	-19.46656	143.52586
10	Site J (Fig. 2B)	08.v.2022	-19.57032	143.48578
11	Site T (Fig. 2D)	09.v.2022	-18.98355	143.38136
12	Site N (Fig. 2A)	11.v.2022	-19.40740	143.57594
13	Bank of Gilbert River at base camp	11.v.2022	-19.13464	143.46974

**Table 1.** A list of the broad-based sites sampled for mites, indicating the name used for the site during the BB expedition, the collection dates, and a representative set of co-ordinates.

At these 13 broad-based sites, general plant sampling was undertaken, but certain plant taxa were targeted if present, including Myrtaceae, Casuarinaceae, Goodeniaceae, Rhamnaceae, Malvaceae, Cyperaceae, Poaceae. In several cases, the same plant species was sampled at multiple sites to accumulate data on the distribution and host specificity of the mites collected.



**Figure 1.** Examples of mite field collecting sites (see Table 1): (A) Site 2 / Carson's Spring; (B) Site 6 / BB Site D (n.b. a tiny Robert Raven can be seen up on the ridge collecting spiders); (C) Site 3 / Green Ant Spring, showing host plant for *Tetranychus bunda* (Tetranychidae); (D) Site 7 / BB Site R. Photos Jenny Beard, QM (B, D), Christine Lambkin, QM (A, C).



**Figure 2.** Examples of mite field collecting sites (see Table 1): (A) Site 12 / BB Site N; (B) Site 10 / BB Site J; (C) Site 4 / BB Site O; (D) Site 11 / BB Site T. Photos Jenny Beard, QM.

## 2.2 Survey techniques

Each plant sampled was individually georeferenced, i.e. each broad-based site has a cluster of GPS points associated with it. In cases where there were multiple individuals of one plant

species growing in close proximity to each other (within a 5 m radius), leaf samples were taken from multiple individuals, and a central georeference point was recorded. Likewise, in cases where several species of plants growing in close proximity to each other were sampled, one central georeference point was recorded.

Samples of plants were collected into zip-lock plastic bags and taken back to the base camp where they were examined using a dissecting microscope. The type of plant parts collected for each plant species was based on previous experience with the microhabitats that the different groups of mites tend to inhabit. Samples mostly consisted of 5–10 branchlets, each 30–40 cm long. As many of the plant species collected during this survey had never been previously sampled for mites, the specific microhabitats of the mites were not certain. Hence, the samples tended to include as many plant structures as possible to cover many known possibilities — new and old leaves, lengths of stems with various diameters (and hence ages), fruit and flowers (also needed for herbarium vouchers), and sometimes roots. Herbarium vouchers were made of all plant taxa that were not identified by the botanists present at the time, and submitted to Queensland Herbarium (BRI) for identification and vouchering. BRI voucher numbers were not available at the time of writing this report, but relevant numbers will be included with any future mite descriptions.

The dorsum and venter of each leaf and all sides of each stem and fruit were examined for mites under a dissecting microscope. The specific location and the colour of each mite species was recorded, along with any other interesting biological notes.

### **2.2.1 Methods used at standard survey sites**

A survey for mites was not undertaken at either of the two standard survey sites.

## **2.3 Identifying the collections**

A total of 677 individual mites representing a subsample from each collection made on the expedition were cleared in Nesbitt's solution and mounted on glass microscope slides in Hoyer's medium. The slides were heated in an oven at 50° Celsius for a minimum of 3 weeks to set the mounting medium. Any excess mounting medium was cleaned away from around the coverslip and two separate coats of sealant were applied around the coverslip (a minimum of 24 hours apart). The slides were then examined under 400X and 1000X for identification (Fig. 3).

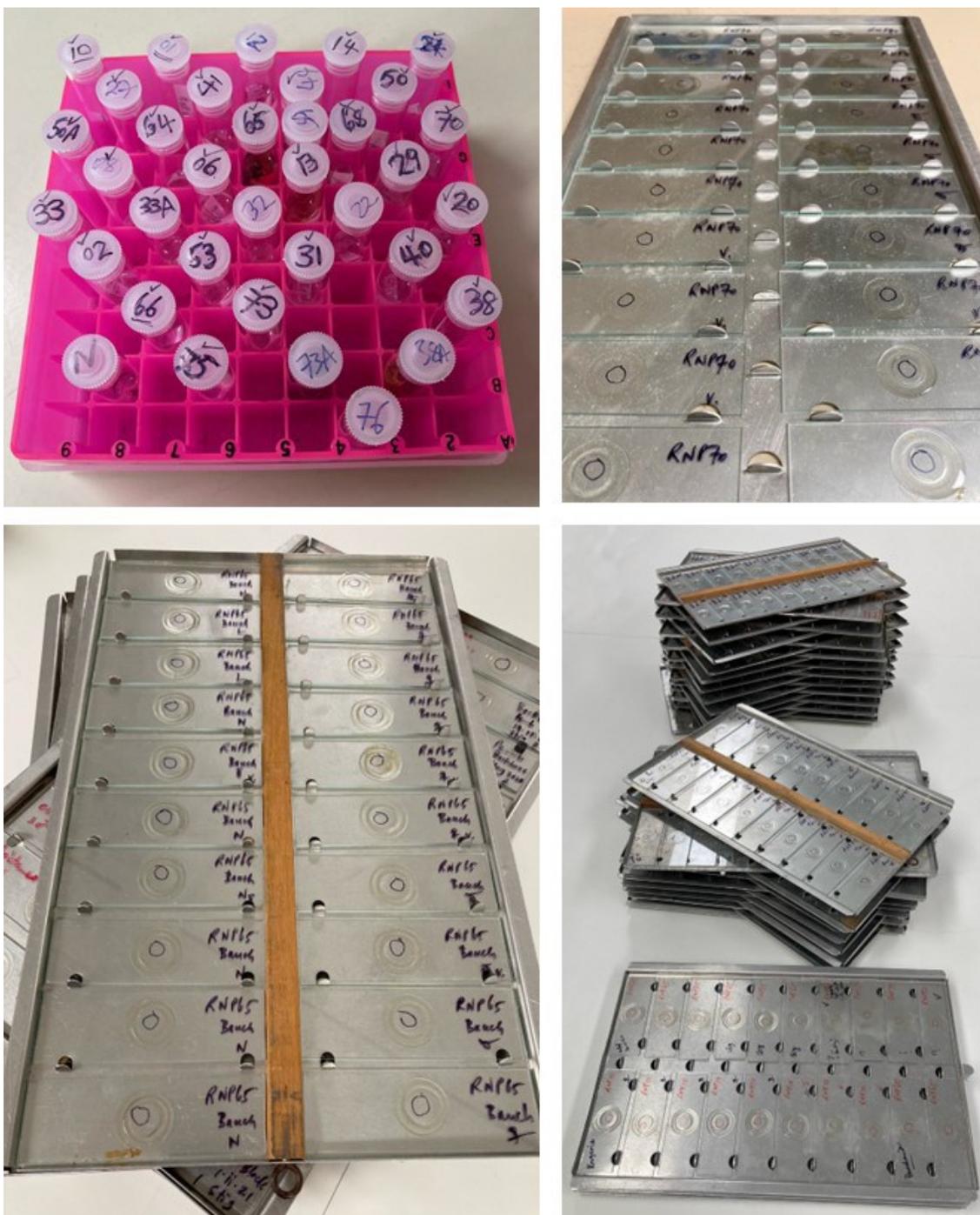
All mites were identified by Dr Jenny Beard (Collection Manager (Acari), Queensland Museum) using relevant literature and through reference to mite specimens in the Queensland Museum Acarology Collection.

The following references were used for the identifications:

Tenuipalpidae: Beard et al. 2005; Beard & Gerson 2009; Beard & Ochoa 2011; Beard et al. 2013; Beard et al. 2014; Beard et al. 2018; Beard et al. 2022; Mesa et al. 2009.

Tetranychidae: Beard 2018; Bolland et al. 1998; Seeman & Beard 2011.

Phytoseiidae: Beard 2001; Chant & McMurtry 2007; Farzan et al. 2013; Schicha 1987; Walter & Beard 1997.



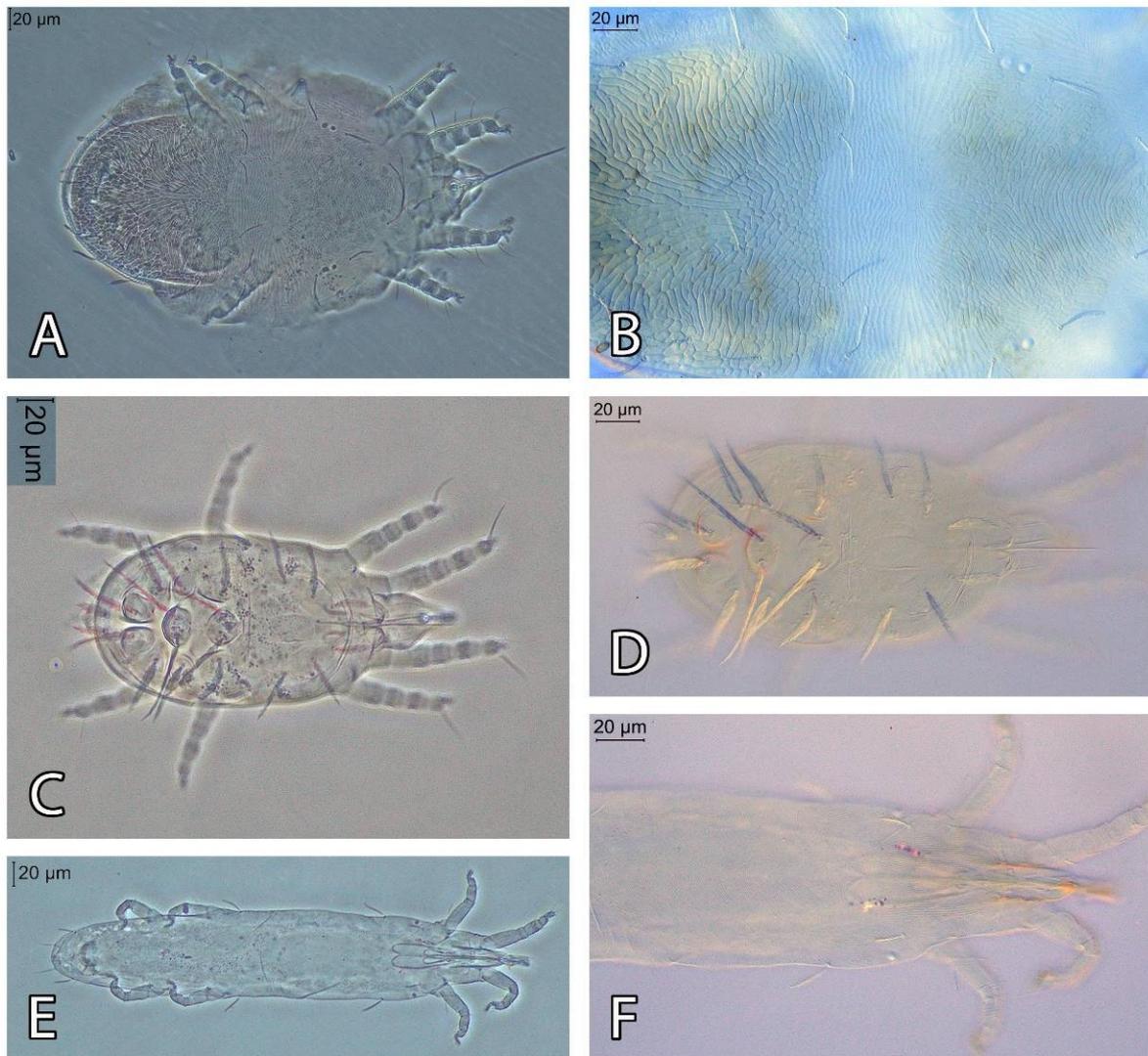
**Figure 3.** Preparing mites for identification from specimens preserved in vials of alcohol to hundreds of specimens preserved on slide preparations ready for labelling and databasing.

### 3. Results and Discussion

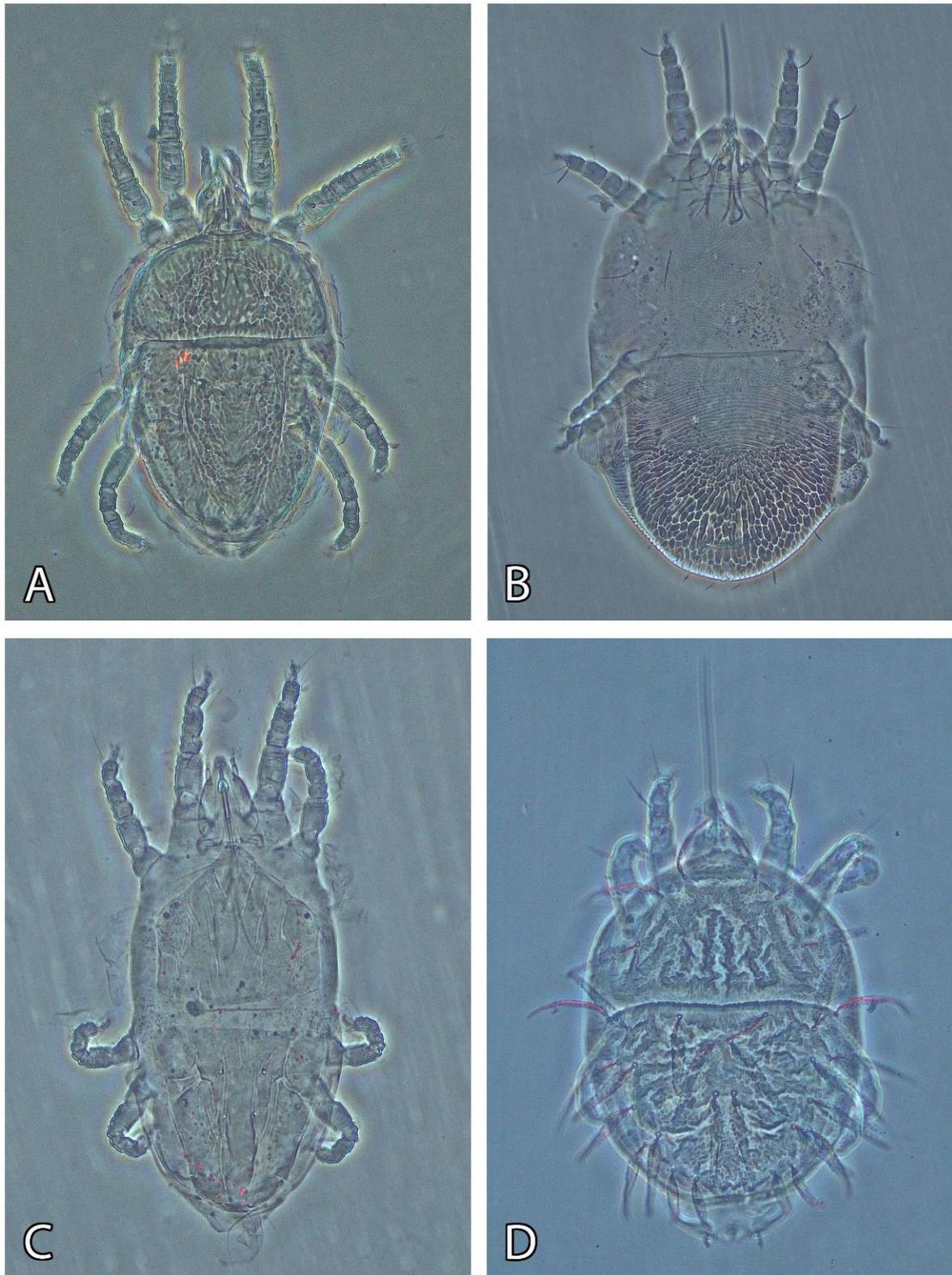
A total of 677 specimens representing at least 35 species of mite in the 4 target families were collected, from 72 samples of plant from 27 species in 13 families. Just over half of the plant samples (43/72) had individuals of at least one of the 4 target mite families present. Only one mite could be identified to species, a spider mite, *Tetranychus bunda* Flechtmann & Knihinicki. This spider mite was only collected at one site, and this record represents a significant range extension (Table 3). At least 22 species new to science were discovered – including a new species in each of three new genera and 20 new species in known genera. The numbers of species collected in the 4 target families were: Phytoseiidae - up to 10 species collected,

including 4 new species; Tenuipalpidae - 21 species collected, including at least 17 new species; Tetranychidae - 3 species collected, including 1 new species; Tuckerellidae - 1 species collected. There is potential for additional new species to be confirmed, but further research is necessary. Several new species and genera from this expedition to Rungulla NP will be described on 2 separate Bush Blitz Taxonomy Research grants.

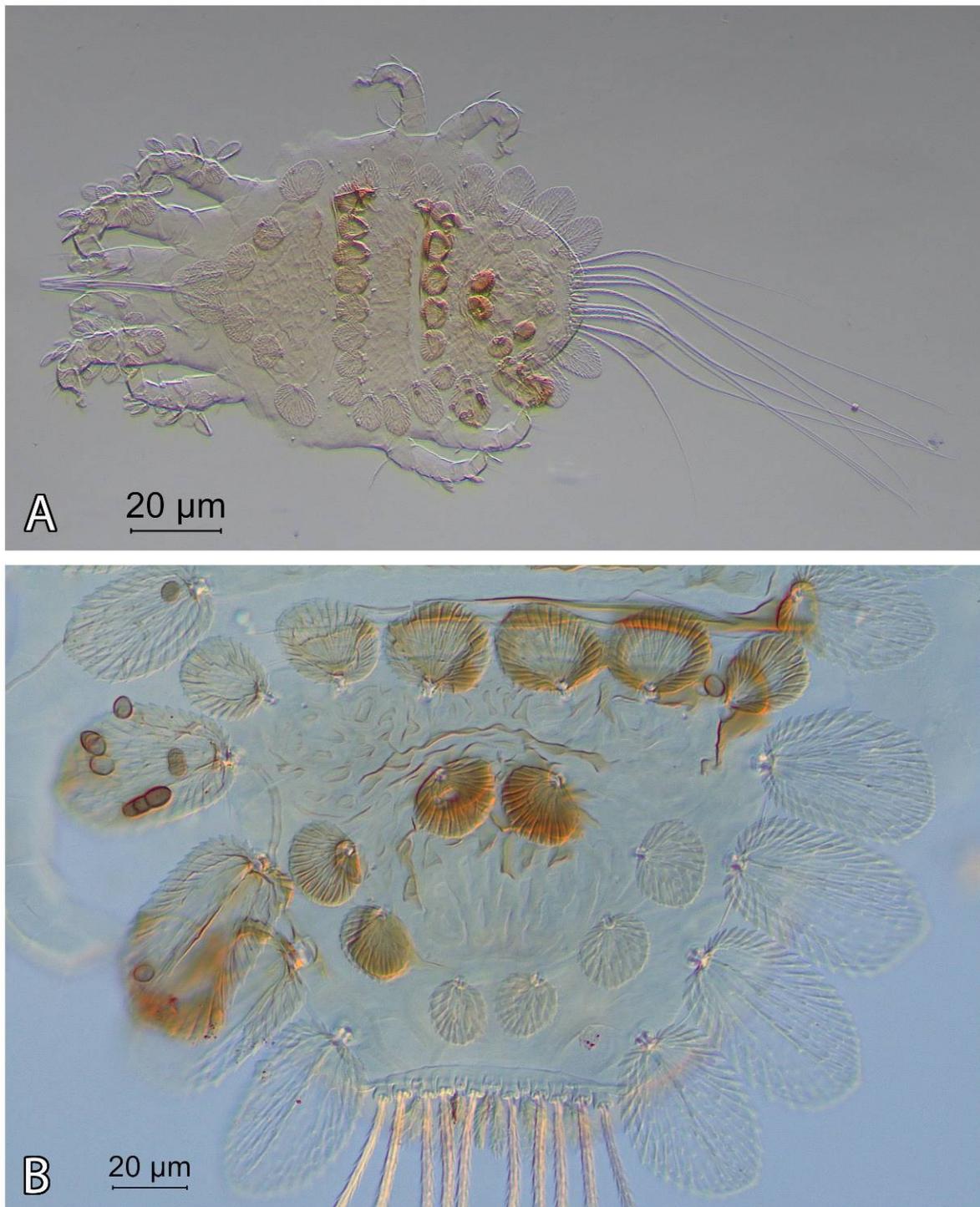
The presence of the target mites was somewhat hit and miss. Some plant species were collected at several sites and always had the same species of mite present, while other plant species had mites at some sites but not at others. For example, the sedge *Scleria sphacelata* (Cyperaceae) was collected at 4 different sites and had Genus A BBRNP sp. 1 present at all sites; and the river sheoak *Casuarina cunninghamiana* (Casuarinaceae) was sampled at 2 separate sites and had the same 2 species of flat mite (Tenuipalpidae) and species of predator (Phytoseiidae) present at both sites. While on the other hand, *Grewia savannicola* (Malvaceae) was sampled at 4 different sites, but the flat mite *Krugeria* BBRNP sp. 1 (Fig. 4 C–D) was found at only 2 of these sites.



**Figure 4.** Flat mite (Tenuipalpidae) species collected during the Rungulla NP Bush Blitz survey. A-B, *Aegyptobia* BBRNP sp. 1, habitus (PC phase contrast) and detail of dorsum showing pattern on cuticle (DIC differential interference contrast); C-D *Krugeria* BBRNP sp. 1, habitus (PC) and detail of dorsum (DIC); E-F, *Prolixus* BBRNP sp. 1, habitus (PC) and detail of anterior half of body. All specimens are adult females.



**Figure 5.** Flat mite (Tenuipalpidae) species collected during the Rungulla NP Bush Blitz survey. A, *Brevipalpus* BBRNP sp. 1; B, Genus B BBRNP sp. 1; C, Genus C BBRNP sp. 1; D, *Australopalpus* BBRNP sp. 1. All specimens are adult females.



**Figure 6.** An adult female peacock mite (*Tuckerella* BBRNP sp. 1: Tuckerellidae) collected during the Rungulla NP Bush Blitz survey. A, habitus showing the tail of elongate setae that the mite raises and rapidly flicks over its dorsum when disturbed, and hence earning its common name; B, close up of the posterior region of the dorsum showing the detail of the broad flattened dorsal setae.

**Appendix 1** lists all Tenuipalpidae, Tetranychidae, Tuckerellidae and Phytoseiidae recorded during the Bush Blitz. Collections made during this Bush Blitz will result in 677 records (1 specimen per slide, but one slide had 2 specimens) being added to the QM collection and an equivalent number of records added to publicly accessible databases.

### 3.1 Un-named or not formalised taxa

There are several taxa that could be identified to genus, but that could not be confidently identified as putative new species. Most of these taxa are morphologically similar to known described species, and further research is needed to confirm final identifications.

Two different species of *Phytoseius* (Phytoseiidae) were collected, and both belong in the *douglasensis* species-group. Neither of these two species have been listed as putative new species because more work is needed to confirm their identification. *Phytoseius* BBRNP sp. 1 is morphologically similar to *P. litchfieldensis* described by Walter & Beard from the Northern Territory.

*Australopalpus* BBRNP sp. 1 (Fig. 5D) was collected from both *Alphitonia excelsa* and *A. pomaderroides* (Rhamnaceae) at several sites. *Australopalpus* is an Australian endemic genus of flat mite with only 1 known species, *A. alphitoniae*, originally described from Brisbane. As no other species are known, we have no understanding of the limits between species for this genus. Beard feels that *Australopalpus* BBRNP sp. 1 is highly likely to be a new species based on the fact that it is a bright red mite and *A. alphitoniae* is a bright yellow mite (which sounds trivial, but is in fact a significant character), and also that it was collected geographically distant to the known distribution of *A. alphitoniae*. Morphologically, there are only very subtle differences between the 2 taxa, and more work needs to be done to confirm their separation.

*Prolixus* BBRNP sp. 1 (Figs 4E–F) was collected from the sedge *Gahnia aspera* (Cyperaceae) at several sites. Although there were differences in the colour of the various populations, from translucent orange to bright red, the populations have only subtle morphological differences, and are conservatively considered to represent one species until further work is completed. *Prolixus* BBRNP sp. 1 is morphologically similar to one of the two known Australian species in this genus, *P. corruginus*. For this reason it was not listed as a putative new species, until further research is completed.

The genus *Krugeria* was only recently recorded in Australia by Beard *et al.* (2022), based on a new species *K. ueckermanni* from *Grewia breviflora* (Malvaceae) collected in the Kimberley region of northern Western Australia. *Krugeria* BBRNP sp. 1 (Figs 4C–D) was collected on this Bush Blitz from *Grewia savannicola* at two different sites. Because it is morphologically very similar to *K. ueckermanni*, it was not listed as a putative new species until further research is done on its true identity.

Two different species of spider mite in the genus *Eotetranychus* were collected on this Bush Blitz. One is not listed as a putative new species because only one female was collected, and males are required for a definite species identification.

The peacock family Tuckerellidae contains just one genus of less than 30 species. The species-level taxonomy is in a state of flux, and it would take a great deal of work to confirm the species identification of the peacock mite *Tuckerella* BBRNP sp. 1 (Figure 6) collected on this expedition.

### 3.2 Putative new species (new to science)

In this report, 'putative new species' means an unnamed species that, as far as can be ascertained, was identified as a new species as a direct result of this Bush Blitz.

Species	Comment
<i>Neoseiulus</i> BBRNP sp. 1	This species was collected on <i>Alphitonia</i> spp. (Rhamnaceae) at two different sites; and it resembles <i>N. thwaiti</i> described from Bathurst NSW. Only two specimens were collected.
<i>Neoseiulus</i> BBRNP sp. 2	This species resembles <i>N. apeuthus</i> described

	from Goondiwindi QLD. Only one specimen was collected.
<i>Neoseiulus</i> BBRNP sp. 3	This species resembles <i>N. dieteri</i> described from Victoria and NSW. Only one specimen was collected.
<i>Neoseiulus</i> BBRNP sp. 4	This species is in the <i>Neoseiulus cangaro</i> species-group, which are associated with leaf litter and low growing plants. This mite was collected from the low-growing prostrate plant <i>Goodenia rosulata</i> (Goodeniaceae). Only one specimen was collected.
<i>Acaricis</i> BBRNP sp. 1	This genus was first described from sedges (Cyperaceae). Here, just one specimen was collected from a species of spinifex.
<i>Acaricis</i> BBRNP sp. 2	This new species was collected from a Cyperaceae host; only a few specimens were collected.
<i>Aegyptobia</i> BBRNP sp. 1	To date, only one species of <i>Aegyptobia</i> has been described from Australia (on <i>Callitrix</i> , Myrtaceae). This new species was collected on <i>Grevillea</i> (Proteaceae) (Figs 4A–B).
<i>Amblypalpus</i> BBRNP sp. 1	This genus has not been recorded from Australia before. This new species was collected from Goodeniaceae. Beard has collected several other new species from Goodeniaceae hosts, and all these new species will be described as part of a BB Taxonomy Research project.
<i>Bauchania</i> BBRNP sp. 1	This is a newly described genus collected from <i>Dampiera</i> and <i>Goodenia</i> (Goodeniaceae). Here it was again collected from a species of <i>Dampiera</i> .
<i>Dolichotetranychus</i> BBRNP sp. 1	This genus is strongly associated with monocot hosts; while the genus is recorded from Australia, there are no native species described yet. This species was collected from the spinifex <i>Triodia molesta</i> at two different sites.
<i>Dolichotetranychus</i> BBRNP sp. 2	This species was collected from a grass in very low numbers. Only two specimens were collected.
<i>Dolichotetranychus</i> BBRNP sp. 3	This species was collected from the spinifex <i>T. bitextura</i> . Only two specimens were collected.
Genus A BBRNP sp. 1	This species was collected from a Cyperaceae and will be formally described as part of a BB Taxonomy Research project. The new genus shares several morphological character states with <i>Afronychus</i> .
Genus B BBRNP sp. 1	This species is highly unusual in that the adult female remains sessile within the accumulated caste skins of all the immature stages (larva, protonymph, deutonymph); while the adult male is motile. The new genus shares morphological character states with <i>Aegyptobia</i> , of which Australia has just one species recorded/described so far (Fig. 5B).
Genus C BBRNP sp. 1	This species was collected from a Convolvulaceae host. This new genus has shares morphological

	character states with <i>Gahniacarus</i> , an Australian endemic genus described from a species of sedge (Cyperaceae) (Fig. 5C).
<i>Magdalenapalpus</i> BBRNP sp. 1	This a host-specific Australian endemic genus of mites associated with sheoaks (Family Casuarinaceae). Prior to this BB, only 3 species were known in the genus.
<i>Raoiella</i> BBRNP sp. 1	This is a genus of flat mites that most likely originated in Australia, and underwent a species radiation on Myrtaceae. Prior to 2018, 6 species were known worldwide, then Beard described 16 new species from Australia. Only four specimens were collected.
<i>Raoiella</i> BBRNP sp. 2	This is a genus of flat mites that most likely originated in Australia, and underwent a species radiation on Myrtaceae. Prior to 2018, 6 species were known worldwide, then Beard described 16 new species from Australia.
<i>Tegopalpus</i> BBRNP sp. 1	This a host-specific Australian endemic genus of mites associated with sheoaks (Family Casuarinaceae). Prior to this BB, only one species was known in the genus.
<i>Tenuipalpus</i> BBRNP sp. 1	This is a very large genus with 352 species described worldwide. Australia has only 5 species previously recorded, 4 of which are described from native plants. Unfortunately, the host plant for this species was not recorded.
<i>Tenuipalpus</i> BBRNP sp. 2	This is a very large genus with 352 species described worldwide. Australia has only 5 species previously recorded, 4 of which are described from native plants. This species is the first species from <i>Corymbia</i> (Myrtaceae).
<i>Eotetranychus</i> BBRNP sp. 1	Seven species of spider mites in this genus have been recorded from Australia. This is the first species from <i>Grevillea</i> (Proteaceae).

### 3.3 Exotic and pest species

There were no confirmed exotic or pest mite species collected on this trip. However, 3 mite families that were targeted on this Bush Blitz (Tetranychidae, Tenuipalpidae, Tuckerellidae) are all entirely obligate plant feeders, and as such include species with considerable economic and quarantine significance world-wide.

The flat mite family Tenuipalpidae contains a genus of taxonomically exceedingly difficult mites, *Brevipalpus*, that are of tremendous economic significance due to their ability to vector highly destructive plant viruses (e.g. the Citrus Leprosis virus complex). *Brevipalpus* BBRNP sp. 1 (Fig. 5A) was collected at 2 different locations on 2 different host plants (Site 2 on *Grevillea pteridifolia* (Proteaceae); Site 13 on *Callicarpa candicans* (Verbenaceae)). This species is morphologically similar to *Brevipalpus yothersi*, a species originally described from the USA, but is present in Australia (and all across the world), and a recently described species *B. incognitus* that had been previously identified as *B. yothersi*. This genus is undergoing significant taxonomic changes due to the presence of cryptic species, and further work is needed to identify this species. Another sample of *Brevipalpus* was collected at a third location on a third host plant (Site 7 on *Labichea brassii* (Caesalpineaceae)), but no further identification could be made with any certainty as the specimens were all immature.

The spider mite family Tetranychidae contains some of the most important mite pests in agriculture world-wide. Only 3 species of spider mite were picked up on this expedition, and these are assumed to all be native species and not of economic significance. Based on preliminary research, the spider mite species *Eotetranychus* BBRNP sp. 1 is assumed to be a new native species; however, further detailed investigation into related fauna, for example in SE Asia, would be required to unequivocally confirm it is not exotic.

The peacock family Tuckerellidae is becoming increasingly important in agriculture as we learn more about their ecology and biology, and they can often go undetected in quarantine as they are more associated with bark than leaves of their plant hosts. It is highly unlikely that *Tuckerella* BBRNP sp. 1 (Fig. 6) is exotic, but more research is required to confirm the species identification.

### 3.4 Threatened species

As there were no threatened plant taxa sampled, it is assumed that there were no threatened mite species collected on this trip.

### 3.5 Range extensions

Species	Location sighted/observed	Distance from nearest known record (km)	Comments
<i>Tetranychus bunda</i>	Green Ant Spring	1,547 km (Fort Hill Wharf, Darwin, Northern Territory)	This species was originally recorded and described from “Florida beggar-weed” <i>Desmodium tortuosum</i> (Fabaceae) collected in Darwin. Here, it was collected from a related host plant, “large tick trefoil” <i>Desmodium brachypodum</i> .

### 3.6 Genetic information

There was no specific genetic sampling undertaken on this expedition.

## 4. Information on species lists

As pointed out in the Introduction, there have been no previous surveys targeting plant-associated mites undertaken in this national park, and only scant opportunistic mite collecting undertaken in north Queensland in general. Only one sample could be identified to species, the spider mite *Tetranychus bunda*. The records for *T. bunda* on ALA suggest that this species was recorded from Western Australia; however these specimens (held in Queensland Museum) are not confirmed as this species, and have actually been identified as “nr *bunda*”. *Tetranychus bunda* was described from Darwin on an introduced species of Fabaceae, Florida begga-weed *Desmodium tortuosum*. This spider mite was collected on a native species of *Desmodium*, which suggests the mite shows some level of host specificity. This is the first record of this spider mite species for Queensland.

Unusually, only two genera of predatory mites in the family Phytoseiidae were collected on this trip, *Neoseiulus* and *Phytoseius* – a greater diversity was expected. The taxonomy for this family is based on adult females, which means that males can only reliably be identified to species when collected with their respective females. Four new species of *Neoseiulus* were collected, each from a different host plant and site. In addition, there were 4 different *Neoseiulus* males collected, but in the absence of females, they cannot be identified further

with confidence. Two different species of *Phytoseius* were collected, both in the *douglasensis* species-group. These 2 species have not been listed as putative new species as more work is needed to confirm their identification. *Phytoseius* BBRNP sp. 1 was only collected from river sheoak, which suggests some level of host specificity, a trait known to occur in the phytoseiid genus *Neoseiulus*.

## 5. Information for land managers

There are no recommendations for land managers at this time.

## 6. Other significant findings

Australia has the greatest diversity of flat mite genera in the world, with 24/41 known genera present here, and more significantly, half (12) of these are found only in Australian (endemic genera). Beard and coauthors have described 6 new Australian genera since 2005, and the discovery of 3 more new Australian genera from one national park is amazing and continue to place Australia solidly at the world centre of flat mite diversity.

## 7. Conclusions

As far as mites are concerned, years of research was generated in the discovery of at least 22 species completely new to science. Keeping in mind that only 13 tiny sites were visited, and only 27 species of plant were sampled across an area of nearly 130,000 hectares, it is easy to suggest that there must be 1000's more new mite species waiting for their turn to be discovered.

## Acknowledgements

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<b>Appendix 1. List of Acari (mites) recorded during the Rungulla National Park Bush Blitz</b>							
<b>Family</b>	<b>Species</b>	<b>Common name</b>	<b>Putative new species</b>	<b>Threatened (EPBC Act)</b>	<b>Threatened (State Act)</b>	<b>Exotic/ pest</b>	
Phytoseiidae	Neoseiulus BBRNP sp. 1	predatory mite	y	n	n	n	
	Neoseiulus BBRNP sp. 2	predatory mite	y	n	n	n	
	Neoseiulus BBRNP sp. 3	predatory mite	y	n	n	n	
	Neoseiulus BBRNP sp. 4	predatory mite	y	n	n	n	
	Neoseiulus BBRNP sp. A	predatory mite		n	n	n	
	Neoseiulus BBRNP sp. B	predatory mite		n	n	n	
	Neoseiulus BBRNP sp. C	predatory mite		n	n	n	
	Neoseiulus BBRNP sp. D	predatory mite		n	n	n	
	Phytoseius BBRNP sp. 1	predatory mite		n	n	n	
	Phytoseius BBRNP sp. 2	predatory mite		n	n	n	
	Tenuipalpidae	Acaricis BBRNP sp. 1	flat mite	y	n	n	n
		Acaricis BBRNP sp. 2	flat mite	y	n	n	n
		Aegyptobia BBRNP sp. 1	flat mite	y	n	n	n
		Amblypalpus BBRNP sp. 1	flat mite	y	n	n	n
Australopalpus BBRNP sp. 1		flat mite		n	n	n	
Bauchania BBRNP sp. 1		flat mite	y	n	n	n	
Brevipalpus BBRNP sp. 1		flat mite		n	n	n	
Dolichotetranychus BBRNP sp. 1		flat mite	y	n	n	n	
Dolichotetranychus BBRNP sp. 2		flat mite	y	n	n	n	
Dolichotetranychus BBRNP sp. 3		flat mite	y	n	n	n	
Genus A BBRNP sp. 1		flat mite	y	n	n	n	
Genus B BBRNP sp. 1		flat mite	y	n	n	n	
Genus C BBRNP sp. 1		flat mite	y	n	n	n	
Krugeria BBRNP sp. 1		flat mite		n	n	n	
Magdalenapalpus BBRNP sp. 1		flat mite	y	n	n	n	
Prolixus BBRNP sp. 1		flat mite		n	n	n	
Raoiella BBRNP sp. 1	flat mite	y	n	n	n		
Raoiella BBRNP sp. 2	flat mite	y	n	n	n		

<b>Family</b>	<b>Species</b>	<b>Common name</b>	<b>Putative new species</b>	<b>Threatened (EPBC Act)</b>	<b>Threatened (State Act)</b>	<b>Exotic/ pest</b>
	Tegopalpus BBRNP sp. 1	flat mite	y	n	n	n
	Tenuipalpus BBRNP sp. 1	flat mite	y	n	n	n
	Tenuipalpus BBRNP sp. 2	flat mite	y	n	n	n
Tetranychidae	Eotetranychus BBRNP sp. 1	spider mite	y	n	n	n
	Eotetranychus BBRNP sp. 2	spider mite		n	n	n
	Tetranychus bunda	spider mite		n	n	n
Tuckerellidae	Tuckerella BBRNP sp. 1	peacock mite		n	n	n