



Mungo National Park New South Wales

25 August–1 September 2017

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

AM

Australian Museum

ANIC

Australian National Insect Collection

BC Act

Biodiversity Conservation Act 2016 (New South Wales)

CSIRO

Commonwealth Scientific and Industrial Research Organisation

EPBC Act

Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

NPWS

NSW National Parks and Wildlife Service

QM

Queensland Museum

RBGS

The Royal Botanic Garden Sydney

UNSW

University of New South Wales

Summary

Mungo National Park was the focus of a Bush Blitz expedition from 25 August to 1 September 2017. The park is in semi-arid, south-western NSW and is managed by NSW National Parks and Wildlife Service (NPWS). Mungo National Park holds great significance for traditional owners and part of the park falls within the Willandra Lakes Region World Heritage Area, recognised for its outstanding evidence of the major stages in the Earth's evolution and Aboriginal heritage.

There have been few invertebrate surveys undertaken within the park—there were no previous records for bees, silverfish or true bugs and only one previous record for spiders and dragonflies. The park was also poorly sampled for vascular plants, seeds and fungi.

Approximately 321 species were recorded during the Bush Blitz. At least 153 species had not been recorded previously in the park (2 vertebrates, 107 invertebrates, 42 vascular plants and 2 fungi) and 32 of those may be completely new to science (1 bee, 15 true bugs and 16 spiders). Many unnamed or not formalised invertebrate taxa were recorded; these may assist scientists to revise, compare and describe species in the future. Two threatened species were recorded—Jewelled Gecko (*Strophurus elderi*) was detected in relative abundance and there were several populations of Silky Swainson-pea (*Swainsona sericea*). Both of these species are listed as Vulnerable in NSW.

Some highlights of this Bush Blitz included:

- the collection of a freshwater mussel, as a sub-fossil, that may represent an undescribed species that is now extinct
- a new state record for the spider *Australomisidia rosea* and possibly the first record of the scorpion *Cercophonius* for western NSW
- 32 significant range extensions for plants, including the first verified record of *Eucalyptus cyanophylla* in this region of NSW, a species listed as rare in Victoria
- the collection of approximately 20 specimens of leaf spot pathogenic fungi from *Eucalyptus* species which will be included in a wide-ranging paper on eucalypt pathogens
- 11 seed collections, representing four species, including three species new to the Australian PlantBank that will be used to support wild populations in the park.

Four invertebrate pest species and 28 exotic plant species were recorded. While most of these species are widespread and have minimal impact on the environment, several of the exotic plant species have high invasion potential and are best controlled while populations are small. Most of the interesting flora records came from the sand dunes in the NW corner of the park or near the southern boundary, and the report outlines management activities that would benefit the persistence of these species.

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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 Mungo National Park Bush Blitz

The Bush Blitz took place between 25 August and 1 September 2017 and therefore the results are representative of those taxa present/active in winter. Cool weather at the beginning of the expedition affected some collecting and site accessibility, and is thought to have affected the mobility of ground-dwelling fauna and flying insects over the main collecting period.

An important feature of this Bush Blitz was the participation of NPWS rangers. The rangers provided assistance by sharing their knowledge of the local environment, and assisting with field collection.

Bush Blitz provided the logistical coordination and overall leadership for the survey. Eight BHP Billiton employees, coordinated by Earthwatch Australia, participated as field assistants to the scientists. The Australian Museum (AM) and the Royal Botanic Garden Sydney (RBGS) were the host institutions for this Bush Blitz, providing the core group of personnel, and accessioning specimens into their collections. Experts from the University of New South Wales (UNSW) and Queensland Museum (QM) also conducted field and laboratory work.

Acknowledgements

The ABRS acknowledges the traditional owners of country throughout Australia and their continuing connection to land, sea and community. We pay our respects to them and their cultures and to their elders both past and present.

Mungo National Park and surrounding areas hold great significance for three traditional Aboriginal tribal groups—Paakantyi, Mutthi Mutthi and Ngyiampaa peoples.

The Bush Blitz team consisted of Kate Gillespie and Anthony Whalen. They would like to thank NPWS, including Jo Gorman, Lars Kogge, Ray Dayman and Rita Enke for their generous assistance and knowledge of the park. They would also like to thank World Heritage staff Leanne Mitchell and Daryl Pappin for their assistance of the scientific team in the field and Dan Rosendahl for his coordination and

executive support. Thanks must also go to Nicola Stern (Mungo Archaeological Project, La Trobe University) for providing valuable local knowledge which greatly assisted with the initial planning and logistics for the expedition.

The enthusiastic and good humoured field assistants from BHP Billiton and their coordinators, Bruce Paton and Justin Foster (Earthwatch Australia), are gratefully acknowledged. BHP Billiton employees on the trip were Gemma Tulloch, Kelsy Sammons, Karl Beidatsch, Anna King, Nigel Smith, Lisa Barbosa, Laurel Murphy, Graham Lindfield and Ben Dwyer.

Finally, the team would like to thank Charlotte King and Marilyn Smiley for their excellent catering.

Reserve overview

Reserve name: Mungo National Park

Area: 121,700 ha

Description

Mungo National Park is situated in south-western NSW in an area known as the Willandra Lakes Region. It is 110 km north-east of the Victorian/NSW border towns of Mildura/Wentworth and 140 km north-west of the NSW town of Balranald. Approximately 65% of the park falls within the Willandra Lakes Region World Heritage Area. The area holds great significance for three traditional Aboriginal tribal groups, Paakantyi, Mutthi Mutthi and Ngyiampaa, who are closely involved in the management of the World Heritage Area and Mungo National Park.

The Willandra Lakes Region, including Mungo National Park, is a landscape that has steadily evolved over the past two million years. It lies within the Lower Murray-Darling Basin, which is an extensive area of Tertiary marine sediments overlain by Pleistocene aeolian deposits of mud and sand. It is a semi-arid landscape of 360 degree horizons with the only relief being low red sandy ridges and crescent-shaped dunes (lunettes) rising up to 40 m on the easterly shore of relict lakebeds. A large proportion of the park consists of playas and basins of the relict lakebeds of Lake Mungo, Lake Leaghur and Lake Garnpung and their associated lunettes, surrounded by undulating sandplain and dunefield land systems.

The vegetation communities that predominate are mallee eucalypts, Belah/Rosewood and Cypress Pine woodlands, shrubland and grassland. The mallee shrublands of Mungo National Park occur on sandy loam interdune plains and are dominated by a mix of mallee eucalypts.

Conservation values

Mungo National Park came into being in 1979 when the NPWS acquired the 1922 'soldier settlement' block known as Mungo. Interest in Mungo stemmed from the archaeological treasures progressively being uncovered at the 'Walls of China'. The archaeological finds were of global significance in the understanding of human evolution and occupation in Australia. In 1984 the adjoining block to the north, Zanci, was added to the park. The adjoining leasehold blocks, Leaghur, Garnpung and Balmoral (or parts thereof), were added to Mungo National Park in October 2002. A further 22,330 ha of the Pan Ban lease to the north of the park (called the Numbucurra block) was acquired in 2003 and gazetted in 2005. In 2011, Joulni Station, a leasehold block to the south of Mungo was added to the park and a further small addition was made in 2012. The total area of the park is now 121,699.6 ha.

The Willandra Lakes Region, including a portion of Mungo National Park, was placed on the World Heritage List in 1981 based on its globally significant archaeological, geomorphological and palaeontological values. The area provides a unique window on the changing climate and society's interaction with the environment during the Pleistocene period.

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
Amphibia and Reptilia	Frogs and reptiles	Stephen Mahony	AM
		Chris Portway	AM
Arachnida	Spiders	Barbara Baehr	QM
Odonata	Dragonflies	John Tann	AM
Heteroptera	True bugs	Aidan Runagall-McNaull	UNSW
Mollusca	Snails	Stephanie Clark	AM
Vascular plants		Shelley James	RBGS
		Guy Taseski	RBGS
		Joel Cohen	RBGS
		Russell Barrett	RBGS
Fungi		Brett Summerell	RBGS
Seed collection		Gavin Phillips	RBGS

The Bush Blitz team would also like to acknowledge the contributions of the following people who assisted with the identification of specimens:

- Gerry Cassis from UNSW (true bugs)
- Mark Harvey from Western Australian Museum (pseudoscorpions)
- Robert Raven from QM (spiders from the families Corinnidae and Miturgidae)
- Volker Framenau from the University of Western Australia (wolf spiders)
- Michael Batley (bees) and Graeme Smith (silverfish) from AM
- Louisa Murray, Andrew Orme, Barbara Wiecek and Peter Wilson (vascular plants) from RBGS

Site selection

All scientists surveyed two standard survey sites, selected by Bush Blitz using modelling prepared by CSIRO. Each standard survey site was centred on a point (permanently marked), but the actual area surveyed varied between taxa. Standard methodologies were used to sample these sites.

The use of standard survey sites provides a unique opportunity to examine broad-spectrum biodiversity. Among other benefits, this will enable Bush Blitz's partners at CSIRO to test assumptions that underpin many conservation decisions (e.g. assumptions about relationships between the diversity of different taxa). It will also allow comparisons between sites, and establish a basis for future monitoring by reserve managers.

Apart from standard survey sites, site selection and collection methods were left to the discretion of the individual scientist. Site selection depended on access, suitability for collecting and time restrictions. Further considerations included:

- Reptile and frog sites were selected across a range of habitats in order to maximise the number of taxa detected, taking into account the most likely habitats for reptiles given the expected cold conditions.
- Dragonfly and freshwater mollusc sites were chosen for their potential for some water. However most tanks and dams had been decommissioned and only a small number held any water.
- Heteroptera sites were selected to sample as thoroughly as possible the different vegetation communities present within the park, and the host plants existing within each community.
- Vascular plant sites were chosen that would give the greatest spread of vegetation community, soil profile, fire history and underlying geology that coincided with the CSIRO gap analysis sites. This maximised the chance of detecting new species, threatened species and species not previously recorded for the park. Sites were preselected using previous vegetation community mapping, soil maps and aerial imagery, and further refined on-ground to represent the greatest range of plant communities that could be sampled in the time available.
- Seed collection sites were selected to allow for the greatest possible species diversity in seed collections and the collection of different provenances to maximise genetic capture of certain species across the park. Typically, it was found that the sites chosen for the associated vascular plant surveys would meet these criteria, so seeds were collected at the same sites as the vascular plant surveys, where practical. The routes to and from the sites were also plotted to pass through vegetation communities where the greatest chance of encountering known target species for seed collection would be found.

Site locations were recorded using global positioning systems.

Survey techniques

A standard suite of survey techniques was used:

- **Reptiles** were surveyed at four main sites using various pit and funnel set-ups:
 1. Four 10 m fences with a central 20 litre pit and 4 funnels per fence were erected, each 10 m apart from each other.
 2. Three 10 m fences were erected outward from a central pit, with a pit on the end of each fence (four total 20 litre pits), and two funnel traps in the centre of each fence.
 3. Two 20 m fences were set up with a central 20 litre pit and a 20 litre pit at each end, no funnels were used.
 4. A pre-existing trap line installed by NPWS was opened that consisted of two sets of four 20 litre buckets, 10 m apart, with a fence along the length of the buckets.

Intensive active searching took place at each of the main sites and at secondary sites. This included scanning for active reptiles and searching cover habitat for non-active reptiles. At each of the main sites, and at the Leaghur Homestead, a half-hour nocturnal spotlight was conducted targeting active

geckos and nocturnal reptiles. At the standard survey sites, intensive searches for reptiles were carried out in accordance with Bush Blitz standard survey techniques. All sites were searched in the day, with spotlighting during the warmest part of the night before temperatures dropped.

- **Frogs** were surveyed at night. Specimens were captured by hand, measured, photographed in-hand, weighed and sexed. A skin swab was taken, to later test for chytrid fungus, and a tissue sample was collected before they were released at the point of capture. Some frogs were retained as voucher specimens to be lodged at AM.
- **Dragonflies and damselflies** were collected using a standard entomological sweep-net (400 mm internal diameter) in and around vegetation close to water. Specimens were placed in glassine envelopes, fixed in acetone, dried, and stored in boxes containing naphthalene and silica gel to prevent insect attack and mould. At standard survey sites, sweeping was conducted for one hour.
- **Bees** were collected by sweeping plants in flower wherever they were found. Some eucalypts were in flower and a weedy species of *Senecio* was flowering and occasionally common.
- **Silverfish** were surveyed by spraying the bark of several trees to a height of about 2 m using Mortein fast knockdown, and collecting individual insects as they fell onto a sheet on the ground. Trees were chosen opportunistically at collection sites for other insects.
- **Heteroptera** specimens were collected primarily by beating or sweeping trees and perennial shrubs, focusing on flowers, fruits and seeds. Samples were then aggregated using an aspirator and killed using ethyl acetate. Some specimens were collected opportunistically from the ground and on plants, whilst others were provided as bycatch by other survey participants using collection methods such as pitfall trapping, active searching and chemical knockdown. At standard survey sites, consistent with previous heteropteran Bush Blitz surveys, beating or sweeping of vegetation took place for one hour. Where flowering or fruiting plants were not present, collections were made on leaves or occasionally under bark.
- **Molluscs** were mainly collected by active searching. For terrestrial molluscs, all logs and other debris on the ground were turned and leaf litter samples were taken to search for small species. For freshwater molluscs, weeds, leaves and mud were searched. Other specimens were found just lying on the ground. At standard survey sites, terrestrial snails were searched for by hand for two hours per site.
- **Spiders** were collected primarily using pitfall traps filled with propylene glycol. Other methods used included visual observation, rock-rolling, bark-brushing, bark-stripping and night collection. In total, eight sites were surveyed with 10 pitfall traps each and by hand collecting. The remaining sites were surveyed by hand collecting only. Standard survey sites were surveyed with 10 pitfall traps and one hour of hand collecting.
- **Plant** collections were made within the preselected vegetation communities using random walks aimed at locating microhabitats and locations with greater moisture accumulation where higher plant diversity and fertile specimens might be expected. A range of time-since-burn sites were also visited to locate species with specific fire responses, especially those that are short-lived post-fire. Collections were made of individuals bearing fertile structures (buds, flowers, fruits, sporangia, apothecia). Habitat and descriptive notes were recorded in the field for each collection and specimens were photographed *in-situ* to record important features and habitat. Gatherings were made of one or more entire individuals (small herbaceous plants) or portions of stems bearing representative foliage, flowers etc. Fertile material was collected, pressed, and preserved using standard herbarium techniques. In all cases, immature leaf material was placed in silica gel for downstream DNA extraction to value-add the collections. A few samples were collected in spirit to preserve soft tissues for future morphological studies. Lichens were collected by removing a portion of substrate including the specimen. Where possible, sufficient material was collected to prepare duplicate specimens to be sent to other herbaria.

At standard survey sites, vascular plants were sampled within a 30 x 30 m plot, with the north-east corner of each GPS tagged. The plot was comprehensively sampled, along with faunal surveys, with specimens of each unique or different plant taxon tagged, numbered and preserved as a voucher collection.

- **Fungi** were incidentally collected during visual surveys of plants. Fungi were photographed in-situ, before being carefully dug out of the soil or cut off timber (with a small portion of substrate) using a penknife.
- **Seed** collections followed the standards laid out in *Plant Germplasm Conservation in Australia*. Collection events involved sampling from as many plants as possible of a single species in an area containing a continuous population to maximise genetic capture. A representative specimen of the species collected was also obtained, tagged and preserved as a voucher herbarium specimen to enable identification.

The fruits of dryland species collected were picked and placed into calico or paper bags so that the fruits and seeds did not sweat and dry prior to being transported to the PlantBank for drying at 15% relative humidity at 15 degrees C. Fruits of any fleshy fruited species were placed into plastic bags and refrigerated immediately at approximately 8 degrees C for transport to the PlantBank for seed extraction.

Seed collections were not made at standard survey sites due to the lack of fruiting material available.

Identification

The specimens taken were identified using available literature and the holdings of museums and herbaria. Fauna specimens will be deposited in the AM collection, vascular plants and lichens in the National Herbarium of NSW at the RBGS, fungi in the National Herbarium of Victoria and seed collections in the Australian PlantBank, Australian Botanic Garden. All specimen data are available through the Atlas of Living Australia.

Results

Locational data for all flora and fauna records are available to reserve managers. At least 153 species were new records for the park (some results are yet to be finalised), including 32 putative new species—these await formal identification. One threatened animal species was observed and one threatened plant. Four exotic or pest animal species and 28 weed species were also recorded.

Table 2 provides a summary of the flora and fauna records for Mungo National Park.

Table 2 Summary of flora and fauna records

Group	Common name	Total species recorded	Species newly recorded for reserve	Putative new species	Threatened species*	Exotic and pest species**
Reptilia	Reptiles	20	1	0	1	0
Amphibia	Frogs	1	1	0	0	0
Hymenoptera	Bees	6	6	1	0	0
Heteroptera	True bugs	41	41	15	0	1
Odonata	Dragonflies	3	3	0	0	0
Zygentoma	Silverfish	2	2	0	0	0
Arachnida	Spiders	47	46	16	0	1
	Pseudoscorpions	3	3	0	0	0
	Scorpions	1	1	0	0	0
Mollusca	Molluscs	8	5	0	0	2
Vascular plants		187	42	0	1	28
Fungi	Fungi	2	2	0	0	0
Total		321	153	32	2	32

* Species listed as Threatened under the Commonwealth EPBC Act or an equivalent listing.

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

Species lists

Lists of all species recorded during the Bush Blitz are provided in [Appendix A](#). Species lists were compiled using data from participating institutions. Lists of species previously known to occur in the park were provided for some taxonomic groups but not others so this should not be considered a complete species list for the park. The list includes flora data obtained from the BioNet Atlas of NSW Wildlife website and the Australian Virtual Herbarium (AVH). The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions.

Some specimens will only be able to be identified to family or genus level. This is partly because identification of specimens is very time-consuming, with detailed microscopic examination needed in many cases. Also, some groups are 'orphans': currently no experts are working on them, or are available to work 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 are available for future study. Collections hold many such specimens, among them species not yet described (i.e. unnamed species) as well as described species that have not been identified. For example, ANIC holds tens of thousands of unidentified specimens. Specimens often wait decades before the resources become available for their study. A key component of Bush Blitz is the funding of studies of specimens collected on Bush Blitz surveys.

Nomenclature and taxonomic concepts used in this report are consistent with the Australian Faunal Directory, Australian Plant Name Index and Australian Plant Census.

Discussion

Putative new species

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

Fauna

Invertebrates

Bees

One species of bee was recorded that may turn out to be a new species. There had previously been only a small number of records of insects found at Mungo National Park, and late August is out-of-season for insect hunting. While few bee specimens were found, the unusual time of year may have meant there was a greater chance of encountering an undiscovered species.

True bugs

Fifteen of the 41 heteropteran species collected are putatively new to science. A further 21 taxa will require further taxonomic work in order to be identified as described species or established as new species.

Spiders

During the Bush Blitz, 16 new species were discovered from seven spider families—Barychelidae (1 species), Corinnidae (3 species), Idiopidae (1 species), Lycosidae (1 species), Miturgidae (5 species), Oxyopidae (1 species), Zodariidae (4 species).

There may be additional new species however, as no recent comprehensive revisions exist for Actinopodidae, Desidae, Dictynidae, Gnaphosidae, Linyphiidae, Lycosidae, Salticidae, Theraphosidae and Thomisidae, it is impossible to determine at this stage. The genus *Tasmanicosa* (Lycosidae) has been partly revised.

Molluscs

One freshwater mussel species, *Velesunio* cf. *ambiguus*, collected only as a sub-fossil, had an unusual shape and appears to have been adapted to the saline conditions of the lakes. It possibly represents an undescribed species that is now extinct but more sampling and comparisons with modern specimens from across its entire range need to be conducted.

Table 3 Putative new invertebrate species

Family	Species
Bees	
Colletidae	<i>Leioproctus (Exleycolletes)</i> BATLEY/BB/28082017/HYM/COLL/001
True bugs	
Miridae	<i>Fronsetta</i> sp_BBLM17_msp006
Miridae	Gn_Cremnorrhinini_001 sp_BBLM17_msp017
Miridae	Gn_Cremnorrhinini_002 sp_BBLM17_msp018
Miridae	Gn_Cremnorrhinini_005 sp_BBLM17_msp021
Miridae	Gn_nr_Myrtemiris sp_BBLM17_msp014
Miridae	Gn_Orthotylini_005 sp_BBLM17_msp011
Miridae	Gn_Orthotylini_006 sp_BBLM17_msp012
Miridae	Gn_Orthotylini_001 sp_BBLM17_msp008
Miridae	Gn_Orthotylini_002 sp_BBLM17_msp009
Miridae	Gn_Orthotylini_004 sp_BBLM17_msp010
Miridae	Gn_Orthotylini_007 sp_BBLM17_msp013
Miridae	Gn_Orthotylini_008 sp_BBLM17_msp015
Miridae	Gn_Orthotylini_009 sp_BBLM17_msp016
Miridae	<i>Metopocoris</i> sp_BBLM17_msp007
Pentatomidae	Gn_Pentatominae_001 sp_BBLM17_msp028
Spiders	
Barychelidae	<i>Idiommata</i> sp.nov. 07
Corinnidae	<i>Nucastia</i> sp.nov. 15
Corinnidae	<i>Poecilipta</i> sp. nov. 02
Corinnidae	<i>Poecilipta</i> sp. nov. 06
Idiopidae	<i>Idiosoma</i> sp.nov. 16
Lycosidae	<i>Tasmanicosa</i> sp. nov. 22
Miturgidae	<i>Argoctenus</i> sp.nov. 18
Miturgidae	<i>Hestimodema</i> sp. nov. 04
Miturgidae	<i>Miturga</i> sp. nov. 20

Family	Species
Spiders (continued)	
Miturgidae	Miturgidae gen. nov.01 sp. nov. 08
Miturgidae	Miturgidae gen. nov.02 sp. nov. 11
Oxyopidae	<i>Oxyopes</i> sp. nov. 01
Zodariidae	<i>Australutica</i> sp.nov. 17
Zodariidae	<i>Neostorena</i> sp. nov. 03
Zodariidae	<i>Neostorena</i> sp. nov. 14
Zodariidae	<i>Neostorena</i> sp. nov. 34

Threatened species

Australia is home to an estimated 580,000–680,000 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 gone extinct; many others are considered to be threatened, i.e. at risk of extinction.¹

Fauna

Vertebrates

Reptiles

One threatened reptile was detected in relative abundance, providing significant records for the species. Jewelled Gecko (*Strophurus elderi*) is listed as Vulnerable in NSW, but was the most abundant reptile observed when searching *Spinifex*. Nine individuals were observed and photographed across two sites over three days of searching. None were collected to minimise impact on the species and because identification by experts was possible from the photographs.

Table 4 Threatened vertebrate species

Family	Species	Common name	Status	Comments
Reptiles				
Diplodactylidae	<i>Strophurus elderi</i>	Jewelled Gecko	Vulnerable (BC Act)	Abundant

¹ Chapman, A. D. 2009, Numbers of Living Species in Australia and the World, 2nd edn. Australian Biological Resources Study, Canberra.

Flora

Vascular plants

Swainsona sericea is a widespread, but relatively rare species in NSW (and the ACT) that is threatened primarily by habitat clearing and degradation. There are several populations in Mungo National Park and they represent important regional reserved populations. Plants were recorded on sand dunes in several locations, including Garnpung Soak and Lake Mungo, along Tour Drive toward Zanci Homestead.

Table 5 Threatened flora species

Family	Species	Common name	Status	Comments
Vascular plants				
Fabaceae	<i>Swainsona sericea</i>	Silky Swainson-pea	Vulnerable (BC Act)	200+ plants

Exotic and pest species

Conservation reserves help to 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.

Invertebrates

True bugs

One pest heteropteran species was recorded at Mungo National Park. Rutherglen Bug (*Nysius vinitor*) is a native species that infests a variety of commercially important crops in Australia including canola, lucerne, wheat, sunflowers, linseed and sorghum.

Spiders

The Redback Spider (*Latrodectus hasseltii*) is not native to the park but was observed at every collecting site.

Snails

Microxeromagna lowei is considered a pest species but it was only found in the gardens and areas towards the tanks. It may occur at the other well established homesteads but these areas were not searched.

It is also possible that *Haitia acuta* was found but only a few long dead shells were found in a dry tank. As *Haitia* is very similar to the native *Glyptophysa*, and no fresh material was found, it is not possible to make a definitive identification. *Haitia* is very widespread in disturbed freshwater habitats across large areas of Australia.

Table 6 lists the pest and exotic invertebrate species that were collected in the reserves.

Table 6 Exotic and pest invertebrate species

Family	Species	Common name	Comments
True bugs			
Lygaeidae	<i>Nysius vinitor</i>	Rutherglen Bug	approx. 30 specimens
Spiders			
Theridiidae	<i>Latrodectus hasseltii</i>	Redback Spider	Abundant in most locations
Snails			
Hygromiidae	<i>Microxeromagna lowei</i>	Citrus Snail	very common
Physidae	<i>Haitia acuta?</i>	Acute Bladder Snail	rare

Flora

Most of the weed species recorded during the vascular plant surveys are widespread and have minimal, though always some, landscape impact. However, several recorded species do have high invasion potential and should be controlled while populations are small. Garnpung Soak and Zanci Homestead were identified as two sites where particular control should be undertaken, and several isolated weed populations noted elsewhere in the region should be given priority for weed control—*Opuntia stricta*, *Acetosa vesicaria*, *Tamarix aphylla* and *Xanthium occidentale*.

A number of weed species were observed that have not previously been recorded in the park and NPWS staff indicated they intend to investigate these further and assess if management actions are required.

Additional weed species, recorded during previous surveys but not on the Bush Blitz, are included in [Appendix A](#).

[Table 7](#) and [Table 8](#) list the exotic weed species that were collected or observed in the park on the Bush Blitz.

Table 7 Gazetted weeds

Family	Species	Common name	Comments
Vascular plants			
Asteraceae	<i>Xanthium occidentale</i>	Noogoora Burr	Locally abundant; declared noxious weed - a priority for removal
Cactaceae	<i>Opuntia stricta</i>	Common Prickly Pear	One clump beside entrance road; declared noxious weed - should be removed
Tamaricaceae	<i>Tamarix aphylla</i>	Athel Pine	A few plants; declared noxious weed – should be removed

Table 8 Non-gazetted weeds

Family	Species	Common name	Comments
Vascular plants			
Aizoaceae	<i>Mesembryanthemum crystallinum</i>	Common Ice Plant	Scattered; a common weed of saline soils
Aizoaceae	<i>Psilocalyon granulicaule</i>	Wiry Noon-flower	Few plants; a weed of saline areas
Anacardiaceae	<i>Schinus molle</i> var. <i>areira</i>	Pepper Tree	Abundant; a common and widespread weed; probably originally planted to stabilise the sand dunes
Asphodelaceae	<i>Asphodelus fistulosus</i>	Onion Weed	Abundant; a common and widespread weed, somewhat invasive, with some impact
Asteraceae	<i>Dittrichia graveolens</i>	Stinkwort	Abundant; a common and widespread weed
Asteraceae	<i>Hypochaeris glabra</i>	Smooth Catsear	Abundant; a common and widespread weed
Asteraceae	<i>Sonchus oleraceus</i>	Common Sowthistle	Scattered; a common and widespread weed
Boraginaceae	<i>Echium plantagineum</i>	Patterson's Curse	Scattered; a common and widespread weed, somewhat invasive, with some impact
Brassicaceae	<i>Brassica tournefortii</i>	Mediterranean Turnip	Abundant; a common and widespread weed
Brassicaceae	<i>Carrichtera annua</i>	Ward's Weed	Abundant; a common and widespread weed
Brassicaceae	<i>Sisymbrium erysimoides</i>	Smooth Mustard	Abundant; a common and widespread weed
Caryophyllaceae	<i>Spergularia diandra</i>	Lesser Sand-spurry	A few plants; a common and widespread weed

Family	Species	Common name	Comments
Vascular plants (continued)			
Chenopodiaceae	<i>Chenopodium murale</i>	Nettle-leaf Goosefoot	A few patches; a common and widespread weed
Cucurbitaceae	<i>Citrullus lanatus</i>		Abundant; a common and widespread weed
Cucurbitaceae	<i>Cucumis myriocarpus</i>	Paddy Melon	Scattered; a common and widespread weed
Fabaceae	<i>Medicago minima</i>	Woolly Burr-medic	Abundant; a common and widespread weed
Geraniaceae	<i>Erodium cicutarium</i>	Common Crowfoot	Abundant; a common and widespread weed
Lamiaceae	<i>Marrubium vulgare</i>	White Horehound	Numerous plants; a common and widespread weed, somewhat invasive, with some impact
Lamiaceae	<i>Salvia verbenaca</i>	Vervain	Abundant; a common and widespread weed
Malvaceae	<i>Brachychiton populneus</i> subsp. <i>populneus</i>		A few trees; planted; native elsewhere in NSW
Oxalidaceae	<i>Oxalis pes-caprae</i>	Soursob	Abundant; a common and widespread weed
Poaceae	<i>Hordeum leporinum</i>	Barley Grass	Scattered; a common and widespread weed
Polygonaceae	<i>Acetosa vesicaria</i>	Bladder Dock	One patch; a common and widespread weed; not yet common in the area and highly invasive - should be removed
Solanaceae	<i>Nicotiana glauca</i>	Tree Tobacco	Abundant; a common and widespread weed
Solanaceae	<i>Solanum nigrum</i>	Black-berry Nightshade	Scattered; a common and widespread weed

Range extensions

Fauna

Invertebrates

True bugs

No previous true bug records were known for Mungo National Park therefore the distribution records for all taxa identified in this report represent range extensions, however these are not considered significant due to lack of existing baseline data.

Spiders and scorpions

The spider *Australomisidia rosea* is only recorded from eastern Queensland and Tasmania so is a new record for NSW.

A scorpion of *Cercophonius* species was collected. It may be the first record of this species in western NSW.

Flora

Most of the vascular plant range extensions documented during the Bush Blitz reflect the paucity of botanical collections in western NSW, and the seasonality of ephemeral species which are easily overlooked. Range extensions of more than 50 km are considered significant in this region and are included in Table 9. The vascular plant and fungi collections include 44 new taxon records for the park, 32 of which represent range extensions of more than 50 km.

The most significant discovery was a population of *Eucalyptus cyanophylla*, a species listed as rare in Victoria, and the first verified record for this region of NSW. This population was located near the southern boundary of the park.

Table 9 Range extensions

Family	Species	Common name	Nearest previous record / Comments
Spiders and scorpions			
Bothriuridae	<i>Cercophonius</i> sp. 40		Possibly first record in western NSW
Thomisidae	<i>Australomisidia rosea</i>		New state record
Vascular plants			
Aizoaceae	<i>Mesembryanthemum crystallinum</i>	Common Ice Plant	60 km; weed
Aizoaceae	<i>Psilocaulon granulicaule</i>	Wiry Noon-flower	65 km; weed
Anacardiaceae	<i>Schinus molle</i> var. <i>areira</i>	Pepper Tree	150 km; weed

Family	Species	Common name	Nearest previous record / Comments
Vascular plants (continued)			
Asparagaceae	<i>Thysanotus tuberosus</i> subsp. <i>tuberosus</i>		80 km
Asteraceae	<i>Brachyscome ciliaris</i> var. <i>ciliaris</i>		140 km
Asteraceae	<i>Brachyscome debilis</i>	Small Hairy Daisy	130 km
Asteraceae	<i>Hyalosperma glutinosum</i> subsp. <i>glutinosum</i>		100 km
Asteraceae	<i>Pterocaulon sphacelatum</i>		100 km
Asteraceae	<i>Senecio lanibracteus</i>		60 km
Asteraceae	<i>Senecio runcinifolius</i>		60 km
Asteraceae	<i>Sonchus oleraceus</i>	Common Sowthistle	80 km; weed
Cactaceae	<i>Opuntia stricta</i>	Common Prickly Pear	110 km; weed
Chenopodiaceae	<i>Osteocarpum acropterum</i> var. <i>acropterum</i>	Water Weed	100 km
Chenopodiaceae	<i>Osteocarpum salsuginosum</i>		60 km
Cucurbitaceae	<i>Citrullus lanatus</i>		95 km; weed
Cyperaceae	<i>Isolepis australiensis</i>		120 km
Haloragaceae	<i>Myriophyllum simulans</i>		110 km
Juncaceae	<i>Juncus bufonius</i>		110 km
Lythraceae	<i>Lythrum hyssopifolia</i>		125 km
Myrtaceae	<i>Eucalyptus cyanophylla</i>	Blue-leaved Mallee	110 km; very significant record
Oleaceae	<i>Jasminum didymum</i> subsp. <i>lineare</i>	Desert Jasmine	60 km
Orobanchaceae	<i>Orobanche cernua</i> var. <i>australiana</i>		130 km
Phrymaceae	<i>Limosella australis</i>		110 km

Family	Species	Common name	Nearest previous record / Comments
Vascular plants (continued)			
Poaceae	<i>Tripogonella loliiformis</i>		140 km
Polygonaceae	<i>Polygonum plebeium</i>		100 km
Polygonaceae	<i>Acetosa vesicaria</i>	Bladder Dock	130 km; weed
Pteridaceae	<i>Cheilanthes lasiophylla</i>		90 km
Ranunculaceae	<i>Myosurus australis</i>		70 km
Solanaceae	<i>Nicotiana simulans</i>		70 km
Tamaricaceae	<i>Tamarix aphylla</i>	Athel Pine	140 km; weed
Fungi			
Agaricaceae	<i>Bovista cunninghamii</i>		70 km
Agaricaceae	<i>Chlamydotus meyenianus</i>		95 km

Other points of interest

Fauna

Vertebrates

Reptiles and frogs (herpetofauna)

All groups were generally targeted but focusing on geckos and skinks was more productive given the cooler weather. A total of 20 reptile and one frog species were documented during the Bush Blitz—a surprising number, given the cold conditions. In addition, 41 tissue samples from 16 taxa were collected, representing the first herpetofauna tissue vouchers for the park.

The herpetofauna of Mungo National Park and its surrounds have previously been thoroughly surveyed. However, two species that had not been officially recorded within the park were detected during the survey. *Limnodynastes tasmaniensis* had been previously recorded adjacent to the park but not within it and occurrence was expected. While no records existed on ALA for Strap-snouted Brown Snake (*Pseudonaja aspidorhyncha*) within the park, the presence of these snakes as specimens in the park's visitor information centre suggests they are well known in the park but possibly misidentified as Eastern Brown Snake (*Pseudonaja textilis*).

Invertebrates

True bugs

The Heteroptera of Australia comprise approximately 2500 species. Recent surveys during Bush Blitz Phase 1 revealed 1391 species of Heteroptera, of which 391 are recognised as being new to science. In a report to the ABRS on Bush Blitz Phase 1, Prof. Cassis and Prof. Laffan indicated that the species

taxonomic accumulation curve was not levelling, and predicted that the total Heteropteran fauna of Australia would amount to approximately 6500 species.

This Bush Blitz resulted in the collection of approximately 41 heteropteran species from 18 localities. Thirteen families were represented in the collection, of which the Miridae were most well represented. This includes a possible new genus in the family Miridae.

Sampling attempted to cover a range of different areas on each host plant (leaves, bark, flowers, etc.) and across as wide a range of lifecycle and fruiting stages as possible. However, due to the scarcity of flowers at the time of collecting, the presence of Heteroptera was extremely heterogeneous within the park. As such, whilst many sites were visited and investigated, samples were collected from fewer sites than originally intended.

Other insects

Not many insects were expected to be recorded during the Bush Blitz as there is minimal insect activity during winter. In addition, Mungo National Park is in a semi-arid zone without creeks, streams or other water courses—the only long-term wet places are a few soaks and some artificial tanks.

Three groups of insects were targeted—dragonflies (order Odonata), bees (families in Hymenoptera), and silverfish (order Zygentoma). Prior to this Bush Blitz only one dragonfly record, and no bee or silverfish records, existed for the park.

Expectations for finding adult dragonflies were low because dragonflies are semi-aquatic and there was little water around, plus they feed on flying insects which are less abundant in winter. Three dragonfly species were recorded, all away from water. All three species are considered to have a widespread distribution.

Six species of bees were found on flowering eucalypts and weeds. Specimens were recorded of *Leioproctus* (*Euryglossidia*), which are among the first bees to appear after winter. *Leioproctus* (*Euryglossidia*) is in a group of bees that is currently under review.

Silverfish need reasonably humid conditions and small numbers were expected to be found in tree bark and leaf litter. Two species of silverfish were found active under the bark of mature trees. They are both probably undescribed. The genus of silverfish, *Acrotelsella*, is very well represented in Australia but also occurs in southern and eastern Asia, Madagascar, eastern Africa, the Caribbean and on some oceanic islands of the Indian and Pacific. This genus needs a lot of work. Most descriptions are old and not sufficient to identify specimens according to our current knowledge. Many species will need to be re-described.

Spiders

Only one spider species had previously been recorded from Mungo National Park so the Bush Blitz expedition provided an excellent opportunity to learn more about the spider fauna of the park.

Of the 47 spider species recorded, only 12 are described species, 16 are putative new species and the remaining 19 cannot be identified due to a lack of relevant literature. Hence 74% of the spider species recorded need further taxonomic work to see their full potential for scientific documentation, including biodiversity modelling. This is not particularly surprising, as comprehensive revisions of ground-dwelling spiders over recent years have revealed a huge amount of new taxa in a broad variety of spider families.

The discovery of 47 species from 17 families shows the surprising diversity of the park's spider fauna. It is unknown whether any of the undescribed species are endemic to the park. All of the described species have a wider distribution.

Most of the collected specimens are spiders that actively hunt. Corinnids, some lycosids and salticids are daylight hunters, mostly hunting in the early mornings. Gnaphosids, lamponids, most lycosids, miturgids, and some zodariids are night-active, hidden under bark, in leaf litter or in burrows during the day.

Mouse spiders (Actinopodidae) were already known to be part of the park's spider fauna, with the Red-headed Mouse Spider (*Missulena occatoria*) documented in 2012 and again during the Bush Blitz. An unidentified juvenile mouse spider was also recorded.

Silverbacks (genus *Idiommata*) were not included in the revision of brush-footed trapdoor spiders (Barychelidae) in 1994 so we do not know much about them.

Swift spiders and ant-mimics (Corinnidae) were revised in "A revision of ant-mimicking spiders of the family Corinnidae (Araneae) in the Western Pacific. Raven, 2015" so it is now possible to identify them to species. Three new species were collected as well as *Nyssus coloripes*, which is widely distributed, especially in eastern Australia.

Intertidal spiders and house spiders (Desidae) are very diverse, including the genus *Forsterina* which belongs to "badumnine-group" with a sinuous embolus of the male palp and a cribellum. *Forsterina* sp. 31 was only recorded in the very harsh environment at the top of the Walls of China.

Mesh-web spiders (Dictynidae) are small cribellate weavers living in grass and shrubs.

Ground spiders (Gnaphosidae) are night-active hunters, resting during daytime in sac-like retreats. They are most diverse in dry areas of Australia but hardly any taxonomic work has been done so it is impossible to decide if the nine species collected are new species.

True trapdoor spiders of the genus *Idiosoma* (Idiopidae) are not yet revised and are thought to be endemic to Western Australia. This new species is the most eastern *Idiosoma* species known.

White-tailed spiders (Lamponidae) are dark-coloured ground-dwelling spiders, often with eye-catching white spots at the back of their abdomen. *Lamponina scutata* is widespread in Australia, especially in dry areas.

Sheet-web spiders (Linyphiidae) are quite rare and poorly known in Australia. These small spiders live mostly in litter or in the lower vegetation.

Wolf spiders (Lycosidae) belong to one of the most diverse spider families in Australia and are difficult to identify. Most of the collected wolf spiders were still juvenile so it was only possible to record a small part of the Lycosid fauna. Mungo National Park is home to at least five species. *Tasmanicosa stella* was only recently described and is widely distributed in southern Australia. The park is also home to three undescribed species and a new species.

False wolf spiders (Miturgidae) are night-active fast-hunting ground spiders that rest in a sac-like retreat during the day. The family was partly revised by Raven in 2003 and 2009. The miturgid fauna of Mungo National Park is surprisingly rich with two new genera and five new species collected.

Only 19 species of lynx spiders (Oxyopidae) are known in Australia. Most species are difficult to identify as no recent revision is available in the literature although most of the type species have been revised.

Australian tarantulas (Theraphosidae) include the largest Australian spiders.

Comb-footed spiders or cob-web spiders (Theridiidae) are extremely diverse in Australia. The Redback Spider (*Latrodectus hasseltii*) is widely distributed within the park.

Crab spiders (Thomisidae) are camouflaged active daytime hunters and master ambushers, mostly on flowers, litter or bark.

Jumping spiders (Salticidae) are one of the most diverse spider families in Australia and only partly revised. *Maratus vespertilio* is a relatively common but camouflaged peacock spider found in NSW, VIC, and common in WA. *Maratus chrysomelas* is widely distributed and common in WA. The genus *Saitis* has not been revised.

Ant-eating spiders (Zodariidae) are active hunters in litter or sand. Most of them mimic ant behaviour and live with ants while preying on them. Four described species were recorded. *Australutica quaerens* is widely distributed but rare in dry, sandy habitats of SA and NSW. *Habronestes grahami* is widely distributed throughout southern Queensland and NSW. *Habronestes monocornis* is rare and found only in central NSW. *Zillimata scintillans* is an iridescent ant-eating spider that mimics green-headed ants (*Rhytidoponera*) and is widely distributed over southern Australia but rarely found. The ant-eating spiders belong to one of the most diverse spider families in Australia. Although some genera have been revised recently, others await revision and the four new species belong to the not yet revised genera *Australutica* and *Neostorena*.

Pseudoscorpions and scorpions

Three un-named pseudoscorpion species from three families, Atemnidae, Geogarypidae and Chernetidae, were reported from three locations within the park.

One un-named scorpion species of the family Bothriuridae was collected.

Molluscs

Prior to the Bush Blitz, there had only been one survey specifically targeting molluscs, conducted on 26 September 2001. Three native species of terrestrial snails and two species of freshwater mussels had been previously recorded, the mussels only as fossils.

Both land and freshwater molluscs were targeted during the Bush Blitz. Due to the prevailing fairly dry and cool conditions, molluscan diversity was not expected to be high and the chance of finding new taxa was considered low.

Eight species of mollusc were recorded either as living animals or recent shells. Five of these had not been previously recorded in the park but all have large distributions.

Snails were very rare at the two standard sites which were both very dry. Only *Pupoides adelaidae* was found at SSS1. Two species were found at SSS2—*Gastrocopta margaretae* and *Paralaoma morti*.

Two species of freshwater molluscs were found. Neither had been previously recorded from the park. *Isidorella hainesii* was found alive but *Haitia acuta?* was found only as dead shells.

Six species of terrestrial molluscs were also recorded, three of which (*Gastrocopta margaretae*, *Pupoides adelaidae* and *Pupoides myoporinae*) were previously recorded from within the park. All species except *Omegapilla australis* were represented by both living and dead individuals although the vast majority of the specimens found were empty shells.

An additional four species were only found as sub-fossils in the sand dunes and are not included in [Appendix A](#)—three species of freshwater molluscs (*Corbicula australis*, *Velesunio* cf. *ambiguus* and *Glyptophysa aliciae*) and one terrestrial mollusc (*Austrosuccinea australis*). All four have wide modern ranges however, as mentioned, the *Velesunio* may represent an undescribed species that is now extinct.

Flora

Vascular plants

Mungo National Park and the surrounding managed lands represent a poorly collected region of NSW for vascular plants. Collections are particularly sparse over the past 15–20 years, and during the winter period. Previous studies have largely focused on general vegetation community structure and distribution.

The season of survey (end of winter, early spring) was not expected to be ideal for the collection of fertile specimens and complete floral inventory, however as rainfall is unpredictable in this region, planning ideal sampling times is difficult. Despite the seasonal timing of the Bush Blitz, a significant number of records was obtained, including 317 voucher specimens.

The Bush Blitz significantly increased our knowledge of vascular plants in the region, and in Mungo National Park in particular. The survey supplemented the earlier work and, following the addition of the 187 species recorded during the Bush Blitz, the total number of vascular plant taxa recorded for the park is now 447. In addition, some taxa previously only represented by visual records were vouchered for the first time during the Bush Blitz.

Most of the interesting records came from the sand dunes in the NW corner of the park, around ephemeral water points (e.g. Garnpung Soak), or near the southern boundary of the park. Management of weeds, grazing and fire frequency in these areas would benefit the persistence of these species.

Several species recorded are fire-ephemerals, those only present for a short period following fire, which stimulates seed germination. Additional surveys following fire events would improve knowledge of the distribution and potential presence of other fire-ephemeral taxa in the park.

Seed collection

In terms of seed collections, there has been very little work done within Mungo National Park. Before the Bush Blitz, only seven individual collections, representing four species, were maintained within the Australian Seed Bank, based at the Australian PlantBank, Australian Botanic Garden. One of these, Red Mallee (*Eucalyptus socialis*), was only represented by a single collection. Given the paucity of collections, the opportunity to collect seed from species sampled as part of this Bush Blitz was a welcome opportunity.

For the Australian PlantBank, Mungo National Park is virtually untapped as a source for wild seed. The survey was keenly expected to allow the collection of many species known in the park including key species with no current seed collections held, such as the Ridge-fruited Mallee (*Eucalyptus incrassata*), as well as from any new species discovered.

A total of 11 seed collections, representing four species, were made during the Bush Blitz, including three species new to the Australian Plantbank. These will be added to the Australian Plantbank collection for conservation to support wild populations in the park.

Fungi

Few fungi had been collected in the park prior to the Bush Blitz.

A small number of macrofungi, which were fruiting at the time of the Bush Blitz, were collected and preliminarily identified to genus or, where possible, to species level. When identification and DNA analysis is completed the specimens will be deposited in the National Herbarium of Victoria.

A number of collections were made of plant material with visible leaf spot symptoms likely to be caused by fungi. These were shipped to the Westerdijk Fungal Biodiversity Institute in Utrecht, The Netherlands, for processing as part of the collaborative research program of Brett Summerell and Professor Pedro Crous.

Two epifoliar fungi were also collected but identification at any level awaits molecular data, so they have not been included in [Appendix A](#).

Lichen

A small number of lichens were collected and are awaiting identification.

Glossary

Aeolian: relating to or arising from the action of the wind.

Cribellum: (in some spiders) an additional spinning organ with numerous fine pores, situated in front of the spinnerets.

Exotic species: a species occurring outside its normal range.

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

Putative new species: an unnamed species that, as far as can be ascertained, was collected for the first time during the Bush Blitz.

Range extension: increase in the known distribution or area of occurrence of a species.

Species range: the geographical area within which a particular species can be found.

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.

Threatened: fauna or flora that are listed under Section 178 of the EPBC Act (or equivalent State legislation) in any one of the following categories—extinct, extinct in the wild, critically endangered, endangered, vulnerable, conservation dependent.

Type locality: the location where the primary type specimen(s) (holotype or syntype series) was found.

Type specimen(s) (holotype, syntypes): the specimen (or set of specimens) on which the description and name of a new species is based.

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

Notes

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PUBLISHER ABRS, Canberra

EDITOR ABRS

LAYOUT Biotext

DESIGN TEMPLATE Biotext

Contributors

Bush Blitz is coordinated by the Australian Biological Resources Study (ABRS), which is part of the Australian Government Department of the Environment and Energy. The program is a partnership between the Australian Government, BHP Billiton Sustainable Communities and Earthwatch Australia.

Research agencies involved in this Bush Blitz were Australian Museum, Queensland Museum, University of New South Wales and the Royal Botanic Garden Sydney.

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Mungo National Park

New South Wales

25 August–1 September 2017



Australian Government

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