



Flinders Island Tasmania

20–30 March 2014

Bush Blitz Species Discovery Program



Australian Government

Department of the Environment and Energy



bhpbilliton

Sustainable Communities



Australian
Biological
Resources
Study

What is Bush Blitz?

Bush Blitz is a multi-million dollar partnership between the Australian Government, BHP Billiton Sustainable Communities and Earthwatch Australia to document plants and animals in selected properties across Australia.

This innovative partnership harnesses the expertise of many of Australia's top scientists from museums, herbaria, universities, and other institutions and organisations across the country.

Abbreviations

ABRS

Australian Biological Resources Study

ANIC

Australian National Insect Collection

EPBC Act

Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

TMAG

Tasmanian Museum and Art Gallery

TSP Act

Threatened Species Protection Act 1995 (Tasmania)

UNSW

University of New South Wales

Summary

From 20–30 March 2014, a Bush Blitz survey was conducted on Flinders Island in Bass Strait. The island has eight reserves, including Strzelecki National Park. Flinders Island is one of the remaining parts of the land bridge between the Australian mainland and Tasmania. This history, plus the wide range of habitats from mountains to open shrubland and coastal areas, means that the island is highly diverse.

The Bush Blitz survey recorded 862 species, 643 of which had not been recorded previously for the reserves. Thirty-nine species that may be new to science were identified, including 33 invertebrate species (3 moths, 1 beetle, 6 true bugs and 23 spiders) and 6 lichen species. One moth and 10 plant species listed under Tasmania's *Threatened Species Protection Act 1995* (TSP Act) were also collected. No species listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* were identified.

The Flinders Island reserves had not previously been surveyed for invertebrates. A total of 123 moth species were collected, including three that may be new to science, six new records for Tasmania, and seven rare and uncommon species. Five species of butterflies and seven species of dragonflies and damselflies were also recorded.

One hundred and twenty-eight beetle species and 64 true bug species were collected. Six true bug species are likely to be new to science, five belonging to the Miridae family and one to the Acanthosomatidae family. The new species of *Sangarius* is likely to have conservation significance because it was found only on Furze Hakea (*Hakea ulicina*), which is listed as Vulnerable under the TSP Act. The diversity of the true bug collection was more than what was expected, and further sampling in spring and summer is likely to extend the species list.

Sixty-two spider species were identified, 23 of which are putatively new to science. Twenty-one species of snails and slugs were collected, including confirmation of a previously unconfirmed species for Tasmania and two new records for Flinders Island. The collections confirmed previous impressions that the island has low overall native land snail diversity, especially in the family Charopidae.

During the Bush Blitz, 166 flowering plants, 26 ferns, 38 liverworts, 67 mosses and 138 lichens were identified. Six lichens putatively new to science were collected.

The Royal Tasmanian Botanical Gardens conducted a seed-collecting program during the Bush Blitz. Eight collections of eight taxa were made, including two threatened species, totalling 204 kilograms of seed.

Seven invertebrate exotic or pest species were identified: European Wasp (*Vespula germanica*), the dung-feeding dor-beetle *Elephastomus proboscideus*, Rutherglen Bug (*Nysius vinitor*), Hedgehog Slug (*Arion intermedius*), Striped Field Slug (*Lehmannia nyctelia*), Small Pointed Snail (*Prietocella barbara*) and White Italian Snail (*Theba pisana*).

No declared weeds listed under Tasmanian or national legislation were found within the reserves. The exotic Sea Spurge (*Euphorbia paralias*) was widespread in coastal areas throughout the island, and poses a significant weed problem. Cape Beach Daisy (*Arctotheca populifolia*) is also common and spreading on the east coast.

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Introduction

This is a report for the Bush Blitz program, which aims to improve our knowledge of Australia's biodiversity. Bush Blitz is an initiative of the Australian Government, through the Australian Biological Resources Study (ABRS), in partnership with BHP Billiton Sustainable Communities and Earthwatch Australia. Bush Blitz aims to:

- promote, publicise and demonstrate the importance of taxonomy through species discovery
- undertake a national species discovery program
- support the science of taxonomy in Australia through training students and early career researchers, and by providing grants for species description and resolution of taxonomically problematic, nationally important groups
- promote partnerships between scientific institutions, government, industry and non-government organisations
- inform reserve managers and other stakeholders of the results of Bush Blitz projects.

The Flinders Island Bush Blitz

The Flinders Island Bush Blitz was held in March 2014. The eight reserves surveyed were dispersed throughout Flinders Island and were highly diverse, from submontane rainforest to coastal scrub, wet peaty heathland, saline lagoons and beach dunes.

The timing of the survey in early autumn was not ideal for the collection of invertebrates or vascular flora (summer is better), however it did not affect the survey of lichens or bryophytes. The weather was generally good for sampling those insects that were around: there were several warm days and nights, although many days were cloudy and some were wet.

This Bush Blitz involved about 30 people, 15 of them leading Australian scientists. The ABRS provided the logistical coordination and overall leadership of the survey.

Experts from the following organisations conducted the field and laboratory work:

- Australian Biological Resources Study
- Queensland Museum
- Royal Tasmanian Botanical Gardens
- Tasmanian Herbarium
- Tasmanian Museum and Art Gallery
- University of New South Wales.

Acknowledgements

The Bush Blitz team consisted of Kate Gillespie and Mim Jambrecina. They would like to thank the Flinders Island Office of the Tasmanian Parks and Wildlife Service, particularly Wayne Dick and Cindy Pitchford, for facilitating access to the reserves and providing advice and assistance, and Wayne Warren for providing access through his private property and guiding the team through Bob Smith's Gully.

Reserve overview¹

Reserve names: Flinders Island, Tasmania, including the Brougham Sugarloaf Conservation Area, Darling Range Conservation Area, Killiecrankie Nature Recreation Area, Logan Lagoon Conservation Area and State Reserve, Mulligans Hill Conservation Area, Patriarchs Conservation Area and Private Sanctuary, Strzelecki National Park, Wingaroo Nature Reserve

Area: Flinders Island = 136 700 hectares; main reserves include Wingaroo Nature Reserve (9144 hectares), and Strzelecki National Park (4216 hectares)

Description

Flinders Island is one of more than 60 islands in the Furneaux Group, located in Bass Strait off the north-east tip of Tasmania on the 40th latitude parallel.

The Furneaux Group of islands is what remains of the original land bridge that once joined Tasmania to mainland Australia. The time of the flooding of this land bridge is debated but it is believed to have happened 12,000–18,000 years ago. Flinders Island is the largest of these islands and the region has around 900 permanent residents.

The long narrow island spans 62 km north to south and 27 km east to west. About one-third of the island is mountainous, with Mount Strzelecki the highest peak in the south and a rugged granite mountain range running the length of the island. Its climate is amongst the warmest and most equable in Tasmania. Though generally rather dry, the island's higher peaks attract cloud and rain while some deep gullies act as refugia from fire and drought.

Coastal areas are dominated by sandy dunes and the east coast is infiltrated by many lagoons with some forming extensive wetlands. The lower elevation coastal areas are covered with open shrub- and heathlands and areas of land cleared for pasture, while the higher elevation vegetation is mainly eucalypt woodland, some wet eucalypt forest and a few remnant pockets of rainforest. While clearance of native vegetation on Flinders Island has resulted in the loss of much of the island's forest and wetland, the remnants are still extensive and largely fall within the reserve system.

Conservation values

The island forms an area where many animal and plant species from mainland Australia and Tasmania overlap and is thus of high biogeographical importance. It straddles the divide between uniquely Tasmanian and mainland Australian flora, being at the southern-most range of several mainland species not otherwise found in Tasmania, and at the northern-most range of a few Tasmanian endemics.

¹ Information sourced from NRS applications and assessments, www.parks.tas.gov.au, www.visitflindersisland.com.au/places/living-on-flinders and en.wikipedia.org/wiki/Flinders_Island.

The Furneaux Group of islands are home to a very diverse fauna and flora. The total number of plant species in the Furneaux Group is well over 800. Mammal species include Red-necked Wallaby (*Macropus rufogriseus*), Common Brushtail Possum (*Trichosurus vulpecula*), Eastern Pygmy-possum (*Cercartetus nanus*), Long-nosed Potoroo (*Potorous tridactylus apicalis*), Common Ringtail Possum (*Pseudocheirus peregrinus*), Tasmanian Pademelon (*Thylogale billardierii*), and Australian Fur-seal (*Arctocephalus pusillus*). It is the only remaining habitat of a subspecies of Bare-nosed Wombat (*Vombatus ursinus ursinus*), which is listed as Vulnerable by the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and Tasmania's *Threatened Species Protection Act 1995* (TSP Act).

Over 120 species of bird are found on Flinders Island, including many visiting migratory Northern Hemisphere species. The region is also home to the Cape Barren Goose (*Cereopsis novaehollandiae*), and the 40-Spotted Pardalote (*Pardalotus quadragintus*), listed as Endangered under the EPBC Act and the TSP Act. Two areas in the centre and east of the island have been identified as Important Bird and Biodiversity Areas (IBAs), areas identified by BirdLife International as being globally important habitat for the conservation of bird populations.



View from Mt Strzelecki, photo Kate Gillespie © copyright, Department of the Environment and Energy

Methods

Taxonomic groups studied and personnel

A number of taxonomic groups were selected as targets for study. Table 1 lists the groups surveyed and the specialists who undertook the fieldwork.

Table 1 Taxonomic groups surveyed and personnel

Group	Common name	Expert	Affiliation
Lepidoptera	Butterflies and moths	Catherine Byrne Abbey Throssell	TMAG
Carabidae	Carabid beetles	Simon Grove	TMAG
Chrysomelidae	Leaf beetles	David de Little	TMAG
Heteroptera	True bugs	Gerry Cassis Jacqueline Karras	UNSW
Odonata	Damselflies and dragonflies	Abbey Throssell	TMAG
Arachnida	Spiders	Robert Raven	Queensland Museum
Gastropoda	Snails and slugs	Kevin Bonham	TMAG
Vascular plants	Vascular plants	Miguel de Salas Matthew Baker	Tasmanian Herbarium
Bryophytes	Liverworts and mosses	Lynette Cave	Tasmanian Herbarium
Lichens	Lichens	Gintaras Kantvilas	Tasmanian Herbarium
Seeds	Seeds	James Wood Natalie Tapson	Royal Tasmanian Botanical Gardens

The Bush Blitz team would also like to acknowledge the contributions of the following people:

- Mauro Daccordi, Museo Civico di Storia Naturale, Italy
- Peter McQuillan, University of Tasmania
- Rossana Silveira, UNSW
- Laura Sherman-Hayes, Sebastian Young and John Smythe, TMAG volunteers

Site selection

Site selection depended on access, suitability for trapping and time restrictions. Site locations were recorded using global positioning systems.



Some of the Bush Blitz team © copyright, Department of the Environment

L-R: Matthew Baker, Gintaras Kantvilas, Miguel de Salas, Natalia Taspson, James Wood, Mim Jambrecina, Simon Grove, Lynette Cave, Kate Gillespie, Jackie Karras, Gerry Cassis

Survey techniques

A standard suite of survey techniques was used:

- **General insect** collection was done by hand, supplemented by opportunistic spotlighting at night, and the use of hand-nets. Malaise, yellow pan and pitfall traps were set at four sites. Some specimens were also caught in light traps and spider pitfall traps.
- **Moths** were collected using light traps and portable bucket traps.
- **Butterflies** were collected with butterfly nets.
- **Carabid beetles** were collected by lifting and splitting logs, turning stones and spotlighting at night.
- **Leaf beetles** were collected by beating foliage and hand stripping bark from trees.
- **True bugs** were collected by beating vegetation, especially flowers, fruits and seeds.
- **Damselflies and dragonflies** were mainly collected using hand-nets near water.
- **Spiders** were collected in pitfall traps and by searching likely habitats, such as under rocks and logs, in leaf litter, under bark and along creek banks.
- **Snails** were hand collected from likely habitats.

- **Vascular plants** were collected and pressed individually.
- **Lichens and bryophytes** were collected as mixed samples and sorted later.
- **Seeds** were also collected. Plants were first inspected to determine viable target populations, and seeds from 50 or more individuals of each species were collected to capture the genetic diversity of the population.



Jackie Karras pooters for Heteroptera (true bugs), photo Mim Jambrecina © copyright, Department of the Environment and Energy

Identification

Collections were identified using available literature and the holdings of museums and herbaria. Fauna species were deposited with the TMAG, and flora species with the Tasmanian Herbarium.

Results

Locational data for all collection and observation records are available to reserve managers. In total 643 species were added to those previously recorded from the reserve, including 39 putative species new to science—these await formal identification. One threatened invertebrate species and 10 threatened flora species were found. Seven exotic or pest animal species and 12 weed species were also recorded. Table 2 provides a summary of the flora and fauna identified during the survey.

Table 2 Summary of flora and fauna species identified

Group	Common name	Number of species collected	Species new to the reserves	Putative new species	Threatened species*	Exotic and pest species**
Hymenoptera	Ants, bees and wasps	4	4	0	0	1
Lepidoptera	Butterflies	5	3	0	0	0
Lepidoptera	Moths	123	123	3	1	0
Diptera	Flies	1	1	0	0	0
Coleoptera	Beetles	128	128	1	0	1
Hemiptera	Lanternflies	1	1	0	0	0
Heteroptera	True bugs	64	64	6	0	1
Blattodea	Cockroaches	1	1	0	0	0
Mantidae	Mantids	1	1	0	0	0
Orthoptera	Grasshoppers, crickets and katydids	6	6	0	0	0
Odonata	Damselflies and dragonflies	7	6	0	0	0
Arachnida	Spiders	62	62	23	0	0
Gastropoda	Snails and slugs	21	5	0	0	4
Magnoliophyta	Flowering plants	166	66	0	9	12
Tracheophyta	Ferns and fern allies	26	5	0	1	0
Bryophytes	Liverworts and mosses	105	34	0	0	0
Lichens	Lichens	138	133	6	0	0
Total		862	643	39	11	19

* Species listed under the EPBC Act and/or the TSP Act.

** Includes native species that are at times pests or are exotic to this region.

Species lists

Species lists for the reserves are provided in [Appendix A](#). Species lists were compiled using data from participating institutions.

Names in **brown bold text** are putative new species. Species marked with an asterisk (*) have not been recorded in the surveyed areas previously for these reserves. Those without an asterisk have been recorded previously and were confirmed by this survey. Species shown with **blue squares** were not recorded during this survey, but are known from previous studies.

Some specimens have been identified only to family or genus level. This is partly because identifying specimens is very time-consuming, with detailed microscopic examination needed in many cases. Also, some groups are ‘orphans’: there are no experts currently working on them, and the taxonomic literature is out of date. Species-level identification is not possible for these groups. Unidentified Bush Blitz specimens are held in institutional collections where they can be subject to future study.

Nomenclature and taxonomic concepts used in this report are consistent with the Australian Faunal Directory and *A Census of the Vascular Plants of Tasmania, including Macquarie Island*.²

² de Salas, M. F. & Baker, M. L. 2015, *A Census of the Vascular Plants of Tasmania, Including Macquarie Island*, Tasmanian Herbarium, Tasmanian Museum and Art Gallery, Hobart, www.tmag.tas.gov.au.

Discussion

Putative new species

Here we use the term ‘putative species new to science’ in the sense of an unnamed species that, as far as can be ascertained, was collected for the first time during the survey. It is confirmed as a new species once it is named and its description published. Specimens collected during the Bush Blitz also include unnamed taxa that are already known from museum and herbarium collections: these are not counted as putative new species.

The discovery of new species on Flinders Island is significant in terms of endemism. The question arises as to whether these new taxa are found elsewhere in Tasmania or the Furneaux Group or in south-east Australia.

Fauna

Invertebrates

Moths

Three moth species that may be new to science were collected. *Tanaoctena* sp. AT21 (Galacticidae), a day-flying species whose larvae feed on *Coprosma* plants, was collected from Mulligans Hill Conservation Area. *Epicoma* sp. CB02 (Thaumetopoeinae) was collected in Strzelecki National Park and Patriarchs Conservation Area. This is a large showy species morphologically close to *E. melanospila*. *Pantogymna* sp. CB17 (Oecophoridae) was collected from the Logan Lagoon Conservation Area and State Reserve and is morphologically close to *Pantogymna* sp. ANIC 1 and *P. titanitis*.

Beetles

A stag-beetle species *Lissotes* n. sp. ‘obtusatus Flinders’ was found that may be new to science. It is distinct from the Flinders Island endemic *Lissotes vanderschoori* and does not match any other described species in this genus. Two specimens were collected from dead wood in the rainforest near the summit of Mt Strzelecki.



Lissotes n. sp. ‘obtusatus Flinders’, photo Simon Grove © copyright, TMAG



True bugs

Six new Heteroptera species were found: five new species of Miridae belonging to the subfamilies Orthotylinae, Phylinae and Mirinae; and one Acanthosomatidae belonging to the genus *Sangarius*.

The discovery of a new *Sangarius* species is potentially of global significance, because of its putative South American affinities, and its association with the vulnerable plant, *Hakea ulicina*. It was found on the fruits of this plant, and was remarkably camouflaged. The species is also significant because it represents the first new species found since the erection of the genus as a monotypic genus. The genus is currently represented by a single Australian species from Western Australia. The identification of six species of Acanthosomatidae is of interest, as we know that the family is well represented in Tasmania. The affinities of the Flinders Island species of this family need to be further investigated.

Spiders

Of the 62 spider species collected, 23 are new to science while only another 14 could be named. The majority of the new species were found in the Darling Range Conservation Area.

Table 3 Putative new invertebrate species documented

Family	Species
Moths	
Galacticidae	<i>Tanaoctena</i> n. sp. AT21
Notodontidae	<i>Epicoma</i> n. sp. CB02
Oecophoridae	<i>Pantogymna</i> n. sp. CB17
Beetles	
Lucanidae	<i>Lissotes</i> n. sp. 'obtusatus Flinders'
True bugs	
Acanthosomatidae	<i>Sangarius</i> n. sp. BBF14Msp.028
Miridae	Orthotylini n. sp. 01 BBF14Msp.014
Miridae	Orthotylini n. sp. 02 BBF14Msp.016
Miridae	Orthotylini n. sp. 03 BBF14Msp.020
Miridae	Orthotylini n. sp. 05 BBF14Msp.008
Miridae	Orthotylini n. sp. 06 BBF14Msp.052

Family	Species
Spiders	
Amphinectidae	<i>Tasmarubrius</i> n. sp.
Anyphaenidae	<i>Amaurobiooides</i> n. sp.
Clubionidae	<i>Clubiona</i> n. sp. 01
Clubionidae	<i>Clubiona</i> n. sp. 02
Clubionidae	<i>Clubiona</i> n. sp. 03
Corinnidae	<i>Poecilopta</i> n. sp.
Cycloctenidae	<i>Cycloctenus</i> n. sp.
Desidae	<i>Badumna</i> n. sp.
Desidae	<i>Toxopsoides</i> n. sp.
Dictynidae	<i>Arangina</i> n. sp.
Gnaphosidae	<i>Coreodrassus</i> n. sp.
Gnaphosidae	<i>Encoptarthria</i> n. sp.
Gnaphosidae	Gnaphosidae n. sp.
Idiopidae	<i>Misgolas</i> n. sp.
Linyphiidae	Linyphiidae n. sp.
Migidae	<i>Migas</i> n. sp.
Miturgidae	<i>Argoctenus</i> n. sp.
Miturgidae	<i>Elassoctenus</i> n. sp.
Miturgidae	<i>Hestimodema</i> n. sp.
Miturgidae	Miturgidae n. gen. n. sp.
Nemesiidae	<i>Stanwellia</i> n. sp.
Orsolobidae	Orsolobidae n. gen. n. sp. 02
Zodariidae	<i>Neostorena</i> n. sp.

Flora

Lichens

Six putative new lichen species were found in Strzelecki National Park, Darling Range Conservation Area and Wingaroo Nature Reserve. Three of these were formally described and published whilst this report was being compiled.

Table 4 Putative new lichen species documented

Family	Species
Lichens	
Megalariaceae	<i>Megalaria</i> n. sp.
Mycoblastaceae	<i>Tephromela granularis</i> n. sp.
Pertusariaceae	<i>Pertusaria</i> n. sp. (stictic acid, sorediate)
Ramalinaceae	<i>Lecania maritima</i> n. sp.
Trapeliaceae	<i>Trapelia</i> n. sp.
Verrucariaceae	<i>Verrucaria alborimosa</i> n. sp.

Threatened species

Australia is home to an estimated 570 000 species, most of which have not been described. Approximately 92% of Australian plants, 87% of mammals, 93% of reptiles and 45% of birds are endemic. Changes to the landscape resulting from human activity have put many of these unique species at risk. Over the last 200 years, many species have become extinct; many others are considered to be threatened, i.e. at risk of extinction.³

Fauna

Invertebrates

No invertebrates listed under the EPBC Act were encountered.

Moths

Two specimens of Chevron Looper Moth (*Amelora acontistica*) were collected from the Strzelecki National Park and Wingaroo Nature Reserve. Abundance was very low at both sites. This species is listed under the TSP Act as Vulnerable. It also occurs in South Australia and Victoria. Its status in Western Australia is uncertain. The Flinders Island records



³ Chapman, A. D. 2009, *Numbers of Living Species in Australia and the World*, 2nd edn. Australian Biological Resources Study, Canberra.

greatly extend the range of this species within Tasmania, as the few state records are restricted to areas near Hobart (Lauderdale, Cremorne, South Arm and Pitt Water). Habitat for this species is believed to be saltmarsh, including coastal succulent saline herbfields. On Flinders Island, it was collected from *Acacia*, *Allocasuarina* and *Eucalyptus*-dominated shrubland, and from *Eucalyptus* woodland, *Epacris* and highland grassy sedgeland. This new information does not support the view that the species is dependent on saltmarsh vegetation and further investigation is warranted.

Beetles

No listed species were encountered, however Flinders Islands' four *Lissotes* stag-beetle species are highly localised and exist in very low population densities, making them potentially vulnerable to over-collection or to excessive disturbance of their microhabitat by collectors. Specimens of rare stag-beetles can command a high price on the international collectors market.

True bugs

Although it is not listed, the new species of *Sangarius* is likely to have conservation significance because it was found only on Furze Hakea (*Hakea ulicina*), which is classed as Vulnerable in Tasmania. It was found on the fruits and was remarkably camouflaged.

Table 5 Threatened invertebrate species documented

Family	Species	Common name	Status	Abundance
Lepidoptera				
Geometridae	<i>Amelora acontistica</i>	Chevron Looper Moth	TSP Act— Vulnerable	Very low (Strzelecki NP, Wingaroo NR)

Flora

Flowering plants

No plants listed under the EPBC Act were encountered. However, 9 flowering plant species are protected under the TSP Act.

The small population of around 100 Saw Banksia (*Banksia serrata*) trees in Wingaroo Nature Reserve represents one of two populations in Tasmania – the other population is restricted to Rocky Cape National Park on Tasmania's north coast. The Wingaroo population is rapidly declining due to the incursion of *Phytophthora*, a soil-borne water mould (oomycete) that causes dieback.

The Furze Hakea (*Hakea ulicina*) population was growing around the Memana Road boundary of the Brougham Sugarloaf Conservation Area and the Darling Range Conservation Area.

Table 6 lists the flowering plant species that were found during the survey that are protected under the TSP Act.

Table 6 Threatened flowering plants documented

Family	Species	Common name	Status	Abundance
Flowering plants				
Elaeocarpaceae	<i>Elaeocarpus reticulatus</i>	Blueberry Ash	Rare	Common (Strzelecki NP) Occasional (Darling Range CA)
Ericaceae	<i>Leucopogon affinis</i>	White Beard	Rare	Common (Patriarchs CA)
Fabaceae	<i>Eutaxia microphylla</i>	Common Eutaxia	Rare	Common (Strzelecki NP)
Poaceae	<i>Sporobolus virginicus</i>	Sand Couch	Rare	Uncommon (Patriarchs CA)
Proteaceae	<i>Banksia serrata</i>	Saw Banksia	Rare	Single small, declining population (Wingaroo NR)
Proteaceae	<i>Hakea ulicina</i>	Furze Hakea	Vulnerable	Locally abundant (Brougham Sugarloaf CA)
Proteaceae	<i>Isopogon ceratophyllus</i>	Horny Cone-bush	Vulnerable	Common, localised (Wingaroo NR)
Rhamnaceae	<i>Pomaderris paniculosa</i> subsp. <i>paralia</i>	Coast Pomaderris	Rare	Common (Strzelecki NP)
Rhamnaceae	<i>Spyridium parvifolium</i>	Dusty Miller	Rare	Outside reserves (slopes of Furneaux Lookout)

Ferns

Table 7 lists the fern that was found during the survey that is protected under the TSP Act.

Table 7 Threatened fern species documented

Family	Species	Common name	Status	Abundance
Ferns				
Psilotaceae	<i>Tmesipteris parva</i>	Small Fork Fern	Vulnerable	Rare, localised (Strzelecki NP)

Exotic and pest species

Conservation reserves help protect Australia’s rare and threatened ecosystems and provide refuge for species at risk. Invasive species can have a major impact on already vulnerable species and ecosystems, as well as economic, environmental and social impacts. The inclusion of exotic and pest species records as part of this report is designed to provide land managers with baseline information to assist with further pest management programs.

Fauna

Invertebrates

Table 8 lists the pest and exotic invertebrate species that were collected in the reserves. The exotic dung-feeding dor-beetle *Elephastomus proboscideus* serves a useful role burying and consuming cow dung in pastures. The European Wasp *Vespula germanica* was observed widely throughout the reserves. It is widespread throughout Tasmania: being an abundant and efficient predator of other insects, it is likely to be having a large impact on the native insect fauna. The Rutherglen Bug (*Nysius vinitor*), a native species that is a pest of many crops across Australia, was found at a number of localities. It can migrate into crops in very large numbers in favourable seasons.

Two well-known pest snail species and two exotic slug species were also found. Striped Field Slug (*Lehmannia nyctelia*), a crop pest, was recorded in very small numbers in Wingaroo and Darling Range reserves. Hedgehog Slug (*Arion intermedius*) was recorded in moderate numbers at three sites in the Darling Range Conservation Area. Exotic snails are likely to be widespread at disturbed sites near edges of all the reserves.

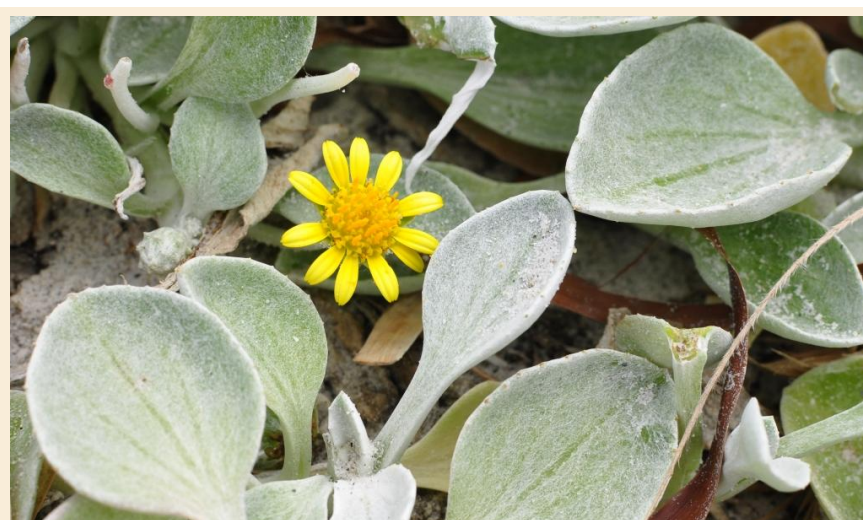
Table 8 Pest invertebrate species documented

Family	Species	Common name	Abundance
Wasps			
Vespidae	<i>Vespula germanica</i>	European Wasp	Observed widely throughout the reserves
Beetles			
Bolboceratidae	<i>Elephastomus proboscideus</i>	Dor-beetle	Confined to pastures
True bugs			
Lygaeidae	<i>Nysius vinitor</i>	Rutherglen Bug	Found in several localities (Killiecrankie NRA, Logan Lagoon CA and State Reserve, Strzelecki NP)

Family	Species	Common name	Abundance
Snails and slugs			
Arionidae	<i>Arion intermedius</i>	Hedgehog Slug	Moderate numbers at three sites (Darling Range CA)
Helicidae	<i>Theba pisana</i>	White Garden Snail	Very common (Killiecrankie NRA)
Hygromiidae	<i>Prietocella barbara</i>	Small Pointed Snail	Common (Strzelecki NP)
Limacidae	<i>Lehmannia nyctelia</i>	Striped Field Slug	Small numbers at two sites (Darling Range CA, Wingaroo NR)

Flora

Table 9 lists the introduced weeds that were identified. No declared weeds listed under Tasmanian or national legislation were found in the reserves. Sea Spurge (*Euphorbia paralias*) was widespread in coastal areas throughout the island and is a significant environmental weed problem. The seeds of Sea Spurge are salt-tolerant seeds and can survive for a number of years on ocean currents that spread them from beach to beach. A colony can spread rapidly, displacing native vegetation and changing the structure of the beach.⁴ This can disrupt many native species including endangered shorebirds. The exotic Cape Beach Daisy (*Arctotheca populifolia*) appeared to be spreading along Planters Beach, on the east coast of Flinders Island south of Babel Island. The roots of this daisy bind sand efficiently, which can change the topography of dune systems and interrupt the flow of seawater into and out of coastal lakes.⁵



Cape Beach Daisy (*Arctotheca populifolia*) appeared to be spreading along Planters Beach, photo Matthew Baker © copyright, Tasmanian Herbarium

⁴ <<http://www.environment.nsw.gov.au/pestsweeds/SeaSpurge.htm>>, accessed 13 July 2016.

⁵ http://keyserver.lucidcentral.org/weeds/data/media/Html/arctotheca_populifolia.htm, accessed 13 July 2016.

Table 9 Non-gazetted weed species documented

Family	Species	Common name	Abundance
Vascular plants			
Asteraceae	<i>Arctotheca populifolia</i>	Cape Beach Daisy	Common on the east coast
Asteraceae	<i>Cirsium vulgare</i>	Scotch Thistle, Spear Thistle	Track to Strzelecki Peaks
Asteraceae	<i>Conyza sumatrensis</i>	Tall Fleabane	Logan Lagoon CA
Asteraceae	<i>Hypochaeris radicata</i>	Flat-weed, Cats-ear	Darling Range CA, Lucks Hill track, due S of Lucks Hill
Asteraceae	<i>Leontodon saxatilis</i>	Hairy Hawkbit	Logan Lagoon CA; NW corner of Stony Lagoon; S end of Fotheringgate beach
Asteraceae	<i>Vellereophyton dealbatum</i>	White Cudweed	S end of Fotheringgate beach
Brassicaceae	<i>Cakile maritima</i> subsp. <i>maritima</i>	Sea Rocket	Mt Killiecrankie Reserve; beach approximately 1.66 km WSW of Pot Boil Point; Planter Beach
Euphorbiaceae	<i>Euphorbia paralias</i>	Sea Spurge	Widespread throughout the island; Mt Killiecrankie Reserve; beach approximately 1.66 km WSW of Pot Boil Point
Gentianaceae	<i>Centaurium erythraea</i>	Common Centaury	NW corner of Stony Lagoon
Gentianaceae	<i>Centaurium tenuiflorum</i>	Branched Centaury	Darling Range CA, Lucks Hill track, due S of Lucks Hill
Poaceae	<i>Aira caryophyllea</i> subsp. <i>caryophyllea</i>	Silvery Hairgrass	Bob Smith's Gully: approximately 400 m S of the end of the paddock on Wayne Warren's property
Poaceae	<i>Lagurus ovatus</i>	Hare's Tail Grass	Logan Lagoon CA

Other points of interest

Fauna

Invertebrates

Research on Australian invertebrates has increased significantly over the last 20 years, but it is estimated that less than 15% of species have been formally described. In general, about one-third of the species collected in any area are found to be new to science.

The Flinders Island reserves have not been previously surveyed for invertebrates.

The reserves on Flinders Island support a rich and biogeographically unusual insect fauna. While all areas have some interest, the most valuable areas for insects are the small pockets of wetter forest clinging to the higher slopes and in gullies protected from fire and drought. These seem to be refugia for a range of species intolerant of drought or fire, and those with very limited ranges such as velvet worms, mygalomorph spiders, snails and *Lissotes* stag-beetles. Because of their scarcity and critical role as refugia, the wet forests on Flinders Island are deserving of the highest level of protection and conservation management. Such areas include Officers and Youngs Creeks (gullies in the foothills of the Darling Range), the higher-altitude saddle and adjacent slopes between Brougham Sugarloaf and Mulligans Hill, and the higher-altitude saddle and adjacent slopes below the summit of Mt Strzelecki, particularly the relict rainforest and fern forest on its eastern face.

Large areas of the reserves were dominated by heathland or by low, dry eucalypt woodland with an understorey of prickly shrubs and a sparse herb layer. These environments proved to be relatively unproductive for daytime insect-collecting – at least at this time of year (note that heathlands can be excellent collecting areas in spring and early summer). Night-time collecting proved to be a little more productive. Most wetlands visited also turned out to be dry at this season and hence very unproductive for collecting (though some water-beetles were attracted to light-traps operated in the vicinity of remaining lagoons).

Taller eucalypt woodland, as occurred more widely towards the inland parts of the island (Darling Range, Brougham Sugarloaf and Mulligans Hill), was more productive, particularly for species associated with leaf-litter, fallen bark and rotten wood.

A notable find was the cavern-cricket *Cavernotettix flindersensis*. This relative of the king-crickets is confined to the Furneaux Group, where it is found in caves, under boulders and in hollow logs. Its nearest relatives occur in similar habitat in Victoria. One was found while spotlighting near Walkers Lookout, and at The Dock.



The cavern-cricket *Cavernotettix flindersensis*, photo Simon Gove © copyright, TMAG

Butterflies, damselflies and dragonflies

Butterflies and odonates are day-flying insects with differing habitat requirements. Butterflies tend to be found in relatively open areas, particularly grasslands and heathlands, while odonates require water for their immature stages and are usually found in or around rivers, lakes, swamps, and other areas of standing or flowing water. The reserves around Flinders Island include a range of suitable habitats for both groups.

Although information on butterflies and odonates found within specific reserves was scarce, numerous species of both groups were known to occur on Flinders Island and it was expected that many of these would be found in the reserves.

In total, seven species of odonate (five damselflies and two dragonflies) and five species of butterfly were collected, all previously known to be present on Flinders Island. Particularly good areas for odonates were south-east Wingaroo reserve and South Chain Lagoon. Butterfly records were less concentrated, with different species dominating in different areas.

The Saltbush Blue Butterfly (*Theclinesstes serpentata*) was abundant around saltbush in some coastal areas. The Shouldered Brown Butterfly (*Heteronympha penelope*) was common in grasslands around the island, and the Common Brown (*Heteronympha merope*) was also reasonably common. The Australian Admiral, *Vanessa itea*, was common on Mount Strzelecki, and a few specimens were seen hilltopping around the summit. The Blue-spotted Hawker Dragonfly (*Adversaeschna brevistyla*) was previously recorded from Brougham Sugarloaf, and was collected during this survey from South Chain Lagoon (Logan Lagoon reserve); adults of this species fly over large distances.

Three butterflies with previous records from the reserves were not seen on this survey: Marbled Xenica, (*Geitoneura klugii*), previously recorded from Darling Range; Fringed Blue, (*Neolucia agricola*), previously recorded from Wingaroo; and Australian Painted Lady, (*Vanessa kershawi*), previously recorded from Patriarchs Reserve. The timing of the survey was around the end of the flight period for the Fringed Blue and Marbled Xenica.

Damselflies were easier to find than dragonflies, especially ringtails of the genus *Austrolestes*, of which three different species were recorded, all of them common in various areas. The two *Ischnura* species, *I. aurora* and *I. heterosticta*, were less common. The Tasmanian populations of *Ischnura heterosticta*, including those on Flinders Island, are considered to belong to an endemic subspecies, *I. heterosticta tasmanica*. Of the sampled sites, the most diverse areas for odonates were south-east Wingaroo reserve, especially around a small lake sampled in that area, and South Chain Lagoon.

Moths

The survey focused on Geometridae, but other families were also collected. The Geometridae are one of the largest families of the Lepidoptera with around 25 000 species known globally and around 1300 species in Australia and around 300 in Tasmania.

Specimen-based distribution (i.e. records that can be confirmed using museum specimens) of Lepidoptera is important for our understanding of the general diversity of areas. Lepidoptera are important bio-indicators for monitoring environmental effects such as climate change, which may alter the composition of vegetation communities. Geometrid moths in particular are widespread and abundant in southern Australia. Each species is closely affiliated with usually one host plant species. The diversity of this group can therefore directly indicate the biodiversity of a geographical region.

In total 405 moth specimens were collected from a wide range of habitats during the Flinders Island survey, consisting of 127 species from 21 families. All species were new records for the reserves. The family with the highest species richness and most common species recorded was geometrid moths with 64 species, representing about 20% of Tasmania's geometrids. This is not surprising as the collecting was somewhat biased towards the Geometridae and this family dominates the Australian macro-moths. Some elements of the geometrid fauna were absent, most likely because of the delayed 'autumn break' in this area. The family with the second-highest number of species recorded was the Arctiidae with 10 species, most from the lichen-feeding Lithosiinae subfamily.

The high diversity of species was not unexpected because of the high diversity of habitats sampled, however the number of rare, uncommon, new state records and species new to science were certainly notable.

Rare and uncommon species collected included *Scoliacma adrasta*, *Eclecta aurorella*, *Casbia oenias*, *Lackrana carbo*, *Xanthorhoe percrassata*, *Poecilathena urarcha* and *Chrysolarentia ptochopis*. New records for Tasmania included *Thallarcha phalarota*, *Chlenias stenosticha* and Unplaced *goniota*. *Xanthorhoe percrassata* was of particular note as most other specimens were collected almost a century ago in Victoria.

The reserve with the highest number of species was the Logan Lagoon Conservation Area and State Reserve with 51 named species and four undescribed or new species, closely followed by Strzelecki National Park with 46 named species and four undescribed or new species.

Beetles

The reserves are unlikely to have been systematically surveyed for beetles in the past, so in all likelihood most, if not all, of the species identified are new records for the reserves.

In total, 111 beetle species were collected. This is a low number compared to what would have been found earlier in the summer; however, the species collected include many that are hard to come by in other parts of Tasmania, probably because they are adapted to warmer conditions than on mainland Tasmania.

The most 'noticed' beetle was the rhinoceros-beetle *Pimelopus nothus*. This pasture-dweller was abundant in open country during our visit; it is rare or absent in cooler parts of Tasmania. It was readily attracted to light, including those in our laboratory and the light-traps set up in reserves.

The species of most note were the four stag-beetles in the genus *Lissotes*. Only a single described species, *L. vanderschoori*, is recorded from Flinders Island; the species is endemic to the island, and probably restricted to the central massifs of the Darling Range and Brougham Sugarloaf. Several specimens were found in tall woodland on the slopes of Walkers Lookout in the Darling Range, and a singleton in wet forest high on Brougham Sugarloaf. In both instances the beetles were found in association with rotting logs. At Officers Creek in the Darling Ranges, a single specimen of *Lissotes distinctus* was collected: a highly localised Tasmanian endemic species. Two more species of *Lissotes* stag-beetle, were found in the relict rainforest and fern forest on the eastern face of Mt Strzelecki, in association with rotten wood and the rotted-out fibrous bases of dead *Dicksonia* tree-ferns. These are distinctive in a number of features and one may represent an undescribed species, which is almost certainly confined to the Strzelecki massif and probably to only the wetter parts, whose total extent may not exceed 30 hectares.

Carabid beetles were well represented with 16 species collected. None of these are considered rare, although some are very localised. Of the 13 species of darkling-beetles collected, the most unusual is *Spharigeris physodes*, a specialist beach-dwelling scavenger that looks more like a pale dung-beetle; it was found on the beach at Trousers Point (Strzelecki National Park). Pie-dish beetle *Pterohelaeus peltatus* is a further species of darkling-beetle with unusual habits, being active by day in dry, open country—its relatives are mostly desert-dwellers. One was found at Trousers Point. Most of the other darkling-beetle species are typical woodland- or forest-dwellers whose larvae live in dead wood and whose adults are most often found either by rolling logs or by spotlighting on tree-trunks at night. Of these, two *Adelium* species, *A. tenebroides* and *A. licinoides*, were particularly common; they are widespread in the warmer parts of Tasmania. Two further and as-yet unidentified *Adelium* specimens may possibly belong to mainland Australian species since they were not matched to species represented in the Tasmanian Forest Insect Collection. Because of its location, Flinders Island may be expected to host outlying populations of several otherwise mainland species. Amongst the darkling-beetles, *Tetragonomenes ruficornis* is one such species that was found in the coastal woodland at Trousers Point. First described from King Island, its Tasmanian range chiefly comprises the Bass Strait islands.



The pie-dish beetle *Pterohelaeus peltatus*, photo Simon Grove © copyright, TMAG

An unusual beetle associated with rotting logs is the passalid *Pharochilus rugiceps*. This is an uncommon species in Tasmania, confined to warmer areas in the east of the State. It was found at Patriarchs Lookout and in the Darling Range. The adults and larvae live together in the same log, since the larvae are dependent on the adults for their food: only the adults have strong enough jaws to chew up the wood on which both adults and larvae feed. They keep in touch with each other by stridulating.



The striking red anthicid beetle *Lemodes coccinea*, photo Simon Grove © copyright, TMAG

The striking red anthicid beetle *Lemodes coccinea* is another mainland Australian species found in wetter forest on Flinders Island; it may also occur in other relatively warm parts of Tasmania. Another strikingly coloured beetle found in wetter forest is *Scaphidium alpicola*, a widespread rove-beetle associated with fungus on moist dead wood.

Leaf beetles

The leaf beetle subfamily Chrysomelinae contains the predominantly Australian Paropsine tribe/subtribe, which includes prominent defoliators of Eucalyptus and Acacia. Other hosts include Leptospermum and Melaleuca. It was hoped that a survey of the Chrysomelinae fauna of Flinders Island would improve knowledge of this subfamily on the Island and show some links between the mainland south-eastern Australian fauna and the island fauna of Tasmania. Also, the diversity of the fauna on Eucalyptus could be compared with the diversity of the entire Tasmanian fauna on Eucalyptus.

Sixteen leaf beetle species were collected representing 22% of the known species of the Chrysomelinae fauna of Tasmania. The diversity of species was surprising given the much narrower range of host species compared to mainland Tasmania (the island has only 13% of the number of Eucalypt species of the mainland) and the short collecting period at a suboptimal time of year. In early autumn immature stages are no longer feeding on foliage and adult stages are beginning to disperse to overwintering sites.

All species collected occur on mainland Tasmania and many also occur in mainland south-east Australia. Only one species with a non-eucalypt host was encountered. This portion of the Chrysomelinae fauna is less common on mainland Tasmania and the host plants of many species are unknown.

True bugs

The Heteroptera of Australia comprise about 2500 species and recent Bush Blitz surveys have discovered 391 Heteroptera species new to science. Flinders Island provided a particular opportunity to assess whether true bugs are diverse on islands. There was an expectation that new species would be discovered but not in any numbers, particularly as the island is close to mainland Tasmania. It was of particular interest to see whether the Heteroptera of Flinders Island overlapped strongly with the Tasmanian biota and if there were any Flinders Island endemics.

Sixty-four Heteroptera species from 13 families were identified. The highest represented family was the Miridae, with 19 species found, followed by the Pentatomidae with 17 species. The capture of six species of Acanthosomatidae is of interest, as we know that the family is well represented in Tasmania, and the affinities of the Flinders Island species of the family need to be further investigated. The two species of *Lasiacantha* found on *Correa alba* is of great interest, as the genus was only known in Tasmania from Mount St Clair. The Flinders Island specimens may represent new species, but further examination is required to determine their identity.

The true bugs were found on 31 host plant species, with the great majority belonging to the Myrtaceae, Fabaceae and Asteraceae families.

The discovery of 64 species in such a short period suggests that a much higher number of true bugs reside on Flinders Island, and resampling is highly recommended.

Spiders

Only one species, a wolf spider *Artoriopsis expolita*, had previously been reported from Flinders Island.

The spider fauna of Flinders Island is potentially a more northerly fauna enjoying a warmer more maritime climate than the rest of Tasmania. The island has a number of habitats of arachnological significance, including the intertidal–marine environment.

The spider fauna of Flinders Island represents three groups: those endemic to the island, those with affinities with Tasmania's north-west, or those with affinities with southern Australia.

New species were collected from a wide range of habitats. Out of 60 species collected, 20 were confirmed new; 20 could be assigned a species name; and 20 could not readily be assigned to a species and are likely to be new. The mygalomorph spider fauna, which are one of the oldest terrestrial invertebrate groups in the fossil record, included three new species in the genera *Stanwellia*, *Migas* and *Misgolas*.

Snails

Flinders Island was fairly well surveyed for snails and slugs prior to this survey. The pre-survey expectation was that most or all of the previously recorded species would be found and that few if any extra species would be added to the Flinders Island list.

Twenty-one gastropod species (four of them exotic) were recorded on the island, including all 15 native species that had been previously recorded. The new records for the island were *Paralaoma* sp. 'Knocklofty' (recorded from two Darling Range sites, at one of which it was common) and *Paralaoma* sp. cf (*hobarti*), of which one specimen was found at a Darling Range site.

The snails displayed a fairly low level of habitat specialisation; for example, a rainforest site surveyed on Strzelecki Peaks had the same fauna as the surrounding wet scrub. A wet forest site on the slopes of Mulligans Hill (just within Brougham Sugarloaf Conservation Area) yielded nine species, the largest number recorded at a single site on Flinders Island. Other than that, site diversity was low with an average of just under four species per site.

The *Helicarion* species present on Flinders Island, the identity of which has long been unclear, is confirmed as the otherwise Victorian species *Helicarion nigra*, thus adding that species to the Tasmanian list. This is the first Victorian species to be recorded from Flinders that is not known from the Tasmanian mainland. Otherwise the Flinders Island fauna consists of cross-Bass-Strait species, locally endemic species and at least one Tasmanian genus (*Thryasona*).

Pernagera officeri was by far the most abundant species, accounting for 46% of all specimens found; it occurred at all thoroughly searched sites except one high on Strzelecki Peaks.

Surprisingly, no more than the four already known Charopidae species were recorded. The Charopidae is the largest south-east Australian family of native snails, and over 90 species are known

from the Tasmanian mainland. The other comparable Bass Strait island, King Island, has six Charopidae species.

The Furneaux Group endemic snail *Letomola barrenensis* was recorded at four sites within reserves plus Ranga Cave. The presence or absence of this snail was very unpredictable, as it inhabits a wide range of forest and scrub types but occurs very inconsistently. The undescribed snail Charopidae gen. "Flinders" sp. "Flinders" – believed to be endemic to Flinders Island or perhaps to the broader Furneaux Group – was found to be common in the four reserves that containing wet forest. It is also



Charopidae gen. "Flinders" sp. "Flinders", an undescribed snail believed to be endemic to Flinders Island or to the Furneaux Group, photo Simon Grove © copyright, TMAG

believed to be relatively insensitive to fire, as it was found easily at sites that were burnt during a major fire in 2003. Hence, despite its small global range, it is not considered threatened.

Flora

Overall the high diversity of flora was consistent with expectations, and reflects the wide variety of habitats, geology and aspect found on Flinders Island. A relatively high number of new records in the bryophytes and lichens reflects the fact that these groups have historically been given less attention.

Although the vascular flora of Flinders Island has been thoroughly collected in the past, and the possibility of finding previously unrecorded taxa is low, most reserves individually had a high number of new records. The lichens again provided the most significant results, with a number of new records not just for individual reserves and Flinders Island, but for Tasmania as a whole, as well as new records for Australia. A total of 261 plant and lichen taxa were newly recorded when each reserve was considered individually.

The survey collected 434 taxa, which consisted of 192 vascular plants, 138 lichens and 105 bryophytes. Within the reserves surveyed the highest number of collections (214 taxa) were from Strzelecki National Park, and the lowest (26 taxa) from the Patriarchs Conservation Area.

Seeds

Eight high-quality seed collections were secured from Flinders Island for the Royal Tasmanian Botanical Gardens. This included one new taxon for the seedbank collection (Coastal Tea Tree – *Leptospermum laevigatum*), and the trip also improved holdings of *Hakea* species restricted to the north-east of the state. Two of the collections were of taxa listed as threatened at the state level: Saw Banksia (*Banksia serrata*) classed as Rare, and Furze Hakea (*Hakea ulicina*) classed as Vulnerable.



Mim Jambreina and James Wood collecting Saw Banksia (*Banksia serrata*) seed pods, photo Natalia Tapson © copyright, Department of the Environment

The timing of the Saw Banksia collection was fortuitous because the site was due to be burnt in winter as part of site management and would not have been available for seed collection for 3–4 years.

Glossary

Endemic: native to or limited to a certain region.

Pest species: a species that has the potential to have a negative environmental, social or economic impact.

Putative new species: a species that has been recognised by an expert as never having been named or described in the scientific literature. Note that specimens may already be in museum or herbarium collections.

Taxon (plural taxa): a member of any particular taxonomic group (e.g. a species, genus, family).

Taxonomy: the categorisation and naming of species. The science of identifying and naming species, as well as grouping them based on their relatedness.

Undescribed taxon: a taxon (usually a species) that has not yet been formally described or named.

Notes

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FRONT COVER Cup Ringtail (*Austrolestes psyche*), photo Simon Grove © Copyright, TMAG

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Flinders Island

Tasmania

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Bush Blitz
SPECIES RECOVERY PROGRAM