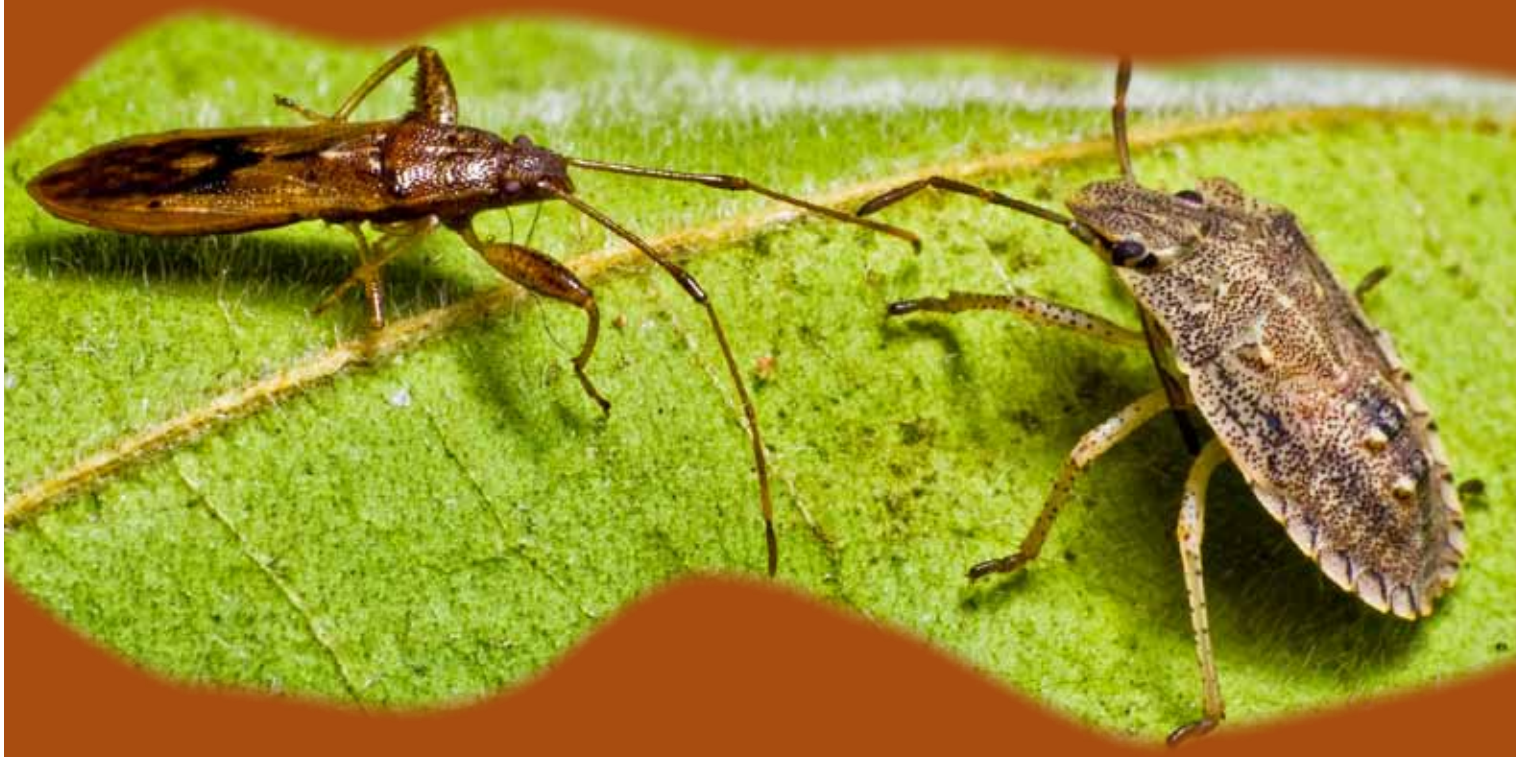
BushBlitz
SPECIES DISCOVERY PROGRAM

BUSH BLITZ SPECIES DISCOVERY PROGRAM



# Fish River Station
# Northern Territory

23 April–3 May 2012

Australian Government

bhpbilliton
resourcing the future

EARTHWATCH INSTITUTE

Australian Biological Resources Study

# What is Bush Blitz?

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

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.

# Contents

# Summary

This Bush Blitz was the first substantial baseline flora and invertebrate survey of Fish River Station, and has significantly increased information for the reserve. In total, 701 flora and fauna species were added to those previously known for the reserve, of which 60 are believed to be new to science. Of the putative new species, a spider (*Phlogius* n. sp. 13) and a vascular plant (*Brachychiton* n. sp. Fish River) are likely to be endemic to Fish River Station. Another major discovery was a new species of goblin spider that has since been described as *Cavisternum attenboroughi* n. sp. in honour of Sir David Attenborough.

Fish River Station supports a diverse group of terrestrial vertebrates broadly characteristic of the tropical savannas of the Top End of the Northern Territory. During this study, 14 frogs, including the Cane Toad (*Rhinella marina*), and 35 reptile species were documented, bringing the number of amphibians and reptiles known from Fish River Station to 81. Six of these were recorded on the reserve for the first time. Fish River Station has a high diversity of freshwater fishes, with 29 species recorded during the survey, raising the total number to 45. Delicate Blue Eye (*Pseudomugil tenellus*) specimens collected have an unusual gold colour form and might be an undescribed species from the Daly Basin, with most of its known range on Fish River Station. A spring-fed swamp appears to be a rare core habitat for this species.

The diversity and abundance of small mammals was low, which reflects the severity of ongoing small mammal declines experienced across the Top End. Unfortunately, the team did not capture the undescribed species of false antechinus (*Pseudantechinus* sp.) that was the main target of mammal trapping. This suggests that population densities are low, requiring a longer survey period.

## Abbreviations

ABRS
Australian Biological Resources Study

ANIC
Australian National Insect Collection

CSIRO
Commonwealth Scientific and Industrial Research Organisation

EPBC Act
*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)

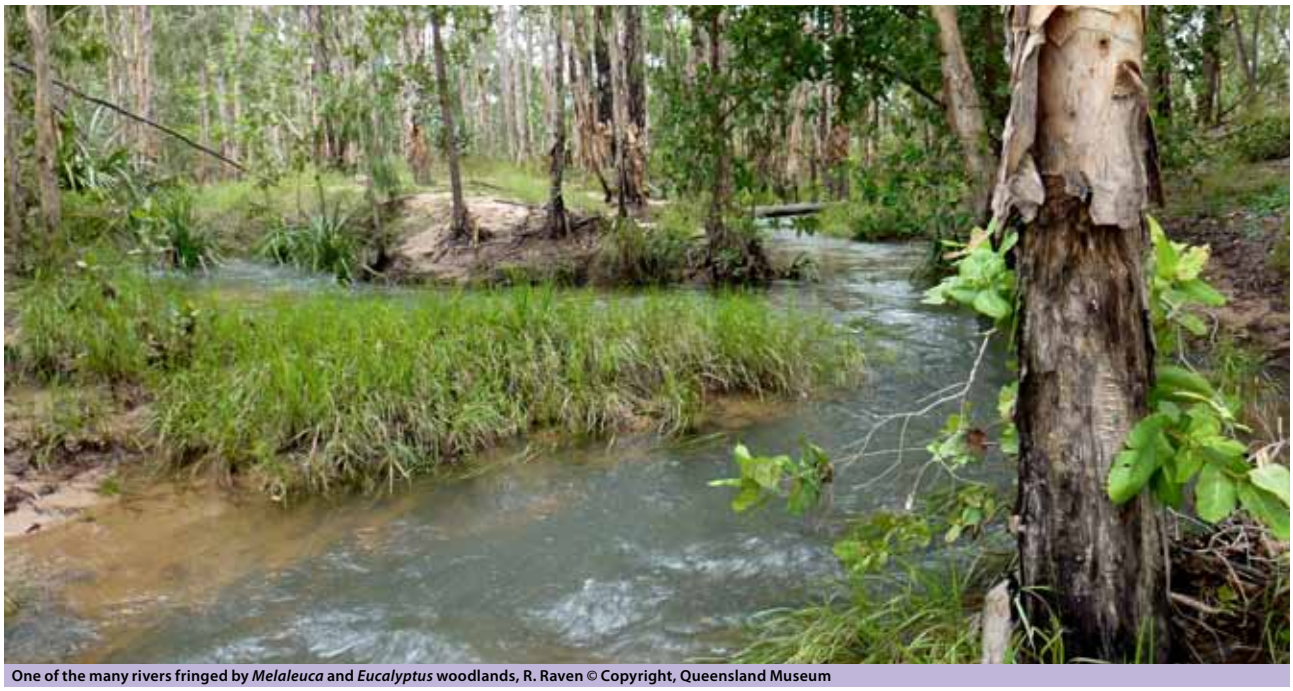
ILC
Indigenous Land Corporation

IUCN
International Union for Conservation of Nature

NRS
National Reserve System

TPWC Act
*Territory Parks and Wildlife Conservation Act 2000* (Northern Territory)

**The survey team for the Fish River Station Bush Blitz © Copyright, R. Whyte**
**Back row: Ben Firth, Ian Cowie, Vince Kessner, Dane Trembath, Gavin Dally, Stephen Richards, Dave Wilson.**
**Middle row: Mim Jambrecina, Nicole Gunther, Jo Harding, Celia Symonds, Chris Cargill, Michael Hammer.**
**Front row: Alister Bell and Darren Stockton (helicopter pilots), Michael Braby, Kate Gillespie, Donna Lewis, Robert Raven, Jeff Long.**



One of the many rivers fringed by *Melaleuca* and *Eucalyptus* woodlands, R. Raven © Copyright, Queensland Museum

The semi-aquatic Mertens' Water Monitor (*Varanus mertensi*) was the only threatened animal observed that is listed under the *Territory Parks and Wildlife Conservation Act 2000* (TPWC Act). No species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) were recorded; however, several are known to occur on the property.

Some 351 flora species were recorded on Fish River Station for the first time. It supports extensive areas of *Excoecaria parvifolia/Eucalyptus microtheca/Melaleuca/Eucalyptus camaldulensis*-dominated forest, a community not observed elsewhere. Thirty-seven species of conservation significance[1] were identified, although no listed threatened plants were recorded. Information gathered during this survey may result in the change of conservation status of some species at the next (2014–15) review of species listings under the TPWC Act.

A significant attribute of Fish River Station is the lack of introduced fishes. Other feral animals were common on most parts of the reserve with 20 exotic or pest animal species recorded. The environmental damage attributed to Water Buffalo (*Bubalus bubalis*), European Cattle (*Bos taurus*) and Pigs (*Sus scrofa*) was evident at most sites. Some reptiles known to experience population declines following the arrival of the Cane Toad and expected to occur on the reserve were not found during this survey.

Twenty weeds were recorded including six noxious weeds gazetted under the *Weeds Management Act 2001* (NT). The most important emerging weed is Gamba Grass (*Andropogon gayanus*), which is not yet well established on Fish River Station, in contrast to nearby pastoral land. Gamba Grass is likely to have a serious impact on the conservation of native flora. Of the non-gazetted weeds, the most significant are Gambia Pea (*Crotalaria goreensis*) and Annual Mission Grass (*Cenchrus pedicellatus* subsp. *pedicellatus*)—both are common and appear to be spreading. Gambia Pea promises to cause similar problems as the declared weeds Coffee Senna (*Senna occidentalis*) and Arsenic Weed (*S. obtusifolia*) because of its similar structure and ecological characteristics.

1 Species of conservation significance are those in the IUCN categories Data Deficient, Not Evaluated and Near Threatened.

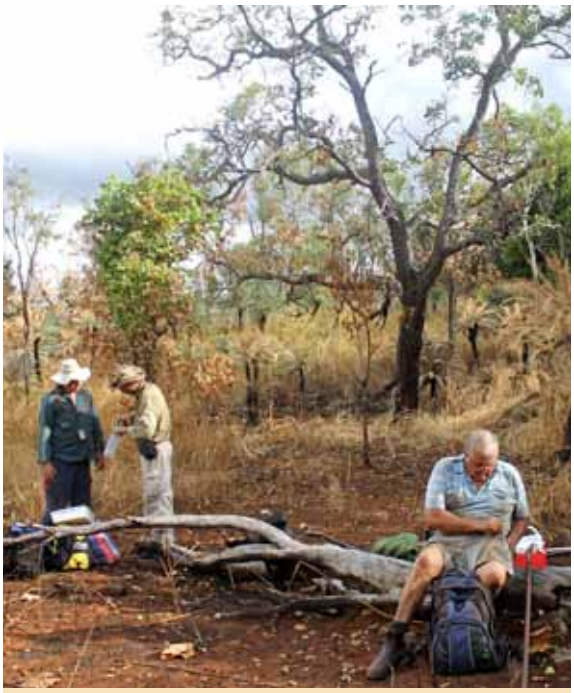
# Introduction

This is a report for the Bush Blitz program, which aims to survey recent additions to the National Reserve System (NRS)[2]. Bush Blitz is an initiative of the Australian Government, through the Australian Biological Resources Study (ABRS), in partnership with BHP Billiton and Earthwatch Australia. The Bush Blitz objectives are:

+ to promote, publicise and demonstrate the importance of taxonomy through species discovery;
+ to undertake a national species discovery program targeted at recently acquired properties of the NRS of Australia;
+ to support the science of taxonomy in Australia through training students and early career researchers, and the provision of grants for species description and resolution of taxonomically problematic, nationally important groups;
+ to promote partnerships between scientific institutions, government, industry and non-government organisations; and
+ to inform the NRS, reserve managers and other stakeholders of the results of the Bush Blitz Project.

This Bush Blitz took place from 23 April 2012 to 3 May 2012, in the transition period between the wet and dry seasons. The ABRS provided logistical coordination and overall leadership of the survey. Experts from the following organisations conducted the field and laboratory work: Museum and Art Gallery of the Northern Territory, Northern Territory Herbarium, Department of Land Resource Management Flora and Fauna Division, Australian National Insect Collection (CSIRO), Australian National Herbarium (CSIRO), Queensland Museum, Darwin Botanic Gardens, University of New South Wales and the consultancy Aquagreen.

The ABRS wishes to thank the Museum and Art Gallery of the Northern Territory and the Northern Territory Herbarium for hosting this Bush Blitz. Jeff Long and Shaun Ansell from the Indigenous Land Corporation (ILC) facilitated access to the reserve and provided helpful advice on survey locations.



Vince Kessner, Michael Braby and Robert Raven having a moment of rest, M. Jambrecina © Copyright, Department of the Environment

2 The NRS is Australia's network of protected areas, covering 16.52% of the country—over 12.7 million hectares, comprising Commonwealth, state and territory reserves, Indigenous lands and protected areas run by non-profit conservation organisations, through to ecosystems protected by farmers on their private working properties <http://www.environment.gov.au/topics/land/national-reserve-system>, accessed 27 May 2014.

# Reserve Overview[3]

## Fish River Station

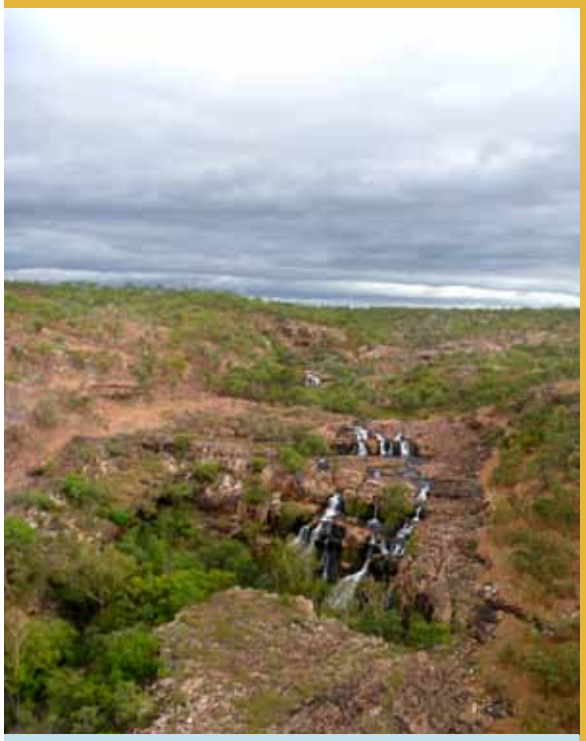
Indigenous Land Corporation

## Date of purchase

2010

## Area

182,500 ha



Spectacular ranges and rocky gorges border Fish River Station to the west


## Description

Fish River Station is a former pastoral property situated approximately 150 km south of Darwin in the Daly Basin bioregion. The property is largely undeveloped, with past clearing only for infrastructure (fencing, tracks, airstrip and homestead) and more recently from tracks associated with uranium exploration and a gas pipeline easement.

The ILC purchased Fish River Station through the NRS component of the Australian Government's Caring for our Country initiative, in partnership with The Nature Conservancy and Pew Foundation. The ILC holds Fish River Station on behalf of the traditional owners (Larbarganyin, Wagiman, Malak Malak and Kamu representatives) in a trust arrangement with Greening Australia. The ILC and traditional owners, with support from The Nature Conservancy, are working to develop long-term, sustainable management plans for Fish River Station.

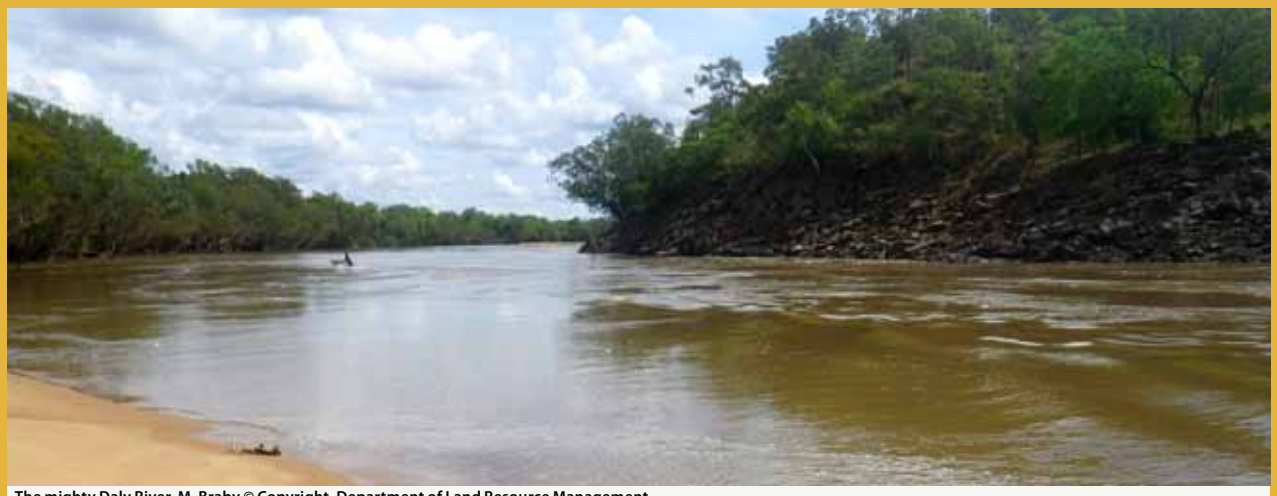
With a tropical wet–dry climate, Fish River Station receives an annual rainfall of approximately 1,300 mm. Bordered to the north by the Daly River, the reserve has extensive river frontage, freshwater tributaries and floodplains. A vast network of creek-lines and riparian areas criss-cross the savannah woodlands, and open forests dominate the reserve. Six major vegetation types occur on the reserve, ranging from tall open forests of Darwin Woollybutt (*Eucalyptus miniata*) and Darwin Stringybark (*E. tetrodonta*) to low open woodlands dominated by *Corymbia* species, with an understorey of tropical grasses. Pockets of dry, riparian and spring fed monsoon rainforest (totalling 947 ha) are generally small and scattered across Fish River Station, although some large stands also occur.

3 Information sourced from NRS applications and assessments; and the Daly Basin Bioregional Description, Department of Land Resource Management (Northern Territory), accessed 23 October 2013 <http://www.lrm.nt.gov.au/plants-and-animals/herbarium/nature/bioregional/dalybasin>.


## National Reserve System conservation values

Fish River Station augments the Trans-Australia Eco-link, a governmental effort to link protected areas from South Australia to the Arafura Sea in the Northern Territory. Fish River Station also increases protection of the Daly Basin bioregion from 2.5% to 9.5%, making a significant addition to the NRS. As one of the most fertile areas in northern Australia, and because of its proximity to Darwin and Katherine, the Daly Basin bioregion is under significant pressure from development.

A large portion of the Daly River Middle Reaches wetland complex, which is listed on the Directory of Important Wetlands,[4] occurs on Fish River Station. The Daly River itself is one of the largest spring-fed perennial rivers in Australia's wet–dry tropics and its middle reaches contains large limestone aquifers that capture monsoon rains and provide high flows during the dry season. The perennial flow of water results in a unique freshwater ecosystem that supports numerous species listed as threatened at the national or territory levels. These include the Australian Bustard (*Ardeotis australis*), Gouldian Finch (*Erythrura gouldiae*), Masked Owl (*Tyto novaehollandiae*), Northern Quoll (*Dasyurus hallucatus*), Mertens' Water Monitor (*Varanus mertensi*), Freshwater Sawfish (*Pristis pristis*) and the Freshwater Whipray (*Himantura dalyensis*). There is also an unusually high diversity of freshwater turtles, the richest in Australia.



**The mighty Daly River, M. Braby © Copyright, Department of Land Resource Management**

4 Department of the Environment, Directory of Important Wetlands, accessed 1 November 2013 <http://www.environment.gov.au/water/topics/wetlands/database/diwa.html>.

# Methods

Collection and observation sites were selected based on land classes, supplemented by identification of suitable microhabitats during the field visit. Site selection also depended on access, suitability for trapping and time restrictions.
At the time of the survey, roads into the property were closed following the wet season, and all sites were accessed by helicopter. Site locations were recorded using global positioning systems.

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

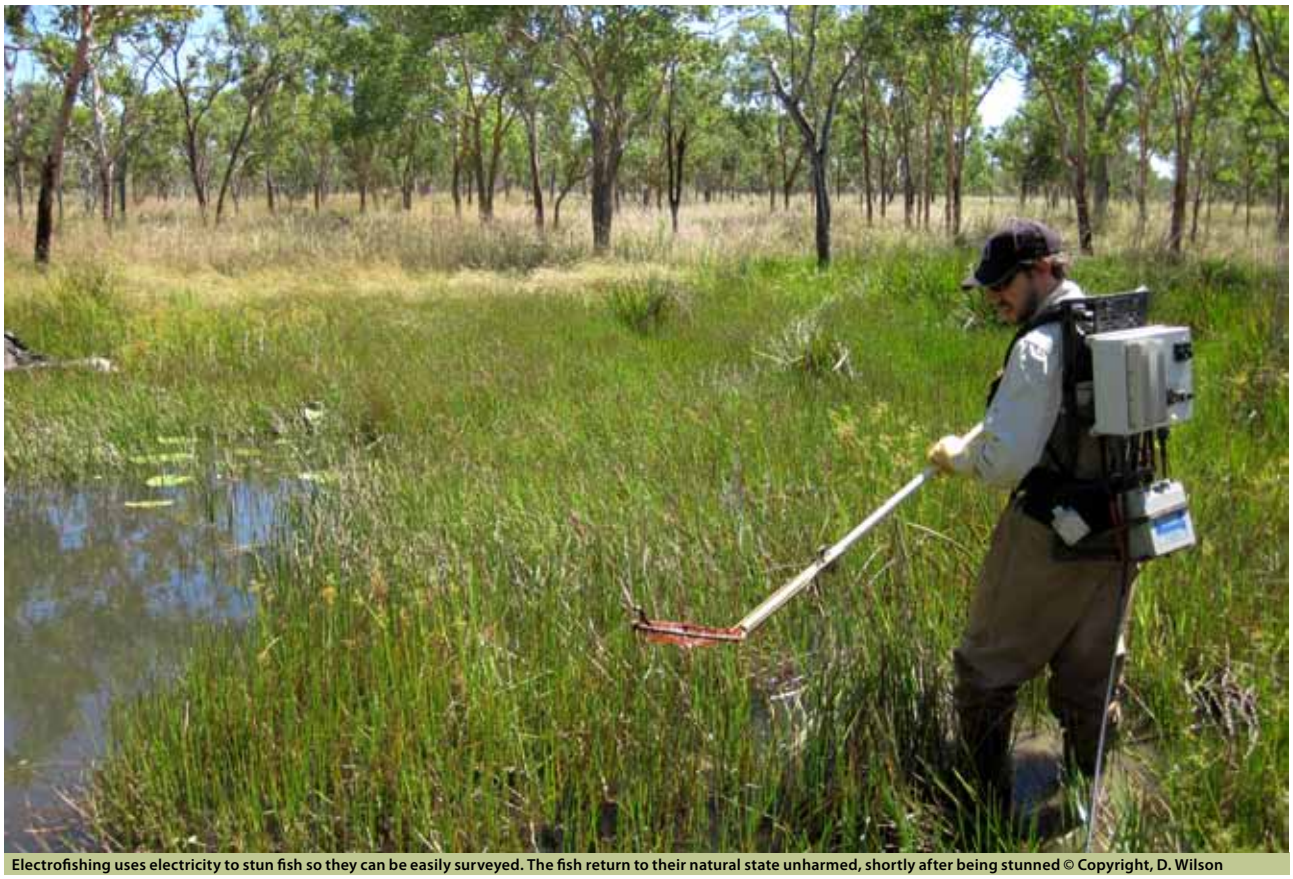
**Table 1: Taxonomic groups surveyed and personnel**

| Group | Common name | Expert | Affiliation |
|---|---|---|---|
| Mammalia, Amphibia and Reptilia | Mammals, Amphibians and Reptiles | Stephen Richards | Museum and Art Gallery of the Northern Territory |
| | | Dane Trembath | Consultant (Museum and Art Gallery of the Northern Territory Associate) |
| | | Stuart Young | Northern Territory Department of Land Resource Management Flora and Fauna Division |
| | | Jeff Long | ILC |
| Pisces | Fishes | Michael Hammer, Gavin Dally | Museum and Art Gallery of the Northern Territory |
| | | David Wilson | Consultant (Aquagreen) |
| Coleoptera | Beetles | Nicole Gunter, Tom Weir (identification) | Australian National Insect Collection (CSIRO) |
| Lepidoptera | Butterflies and Moths | Michael Braby | Northern Territory Department of Land Resource Management Flora and Fauna Division |
| Gastropoda | Snails | Vince Kessner | Consultant |
| Heteroptera | True Bugs | Celia Symonds | University of New South Wales |
| Odonata | Dragonflies and Damselflies | Stephen Richards | Museum and Art Gallery of the Northern Territory |
| Arachnida | Spiders | Barbara Baehr | Queensland Museum |
| Vascular Plants | Vascular Plants | Ian Cowie, Donna Lewis | Northern Territory Herbarium |
| | | Ben Wirf | George Brown Darwin Botanic Gardens |
| | | Chris Cargill | Australian National Herbarium |
| Bryophytes | Liverworts, Hornworts and Mosses | Chris Cargill | Australian National Herbarium |

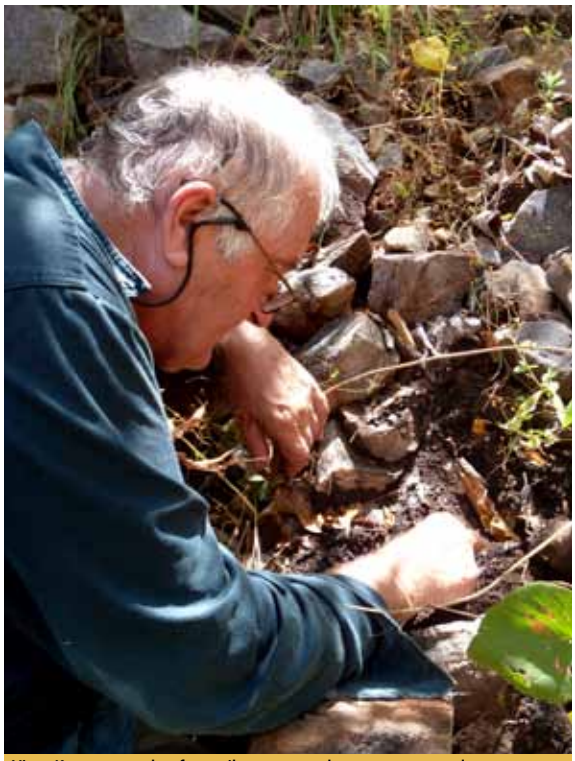
Dane Trembath releasing an Olive Python (*Liasis olivaceus*)
© Copyright, R. Whyte

A standard suite of survey techniques was used:

+ Small mammals were surveyed using Elliot traps over three consecutive nights on Mount Muriel.
+ Frogs were surveyed using visual and aural searches during the day and night.
+ Reptiles were surveyed using intensive pitfall and funnel trapping at three sites, and by day and night habitat searches.
+ Freshwater turtles were sampled using three aquatic turtle traps for one day in the Daly River.
+ Fish were primarily surveyed by backpack electro fishing, supplemented by the use of dip net, cast net, angling and spot lighting at some sites.
+ Dung beetles were collected using baited pitfall traps at six sites and at light traps (mercury vapour light shining on a white sheet) on two nights, as well as opportunistic hand collection from fresh dung.



Electrofishing uses electricity to stun fish so they can be easily surveyed. The fish return to their natural state unharmed, shortly after being stunned © Copyright, D. Wilson



Vince Kessner searches for snails amongst talus, pavements and boulders. Layers of rock provide moisture and shelter. The oldest snails are normally found in the deepest layers, while the young are found near the surface where they are vulnerable to predators and drying-out, M. Jambrecina © Copyright, Department of the Environment

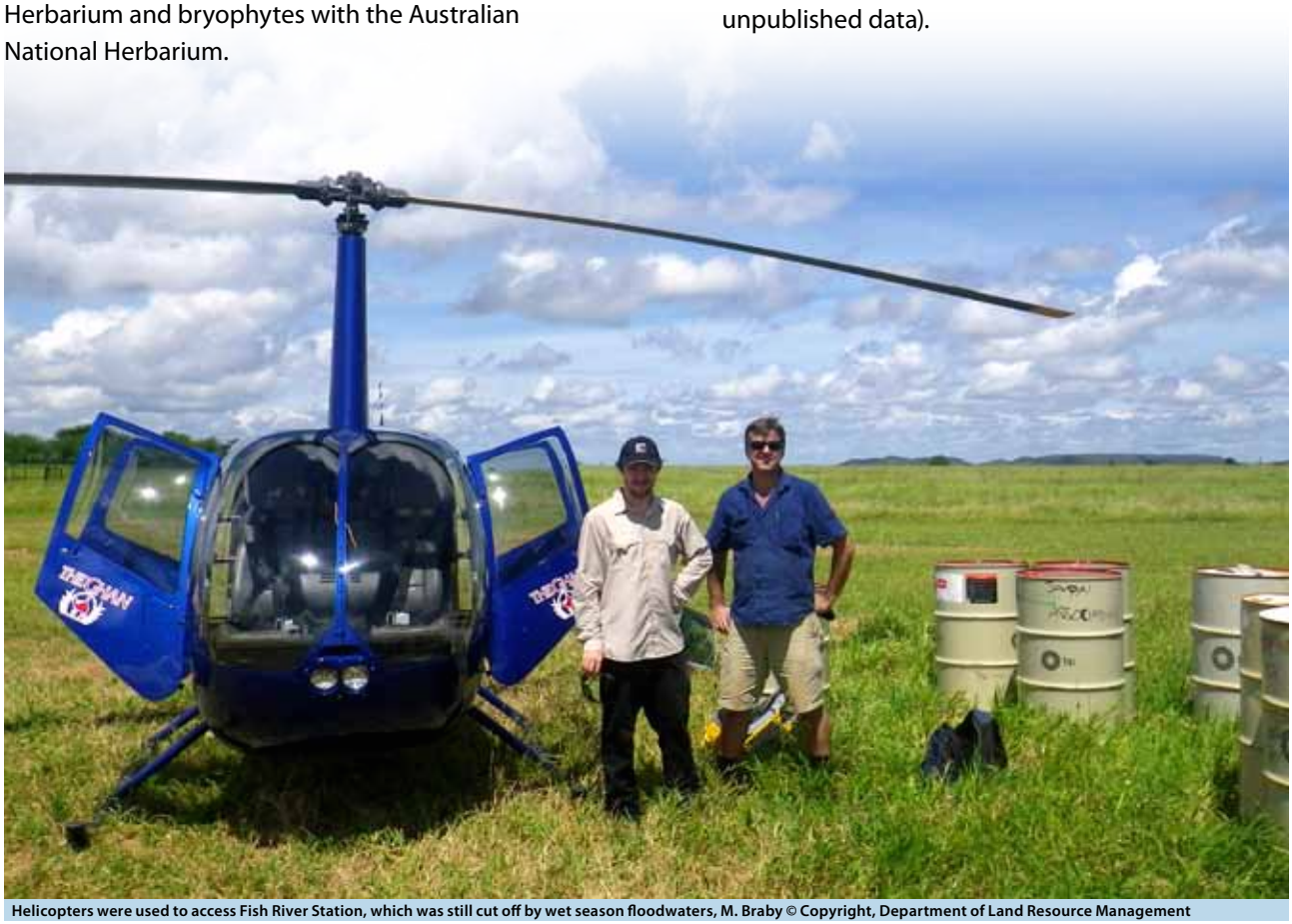
- Butterflies and diurnal moths were surveyed by visual observation and collected using sweep and canopy nets. Targeted searches were also undertaken for the presence of early stages (larvae, pupae) on their larval food plants. Two hilltops were surveyed to exploit the well-known 'hill-topping' mate-location behaviour exhibited by many species of butterflies.
- Dragonflies and damselflies were captured using large insect nets during intensive searches around all accessible water bodies. Searches during the mornings, evenings and on sunny afternoons covered the different activity patterns of taxa.
- True bugs were collected primarily by foliage beating and sweeping grasses, supplemented by pitfall traps and light traps. Light traps were used on two nights.
- Spiders were collected in small pitfall traps filled with propylene glycol at seven sites, and by excavating burrows, hand searching, and sifting through leaf litter to catch small and less mobile species.
- Land snails were sampled by digging and excavating talus, pavement and boulders in limestone or sandstone outcrops using a range of rakes and crowbars. Samples of leaf litter were also collected and sorted for microscopic snails.
- Vascular plants were sampled using standard methodologies for vegetation and flora sampling in the Northern Territory and emphasis was placed on collecting under-sampled flora of the region. Several pre-determined sites were selected along transects intersecting different vegetation patterns, topography and geology types. Further collecting was done along the transect between sites. A quadrate based method was used to sample one to two sites per day for full floristic and structural information, to better document the floristic variation across Fish River Station.
- Liverworts, hornworts and mosses were collected by hand where they occurred in large enough colonies. Specimens approximately 10 cm in diameter or less were collected from a variety of substrates including soil, bark, wood and rocks.

Incidental records were obtained for freshwater snails, fungi and algae. Macrofungi were photographed but not collected. Voucher specimens of all other groups were retained for further study and examination. Fauna specimens were tagged, fixed in formalin and preserved in alcohol. Vascular plant specimens were pressed and dried. Bryophytes were placed in paper envelopes and dried. Some bryophytes were kept

alive under refrigeration for further study and culturing at the Australian National Herbarium. Tissue samples for DNA analysis were obtained from all vertebrates, snails and butterflies vouchered during the survey, as well as some true bugs and dung beetles.

Collections were identified using available literature and the holdings of museums and herbaria. Fauna specimens were deposited with the Northern Territory Museum and Art Gallery, type specimens of dung beetles with the Australian National Insect Collection (ANIC), vascular plants with the Northern Territory Herbarium and bryophytes with the Australian National Herbarium.

Final species lists were compiled using data provided by the results of this Bush Blitz, museum and herbarium collections, the Australian Natural Heritage Assessment Tool, Northern Territory Biodiversity Conservation Invertebrate Database, University of New South Wales Heteroptera Database, Fish River Wildlife Survey 2011 (Department of Natural Resources, Environment, the Arts and Sport, unpublished data), long-term monitoring on the Daly River (Griffith University Australian River Institute, unpublished data), and the Northern Australian Freshwater Fish project (National Centre for Tropical Wetland Research and Griffith University Australian River Institute, unpublished data).



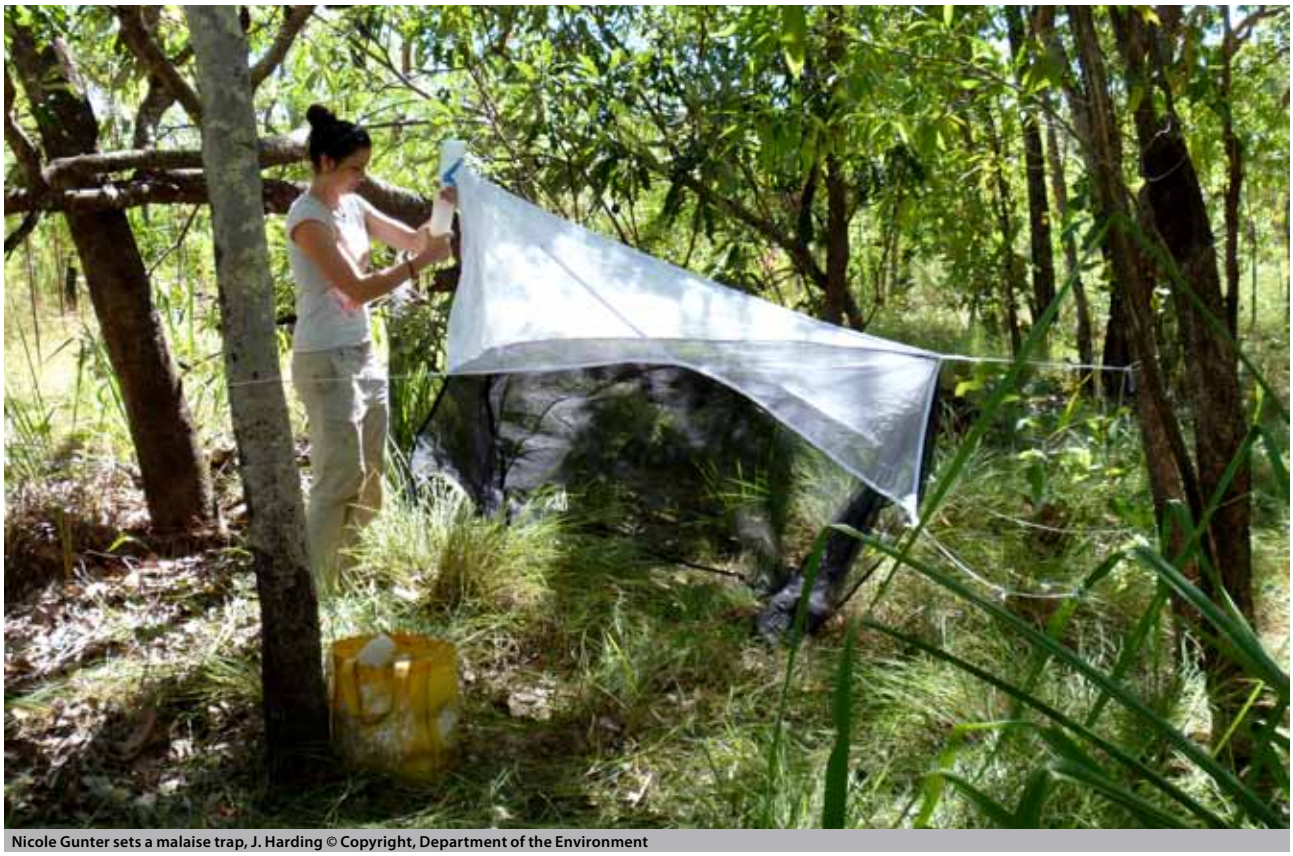
Helicopters were used to access Fish River Station, which was still cut off by wet season floodwaters, M. Braby © Copyright, Department of Land Resource Management

# Results

The locational data of collected and observed specimens are available to reserve managers. A total of 701 species were added to those previously recorded from the reserve, including 60 putative species new to science that were discovered during this Bush Blitz—these await assessment. One threatened animal species was observed and, although no threatened plants were recorded, 37 plants of conservation significance were identified for Fish River Station. Twenty exotic or pest animal species and 19 weed species were also recorded.

## Species Lists

Appendix A provides full, updated species lists for the reserve. Names in **brown bold text** are putative new species. Species marked with an asterisk (*) have not been previously recorded in the reserve. Those without an asterisk have been recorded previously and were identified again during this survey. Species shown in blue text were not recorded on this survey, but are known from previous studies. Table 2 provides a summary of the number of flora and fauna records and putative new taxa for the reserve.



Nicole Gunter sets a malaise trap, J. Harding © Copyright, Department of the Environment

Some specimens collected during this survey have been identified only to family or genus level. This is because a great deal of time is required to examine and identify to species level the many collections that are generated. In many cases, microscopic examination of the material is necessary. Additional limitations include the lack of experts working on particular groups, and that the taxonomic literature for some groups is not current. Further work will be conducted on these collections.

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

**Table 2: Summary of flora and fauna records and putative new species**

| Group | Common name | Total number of species | Species new to reserve | Species new to science |
|---|---|---|---|---|
| Mammalia | Mammals | 33 | 0 | 0 |
| Aves | Birds | 38 | 0 | 0 |
| Reptilia | Reptiles | 64 | 5 | 0 |
| Amphibia | Frogs and Toads | 17 | 1 | 0 |
| Pisces | Fishes | 45 | 3 | 0 |
| Lepidoptera | Butterflies and Moths | 75 | 73 | 0 |
| Coleoptera | Beetles | 21 | 15 | 0 |
| Heteroptera | True Bugs | 161 | 161 | 40 |
| Dermaptera | Earwigs | 1 | 0 | 0 |
| Odonata | Damselflies and Dragonflies | 38 | 38 | 0 |
| Arachnida | Spiders | 33 | 33 | 18 |
| Gastropoda | Snails and Slugs | 21 | 21 | 0 |
| Flowering Plants | Flowering Plants | 691 | 317 | 2 |
| Conifers | Conifers | 1 | 0 | 0 |
| Cycads | Cycads | 4 | 0 | 0 |
| Ferns | Ferns | 5 | 4 | 0 |
| Bryophytes | Liverworts | 8 | 8 | 0 |
| Bryophytes | Hornworts | 1 | 1 | 0 |
| Bryophytes | Mosses | 13 | 13 | 0 |
| Fungi | Fungi | 5 | 5 | 0 |
| Green Algae | Green Algae | 3 | 3 | 0 |
| **Total** | | **1,278** | **701** | **60** |

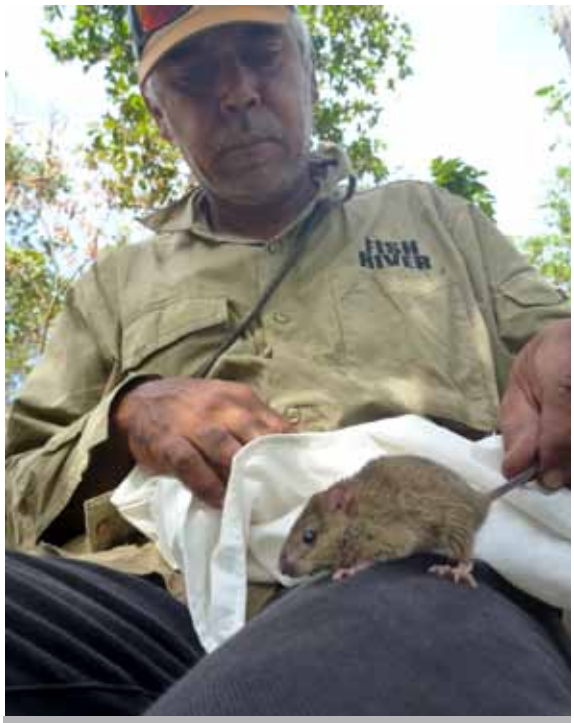
## Threatened Species

Appendix B includes the species listed under the Commonwealth EPBC Act and Northern Territory TPWC Act known from the reserve. A summary of threatened species identified during the study is provided in Table 3.

**Table 3: Summary of threatened species identified**

| Group | Total number of species | Species new to reserve |
|---|---|---|
| Fauna | 1 | 1 |
| Flora | 0 | 0 |

Botanist, Donna Lewis, preparing plant specimens in the field, J. Harding © Copyright, Department of the Environment



Fish River ranger, Geoff Long, holds a Common Rock Rat (*Zyzomys argurus*), one of only two small mammal species captured during three nights of trapping at Mt Muriel © Copyright, Department of the Environment

## Exotic and Pest Species

Appendix C lists the exotic pest species known from the reserve. A summary of exotic and pest species identified during the study is provided in Table 4.

An exotic species is one that occurs outside of its normal range. A pest is a species that has the potential to have a negative environmental, social or economic impact. Native species that are at times pests or are exotic to this region of Australia are included in the numbers in Table 4.

**Table 4: Summary of exotic and pest species identified**

| Group | Total number of species | Species new to reserve |
|---|---|---|
| Fauna | 20 | 16 |
| Flora | 20 | 16 |

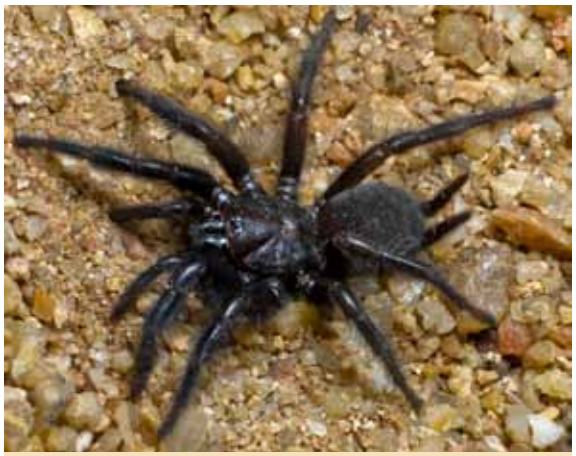
# Discussion

## Putative New Species

A putative species new to science is one that has been recognised by an expert as never having been named or described in the scientific literature. It is confirmed as a new species once it is named and its description is published. In addition to species that are considered new to science, specimens collected during this survey include many undescribed taxa that are already known from museum and herbarium collections, but have not yet been formally described and named. A summary of the groups in which putative new species have been discovered is provided in Table 5.

**Table 5: Putative new species by group**

| Group | Total number of species | Species new to science |
|---|---|---|
| True Bugs | 161 | 40 |
| Spiders | 33 | 18 |
| Flowering Plants | 691 | 2 |



This curtain web spider (*Cethegus* n. sp. 12) is one of 18 putative new species of spider discovered during the survey, some of which have since been described © Copyright, R. Whyte

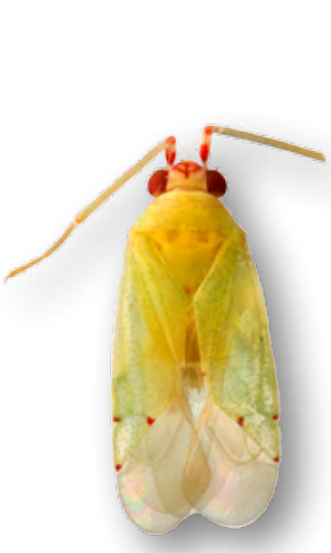
This new tarantula (*Phlogius* n. sp. 13) might be endemic to Fish River Station, R. Raven © Copyright, Queensland Museum

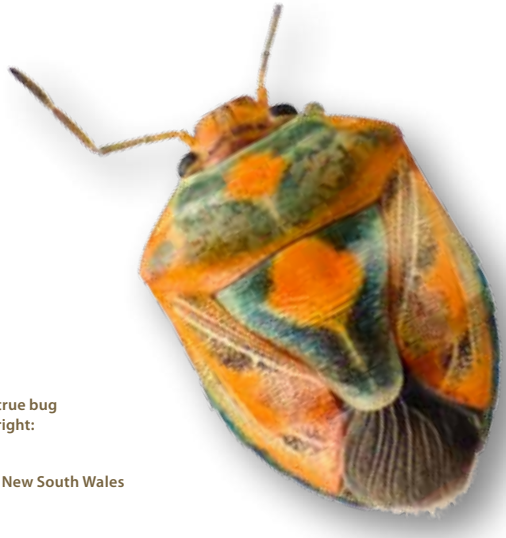
### Fauna

Forty putative new species of true bug and 18 putative new species of spider were recorded. One of these, the tarantula *Phlogius* n. sp. 13, might be endemic to Fish River Station, with its closest relative near Borroloola (near the Gulf of Carpentaria). Descriptions of four of the ten new species of goblin spider (Oonopidae) from the genus *Opopaea* have since been published.[5] Another goblin spider has been named *Cavisternum attenboroughi* in honour of Sir David Attenborough for his contributions in recognizing the magnificence of the world's biodiversity and his support for life on planet Earth.[6]

5 Baehr, B., Harvey, M. S., Smith, H. M. & Ott, R., 2013, The goblin spider genus *Opopaea* in Australia and the Pacific islands (Araneae: Oonopidae), *Memoirs of the Queensland Museum—Nature* **58**: 107–338.

6 Baehr, B., Raven, R. & Whyte, R. 2013, 'Biodiversity discovery program *Bush Blitz* yields a new species of goblin spider, *Cavisternum attenboroughi* (Araneae: Oonopidae), from the Northern Territory', *Zootaxa* **3616**(4): 396–400. doi:10.11646/zootaxa.3616.4.8.





Two of the 40 putative new species of true bug collected on Fish River Station, left to right: Miridae Orthotylini n. sp. 3; *Antestiopsis* n. sp. (BBFR12msp008), C. Symonds © Copyright, University of New South Wales

The flower (top) and seed pod (bottom) of *Brachychiton* n. sp. Fish River, I. Cowie © Copyright, Department of Land Resource Management

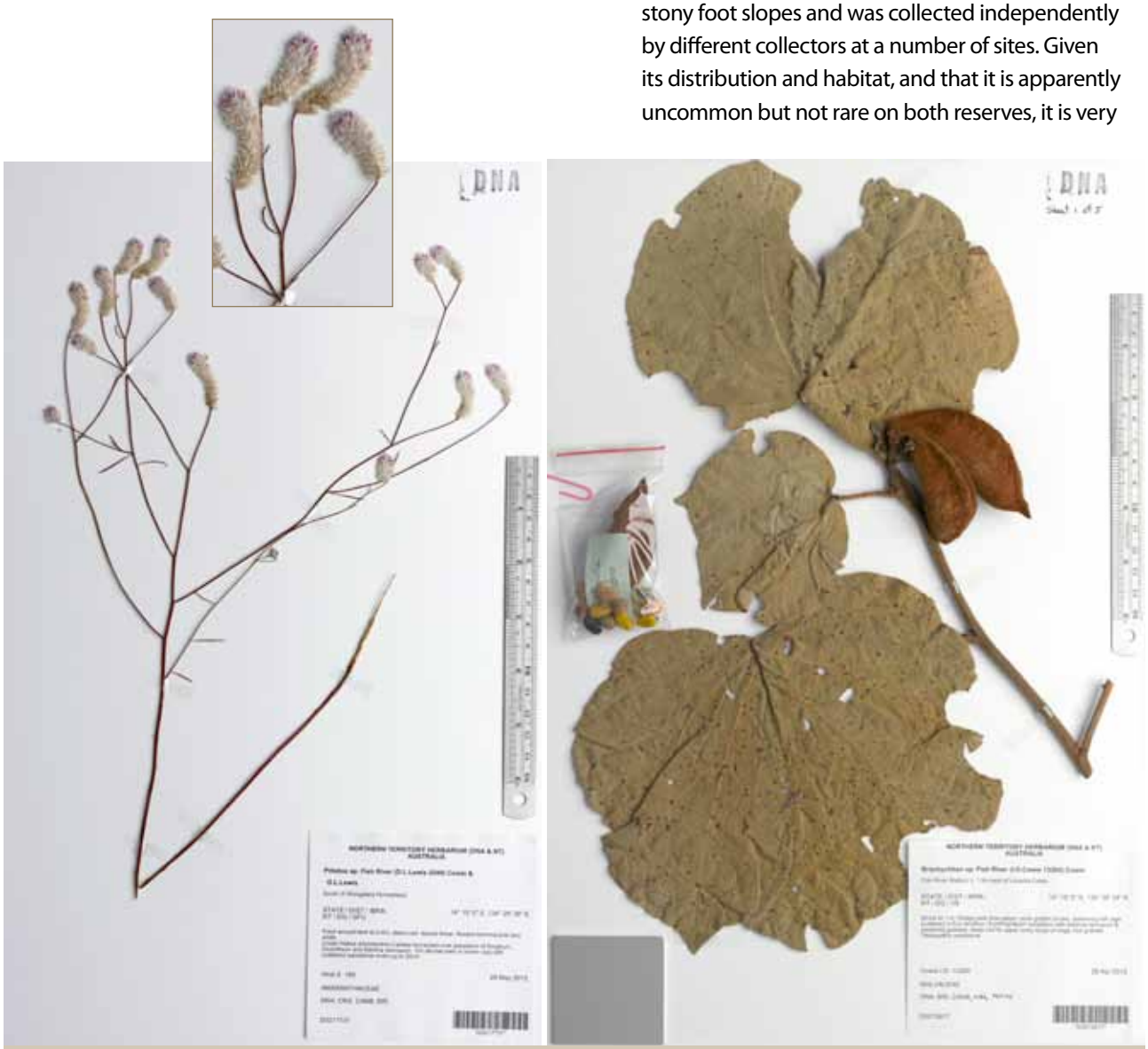
## Flora

The two putative new vascular plant species recorded during the survey were a kurrajong (*Brachychiton* n. sp. Fish River) and a mulla mulla (*Ptilotus* n. sp. Fish River). The kurrajong was found growing on an upper ridge slope dominated by Darwin Box (*Eucalyptus tectifica*) and Rat's Tail Grass (*Sehima nervosum*) on fine-grained, possibly felspathic sandstone. The population extended north along the ridge for at least half a kilometre. From satellite imagery, this ridge extends to the south as well as the north for some kilometres. This species was not recorded on similar but unconnected ridges to the south. It is likely to have a restricted distribution, given the unusual type of sandstone substrate that has not been found elsewhere during this or other surveys of surrounding areas.

The new kurrajong species might warrant a vulnerable or near threatened status under the TPWC Act. Additional surveys are recommended to better understand the distribution, abundance

and threats to the species, however no immediate threats were evident. More specimens are also needed to help clarify diagnostic characters, especially to describe the species and understand its natural variation. The plants were not flowering at the time of the survey, however seeds were collected and plants have been cultivated.

The putative new species of mulla mulla has several obvious characters that separate it from similar well-known taxa. Based on known collections it occurs on both Fish River Station and Wongalara Sanctuary (approximately 300 km east of Fish River Station), where it was collected during a subsequent Bush Blitz survey. On both reserves, the species was found on stony foot slopes and was collected independently by different collectors at a number of sites. Given its distribution and habitat, and that it is apparently uncommon but not rare on both reserves, it is very



**Two putative new vascular plants were discovered on Fish River Station: a mulla mulla (*Ptilotus* n. sp. Fish River) (left) and a kurrajong (*Brachychiton* n. sp. Fish River) (right). The kurrajong is likely to be endemic to Fish River Station, I. Cowie © Copyright, Department of Land Resource Management**

Mertens Water Monitor (*Varanus mertensi*) is listed as vulnerable under the TPWC Act. It is highly susceptible to Cane Toad (*Rhinella marina*) toxin © Copyright, G. Schmider

likely to be more widespread than current records indicate. This species has probably been collected before and confused with other taxa. An IUCN Data Deficient status is recommended, but it is likely to be given a status of Least Concern with further survey or more complete curation of the Northern Territory Herbarium collection.[7]

## Threatened Species

Australia is home to around 570,000 species, most of which are yet to be formally described. Approximately 92% of Australian plants, 87% of mammals, 93% of reptiles and 45% of birds are endemic. Changes to the landscape and native habitat as a result of human activity have put many of these unique species are at risk. Over the last two hundred years, many species have become extinct; many others are threatened.[8]

7 IUCN Red List Categories and Criteria, accessed 23 October 2013 <http://iucn.org/about/work/programmes/species/our_work/the_iucn_red_list/resources/iucn_red_list_categories_criteria/>.

8 Chapman, A. D. 2009, *Numbers of Living Species in Australia and the World*, 2nd edn., Australian Biological Resources Study, Canberra, 80 pp.

9 Mahney, T., Young, S., Brennan, K., Fegan, M., Ansell, S., Daly, D., Daly, J. & Long, J. 2011, *Fish River Station Wildlife Survey 2011*, Unpublished Report by Department of Natural Resources, Environment, the Arts and Sport, Northern Territory Government, Darwin.

## Fauna

Mertens' Water Monitor (*Varanus mertensi*) was the only threatened species recorded; however, several others—mainly birds and large mammals—are known to occur on the reserve.[9] The semi-aquatic Mertens' Water Monitor is listed as vulnerable under the TPWC Act. The arrival of Cane Toads (*Rhinella marina*) to the Daly Basin has caused populations to decline, as it is highly susceptible to Cane Toad toxin.[10] Cane Toads can also deplete the prey eaten by monitors, especially foods eaten by juvenile monitors.[11]

## Flora

No threatened flora species listed under the TPWC Act were recorded; however, 37 species of conservation significance were identified. The wider region has been insufficiently surveyed to establish the distribution, abundance and threats of many of the rarer taxa. The region is dominated by relatively intact native vegetation, and threats have historically been relatively subtle (for example, grazing by introduced herbivores and changed fire regimes) but often operating at a landscape scale.

Apart from newly discovered species, the most important species of conservation significance on Fish River Station are the tree *Croton* sp. aff. *dockrillii*, the vine *Glycine hirticaulis* subsp. *hirticaulis*, the shrubs *Abutilon* sp. Mataranka and *Hibiscus bacalusius*, and the herbs *Dopatrium junceum*, *Stylidium aquaticum* and *Tephrosia* sp. G Kimberley Flora. All of these plants appear to have either a restricted distribution or relatively specialised habitat requirements, and sometimes both. Two are relatively small, ephemeral and inconspicuous, and are likely to have been missed during previous surveys. None, except perhaps *Glycine hirticaulis* subsp. *hirticaulis*, appears to have significant threats. Table 6 lists the plant species of conservation significance recorded from Fish River Station.

The increased knowledge of the distribution and abundance of species collected during the survey will be used to re-assess their conservation status at the next (2014–15) five yearly review of listings under the TPWC Act. For some species there has been sufficient information gathered during this survey to probably result in a change of conservation category.

All Northern Territory plants are assessed against IUCN criteria and assigned a status or category. Applying the IUCN criteria in assessing species relies on having a solid taxonomic foundation. In many cases, species may be Data Deficient because taxonomic research is needed to clarify species concepts or because of a need for curation of specimen records to species or sub-specific level. 'Not Evaluated' species are those that have not been assessed against IUCN criteria because they have been discovered or recognised since the last formal assessment period. In the past, some species were assigned to this category because of unresolved taxonomic problems. This Bush Blitz survey and related taxonomic research grants will contribute significant information for IUCN assessments.

10 Smith, J. G., & Phillips, B. L. 2006, 'Toxic tucker: the potential impact of cane toads on Australian reptiles', *Pacific Conservation Biology* **12**: 40–49.

11 Parks and Wildlife Commission of the Northern Territory, Threatened Species of the Northern Territory, Mertens Water Monitor (*Varanus mertensi*), accessed 23 October 2013 <http://lrm.nt.gov.au/__data/assets/pdf_file/0018/10881/varanus_mertensi_vu.pdf>.

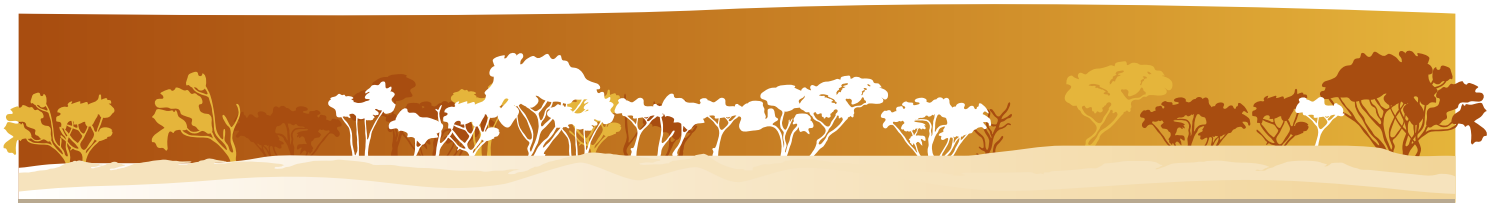


**Table 6: Plant species of conservation significance recorded from Fish River Station**

| Family | Taxon | NT IUCN Cat. | Latitude | Longitude | Approximate location on the reserve | No. NT Records (2010) | Comment |
|---|---|---|---|---|---|---|---|
| ACANTHACEAE | *Dipteracanthus australasicus* subsp. *dalyensis* * | dd | -14.0255 | 131.16612 | 3.4 km north of Reedy Hole | 7 | NT endemic |
| | | | -13.9025 | 131.19670 | Near Mt Muriel | | |
| | | | -14.1162 | 130.84094 | 48 km south-west of Douglas Daly Research Farm | | |
| AMARANTHACEAE | *Gomphrena lacinulata* * | lc | -13.9805 | 130.77710 | 45 km west of Douglas Daly Research Farm | 11 | NT endemic |
| | | | -14.0844 | 130.80416 | Headwaters of Snape Creek | | |
| | | | -14.3541 | 131.07561 | 56 km south of Douglas Daly Research Farm | | |
| | *Ptilotus* n. sp. Fish River * | ne | -13.9699 | 131.17680 | – | – | Newly discovered |
| | | | -14.1204 | 130.96959 | 48 km south of Douglas Daly Research Farm | | |
| | | | -14.1424 | 131.00197 | – | | |
| | | | -14.3023 | 130.99776 | 12 km north-east of Collah Waterhole | | |
| ASTERACEAE | *Cyanthillium* sp. grey leaf * | ne | -14.0168 | 131.17647 | 3.4 km north of Reedy Hole | – | Newly recognised and common |
| | *Pterocaulon discolor* * | ne | -14.3675 | 131.07726 | – | – | Newly described |
| | | | -13.8931 | 131.15906 | Mt Muriel area | | |
| | *Apowollastonia verbesinoides* * | ne | -13.8931 | 131.15906 | Mt Muriel area | – | – |
| BORAGINACEAE | *Heliotropium prostratum* * | dd | -14.0235 | 131.17673 | 3.4 km north of Reedy Hole | 13 | – |
| COMMELINACEAE | *Cartonema spicatum* var. *spicatum* * | ne | -14.0120 | 130.74642 | Headwaters of Survey Creek | – | Not previously recognised, common |

Key

* new record for this reserve

NT IUCN Categories:

lc = Least Concern
nt = Near Threatened
dd = Data Deficient
ne = Not yet evaluated against IUCN criteria

| Family | Taxon | NT IUCN Cat. | Latitude | Longitude | Approximate location on the reserve | No. NT Records (2010) | Comment |
|---|---|---|---|---|---|---|---|
| CONVOLVULACEAE | *Jacquemontia* sp. Douglas Daly | dd | -13.9177 | 130.71719 | Daly River | 4 | NT endemic |
| | | | -13.9787 | 130.97252 | 30 km south-west of Douglas Daly Research Farm | | |
| | | | -13.8928 | 131.15663 | Mt Muriel area | | |
| CUCURBITACEAE | *Cucumis althaeoides* * | ne | -13.9024 | 131.18513 | Near Mt Muriel | – | Newly described |
| | *Cucumis picrocarpus* * | ne | -14.2813 | 130.98936 | Ridges between Jogi and Lilyarba Creeks | – | Not previously recognised |
| DROSERACEAE | *Drosera fulva* * | dd | -13.9354 | 130.74306 | 50 km west of Douglas Daly Research Farm | 23 | NT endemic |
| EUPHORBIACEAE | *Croton* sp. aff. *dockrillii* * | dd | -13.9101 | 130.74109 | 5 km east of Mt Boulder | 4 | – |
| FABACEAE | *Alysicarpus brownii* | dd | -14.1486 | 130.93455 | 9.5 km south Fish River Homeseat turn-off | 20 | – |
| | *Galactia* sp. Katherine * | dd | -14.2474 | 130.99797 | 1 km east of Lilyarba Creek | 30 | – |
| | *Glycine hirticaulis* subsp. *hirticaulis* * | dd | -13.9002 | 131.18097 | Adjacent to Mt Muriel | 3 | NT endemic |
| | *Neptunia gracilis* f. *glandulosa* * | dd | -14.0560 | 131.02849 | – | 8 | – |
| | *Tephrosia brachyodon* * | ne | -14.0580 | 131.02774 | – | 35 | Needs taxonomic revision |
| | *Tephrosia* sp. G Kimberley Flora | ne | -14.2803 | 130.98627 | 70 km south-west Research Farm | 5 | – |
| | *Tephrosia* sp. Muddy Bay * | ne | -14.2810 | 130.98659 | Ridge between Jogi and Lilyarba Creeks | – | Not previously recognised |
| MALVACEAE | *Abutilon* sp. Mataranka * | dd | -14.2810 | 130.98659 | Ridge between Jogi and Lilyarba Creeks | 4 | – |
| | *Brachychiton* sp. Fish River * | ne | -14.2508 | 130.99281 | 1 km east of Lilyarba Creek | – | Newly discovered |
| | *Brachychiton* sp. Wangi * | dd | -13.8927 | 131.15335 | Mt Muriel area | 15 | NT endemic species found from Litchfield to Fish River |
| | | | -13.9025 | 131.19670 | Near Mt Muriel | | |
| | | | -14.1162 | 130.84094 | 48 km south-west of Douglas Daly Research Farm | | |
| | | | -14.0255 | 131.16612 | 3.4 km north of Reedy Hole | | |

| Family | Taxon | NT IUCN Cat. | Latitude | Longitude | Approximate location on the reserve | No. NT Records (2010) | Comment |
|---|---|---|---|---|---|---|---|
| MALVACEAE | *Hibiscus bacalusius* | dd | -14.0488 | 130.76823 | – | 5 | Endemic to Rock Candy River |
| | | | -14.0120 | 130.74642 | Headwaters of Survey Creek | | |
| | | | -14.0523 | 130.78235 | Survey Creek | | |
| | *Hibiscus lobatus* | dd | -13.9153 | 130.80122 | Daly River, 18 km south-west of Xing | 8 | – |
| | | | -13.8653 | 131.08454 | Daly River Road, Tipperary Station | | |
| PHYLLANTHACEAE | *Phyllanthus lacerosus* * | dd | -14.0204 | 131.02130 | – | 18 | – |
| | | | -14.1394 | 131.00366 | – | | |
| PLANTAGINACEAE | *Dopatrium junceum* | dd | -13.9319 | 130.83455 | Daly River, south of Rock Candy Range | 3 | – |
| POACEAE | *Ectrosia schultzii* var. *schultzii* * | dd | -13.9894 | 131.08324 | East of Bamboo Creek | 16 | – |
| POLYGALACEAE | *Polygala barbata* * | ne | -14.3541 | 131.07561 | 56 km south of Douglas Daly Research Farm | 94 | – |
| | | | -13.9091 | 130.75011 | Near Northern Creek | | |
| | | | -13.9025 | 131.19670 | Near Mt Muriel | | |
| | *Polygala bifoliata* | ne | -14.0504 | 130.78030 | Survey Creek | 92 | – |
| | | | -13.9354 | 130.74310 | – | | |
| | | | -14.0168 | 131.17647 | 3.4 km north of Reedy Hole | | |
| | *Polygala integra* * | ne | -14.1451 | 131.00067 | – | 53 | – |
| | *Polygala petrophila* var. *petrophila* * | ne | -14.2512 | 130.98865 | Near Lilyarba Creek | 6 | – |
| | *Polygala pterocarpa* * | ne | -14.2537 | 130.98378 | Lilyarba Creek | 71 | – |
| | *Polygala succulenta* var. *congesta* * | ne | -14.0545 | 131.16980 | 30 km south of Douglas Daly Research Farm | 40 | – |
| | | | -13.9091 | 130.75011 | 5 km east of Mt Boulder | | |
| SOLANACEAE | *Nicotiana monoschizocarpa* | dd | -13.8301 | 130.73302 | Daly River | 13 | NT endemic |
| STYLIDIACEAE | *Stylidium aquaticum* * | dd | -14.0838 | 130.79990 | Headwaters of Snape Creek | 4 | NT endemic |
| URTICACEAE | *Pouzolzia zeylanica* | nt | -14.3153 | 131.01789 | Lilyarba Creek, Wingate Mountains | 14 | – |

Key

* new record for this reserve

NT IUCN Categories:

lc = Least Concern

nt = Near Threatened

dd = Data Deficient

ne = Not yet evaluated against IUCN criteria

# Exotic and Pest Species

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 will provide land managers with baseline information to assist with pest management programs.

## Vertebrate Fauna

Feral animals were common on most parts of Fish River Station and were frequently encountered in the field. It was usual to count 30 or more Water Buffalo (*Bubalus bubalis*) or European Cattle (*Bos taurus*) during a 30-minute helicopter flight. Large numbers of Pigs (*Sus scrofa*) were also seen. The environmental damage attributed to these species was evident at most sites.

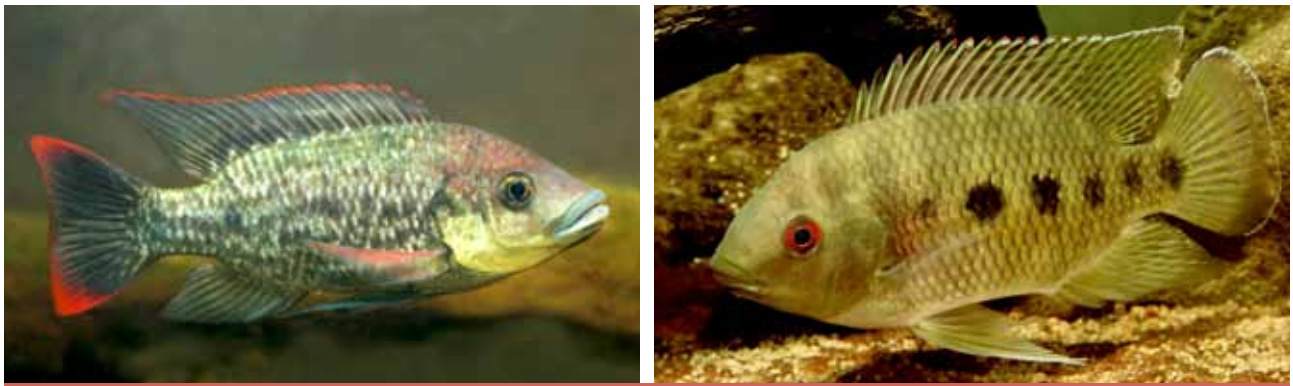
Cane Toads (*Rhinella marina*) were common at all vertebrate survey sites. Some species of reptile known to have experienced population declines following the arrival of Cane Toads and expected to occur at Fish River Station (for example, King Brown Snake (*Pseudechis australis*), Eastern Blue-tongue (*Tiliqua scincoides*), Mitchell's Water Monitor (*Varanus mitchelli*) and Yellow-spotted Monitor (*Varanus panoptes*)) were not found during the survey.

A significant attribute of Fish River Station is the lack of introduced fishes. Potential invaders that are already problem species in tropical Queensland and southern New Guinea include Tilapia (*Oreochromis mossambica*), Spotted Tilapia (*Tilapia mariae*), Climbing Perch (*Anabas testudineus*) and Northern Snakehead (*Channa argus*).

## Invertebrate Fauna

No pest species of dung beetle were found on Fish River Station; however, three exotic species—considered beneficial and introduced as agricultural dung control—were collected: Gazella Dung Beetle (*Digitonthophagus gazella*), Bronze Dung Beetle (*Onitis alexis*) and Sri Lankan Dung Beetle (*Onthophagus sagittarius*).

Twelve true bug pest species were identified in low abundances; most are Australian natives that can become pests under certain conditions. The Rutherglen Bug (*Nysius vinitor*), Brown Bean Bug (*Melanacanthus scutellaris*), Redbanded Shield Bug (*Piezodorus oceanicus*), Green Vegetable Bug (*Nezara viridula*) and



A significant attribute of Fish River Station is the lack of introduced fish species. Some of the potential invaders include (left) Tilapia (*Oreochromis mossambica*) and (right) Spotted Tilapia (*Tilapia mariae*) © Copyright, G. Schmider

Gamba grass (*Andropogon gayanus*) is the most significant weed on Fish River Station. It is likely to have serious consequences for native flora


Green Mirid (*Creontiades dilutus*) can be pests with varying damage potential on various agricultural crops. Coon Bug (*Oxycarenus arctatus*), Seed Eating Bug (*Graptostethus servus*) and Swan Plant Seed Bug (*Remaudiereana nigriceps*) can form large swarms in rural areas of the Top End, and although they do not threaten crops, they can cause indirect damage and are regarded as a nuisance.[12]

During this survey, a potential pest lace bug (*Aconchus urbanus*) was recorded in Australia for the first time. Known throughout Africa and Asia as a common pest on pawpaw and *Urochloa* species, *Aconchus urbanus* can cause considerable damage, but there have been few such occurrences worldwide.[13] Further research is required to determine the distribution and pest potential of this lace bug in Australia. The exotic Redback Spider (*Latrodectus hasseltii*), which is native to southern Australia, was also recorded.

12 NT Department of Regional Development, Primary Industry, Fisheries and Resources (2009) Factsheet ENT7: Swarming bugs (family Lygaeidae). Northern Territory Government, Darwin.

13 Neal Jr, J. W. & Schaefer, C. W. 2000, 'Lace Bugs (Tingidae)', in *Heteroptera of Economic Importance*, eds Schaefer, C. W. & Panizzi, A. R., Boca Raton: CRC Press, pp. 85–137.

## Flora

Six noxious weeds gazetted under the *Weeds Management Act 2001* (NT) were identified (see Table 7). The most important emerging noxious weed on Fish River Station is Gamba Grass (*Andropogon gayanus*). It is likely to have serious consequences for the conservation of native flora, particularly for species with restricted distributions that overlap with its preferred habitat, a category that includes many species of conservation significance. Gamba Grass is well established on pastoral land immediately to the east of Fish River Station and scattered stands are already on the property. These outliers ahead of an invasion front may greatly increase the rate of spread of Gamba Grass by acting as a source of seed. Gamba Grass can substantially change savannah fire regimes: it forms taller, denser stands than the native grasses, and cures later in the dry season. With a high biomass and higher flame heights than native grasses, Gamba Grass can dramatically increase local fuel loads from the 2–4 tonnes/ha typical for native grasses to 11–15 tonnes/ha or sometimes up to 30 tonnes/ha, resulting in more intense fires that can kill trees or reduce their vigour.[14] [15] Gamba Grass can also out-compete native woody species by altering the availability of nitrogen to plants and by using larger amounts of water than native grasses.[16] [17] It can also shade out smaller low-growing species.

14 Rossiter, N. A., Setterfield, S. A., Douglas, M. M. & Hutley, L. B. 2003, 'Testing the grass-fire cycle: exotic grass invasion in the tropical savannas of northern Australia', *Diversity and Distributions* **9**: 169–176.

15 Ferdinands, K. Setterfield, S. A., Douglas, M. M. & Barratt, J. 2006, 'Africanising the tropical woodlands: canopy loss and tree death following gamba grass *Andropogon gayanus* invasion', in *Proceedings of the 15th Australian Weeds Conference*, eds. Preston, C., Watts, J. H. & Crossman, N. D., Weed Management Society of South Australia, Adelaide, p. 296.

Table 7: Gazetted weeds documented on Fish River Station

| Species | Common name | Latitude | Longitude | Location | Indication of abundance |
|---|---|---|---|---|---|
| *Andropogon gayanus* | Gamba Grass | -13.89351 | 131.15871 | Mt Muriel | Scattered with several dozen plants |
| | | -14.02426 | 131.16063 | 3.5 km north of Reedy Hole | A few large plants |
| *Hyptis suaveolens* | Hyptis | -14.06179 | 130.83479 | – | – |
| *Senna obtusifolia* | Arsenic Weed | -14.33648 | 131.02362 | 60 km south of Douglas Daly Research Farm | – |
| | | -14.21937 | 130.92655 | Fish River | – |
| *Senna occidentalis* | Coffee Senna | -14.06327 | 130.83565 | – | – |
| *Sida acuta* | Spinyhead Sida | -14.06179 | 130.83479 | – | – |
| | | -13.93819 | 130.73538 | 50 km west of Douglas Daly Research Farm | – |
| *Sida cordifolia* | Flannel Weed | -14.33648 | 131.02362 | 60 km south of Douglas Daly Research Farm | – |
| | | -14.21937 | 130.92655 | Fish River | – |
| | | -14.058 | 131.02771 | – | – |

Thirteen other weeds recorded on Fish River Station are not gazetted as noxious weeds (see Table 8). Of these, the most significant are Gambia Pea (*Crotalaria goreensis*) and Annual Mission Grass (*Cenchrus pedicellatus* subsp. *pedicellatus*)—both are common and appear to be spreading. Feral animals such as Water Buffalo (*Bubalus bubalis*) probably assist the spread of Gambia Pea. It was prevalent in some habitats, for example on creek flats where it can form dense stands. Gambia Pea appears to be similar in stature with similar densities, habitat and problems caused by Coffee Senna (*Senna occidentalis*) and Arsenic Weed (*S. obtusifolia*), both declared weeds. Annual Mission Grass is probably dispersed by wind. It was found in some remote places, apparently independent of any obvious disturbance.

16 Rossiter, N. A., Setterfield, S. A., Douglas, M. M., Hutley, L. B. & Cook, G. D. 2004, 'Exotic grass invasion in the tropical savannas of northern Australia: Ecosystem consequences', in *Proceedings of the 14th Australian Weeds Conference*, eds. Sindel, B. M. & Johnson, S. B., Weeds Society of New South Wales, Sydney, pp. 168–171.

17 Rossiter-Rachor, N. A., Setterfield S. A., Douglas, M. M., Hutley, L. B., Cook, G. D. & Schmidt, S. 2009, 'Invasive *Andropogon gayanus* (gamba grass) is an ecosystem transformer of nitrogen relations in Australian savanna', *Ecological Applications* **19**(6): 1546–1560.

Table 8: Non-gazetted weeds documented on Fish River Station

| Species | Common name | Latitude | Longitude | Location | Indication of abundance |
|---|---|---|---|---|---|
| *Alysicarpus ovalifolius* | Oval-leafed Alysicarpus | -14.14695 | 131.07358 | Near Black Loaf Billabong, Bamboo Creek | Minor weed, locally common |
| *Bidens pilosa* | Cobbler's Pegs | -14.05799 | 131.02771 | – | Minor weed |
| *Cenchrus pedicellatus* subsp. *pedicellatus* | Annual Mission Grass | -13.89886 | 131.16393 | Mt Muriel area | Appears to be spreading on Fish River; not widespread away from disturbance |
| *Crotalaria goreensis* | Gambia Pea | -13.99276 | 131.07036 | East of Bamboo Creek | Appears to be common and spreading on Fish River; similar problems to *Senna occidentalis* and *S. obtusifolia* |
| | | -13.98088 | 130.99158 | 30 km south-west of Douglas Daly Research Farm | Appears to be common and spreading on Fish River; similar problems to *Senna occidentalis* and *S. obtusifolia* |
| | | -14.25200 | 130.98400 | Headwaters of Lilyarba Creek | Abundant on creek flat |
| *Crotalaria juncea* | Sunhemp | -13.97887 | 130.98399 | 30 km south-west of Douglas Daly Research Farm | Minor weed |
| *Cynodon radiatus* | Giant Couch Grass | -14.25538 | 130.98305 | Near Lilyarba Creek | Probably pre-European |
| | | -14.05997 | 131.19359 | 30 km south of Douglas Daly Research Farm | Probably pre-European |
| *Digitaria ciliaris* | Summer Grass | -14.33648 | 131.02362 | 60 km south of Douglas Daly Research Farm | Minor weed, may be native |
| *Hibiscus sabdariffa* | Rosella | -14.26210 | 130.90160 | Fish River Gorge, 55 km south of Douglas Daly Research Farm | – |
| *Macroptilium lathyroides* var. *semierectum* | Wild Bushbean | -14.15189 | 131.07735 | Near Black Loaf Billabong, Bamboo Creek | Minor weed |
| *Malvastrum americanum* | Spiked Malvastrum | -14.28288 | 130.98831 | Ridges between Jogi and Lilyarba creeks | Minor weed |
| *Scoparia dulcis* | Scoparia | -14.05989 | 131.19408 | 30 km south of Douglas Daly Research Farm | Probably pre-European, minor weed |
| *Triumfetta pentandra* | Fivestamen Burrbark | -13.93819 | 130.73538 | 50 km west of Douglas Daly Research Farm | Minor weed |
| *Triumfetta rhomboidea* | Chinese Burr | -14.06181 | 130.83478 | – | Pre-European |

# Other Points of Interest

## Vertebrate Fauna

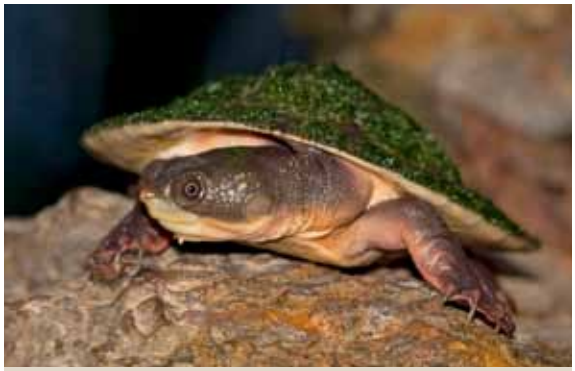
### Mammals, Reptiles, Frogs and Toads

Fish River Station supports a high diversity of terrestrial vertebrates broadly characteristic of the tropical savannas of the Top End. This survey focused on frogs, reptiles and small mammals. The reserve has been surveyed for terrestrial vertebrates previously by the Northern Territory Government; as a result, a fairly comprehensive list now exists.

Fourteen frog (including the Cane Toad) and 35 reptile species were identified during the survey, bringing the number of amphibians and reptiles known from Fish River Station to 81. The following five reptile species were recorded on the reserve for the first time:

+ Northern Ctenotus (*Ctenotus borealis*), a large skink, was collected from Mount Muriel. This species might have been recorded from Fish River Station previously but misidentified as Robust Ctenotus (*C. robustus*).

The Excitable Delma (*Delma tincta*) was a new record for Fish River Station

Northern Snapping Turtle (*Elseya dentata*) was common in Fish River Gorge and was a new record for the reserve


+ Excitable Delma (*Delma tincta*), a common and widespread species of legless lizard expected to occur on the reserve. A single individual was caught in an arachnid trap.
+ Northern Snapping Turtle (*Elseya dentata*), a large chelid turtle, was found to be common in Fish River Gorge and is common in the Daly River.
+ Marbled Velvet Gecko (*Oedura marmorata*), a large gecko found on exposed rock faces and trees at night. Several individuals were found on one of the larger rock escarpments.
+ Mertens' Water Monitor (*Varanus mertensi*) is a large semi-aquatic varanid lizard. A single individual was observed.

The Daly River is home to six species of freshwater turtle (Pig-nosed Turtle (*Carettochelys insculpta*), Northern Snake-necked Turtle (*Chelodina oblonga*), Jardine River Turtle (*Emydura subglobosa*), Northern Yellow-faced Turtle (*E. tanybaraga*) and North-west Red-faced Turtle (*E. victoriae*)), but only two of these (Northern Snake-necked and North-west Red-faced Turtles) were recorded on the reserve. Given that the Daly River borders Fish River Station, it could be argued that all six species should be included on the species list for the reserve.

Small mammals were surveyed over three nights along the western side of the Mount Muriel range, with the main aim of capturing a false antechinus (*Pseudantechinus* sp.). Nine small mammals of two species were captured—three Grassland Melomys (*Melomys burtoni*) and six Common Rock-rats (*Zyzomys argurus*). Both are common and widespread across the Top End. No other small mammals were observed during the survey. Unfortunately, the undescribed species of false antechinus was not captured. This does not suggest that the animal has vanished from the location but rather that population densities are low, and a longer survey period is needed. The low diversity and abundance of small mammals documented during this study reflects the severity of ongoing small mammal declines experienced across the Top End.[18]

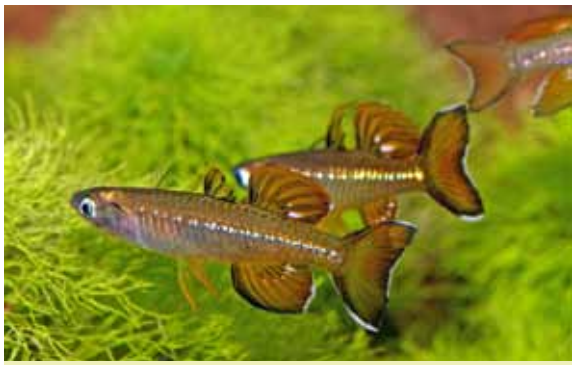
The taxonomic status of two species collected during the survey requires further study. A large gecko (*Gehyra* sp.) was collected on an exposed rock face at Fish River Gorge. Research is underway at the Museum and Art Gallery of the Northern Territory to study its relationships to the Northern Dtella (*G. australis*) and King's Dtella (*G. koira*) and to determine whether it is an undescribed species. A toadlet from the taxonomically difficult *Uperoleia* genus could not be identified. This individual's call was similar to that of the Floodplain Toadlet (*U. inundata*). Tissue samples from this specimen will be included in a large project looking at molecular relationships of taxa within this genus. The advent of modern molecular systematic techniques has revealed that many well-known species in the Top End are composites of cryptic taxa. Describing these new species will require a combination of molecular techniques and traditional taxonomic studies.

### Fishes

Fish River Station has a high diversity of freshwater fishes. A large number of sites (18) were surveyed, recording 29 species, three of them for the first time. This brings the total number of known species for the reserve to 45. Previous management reports of fishes on Fish River Station were limited to a handful of larger species and riverine habitats, so considerable new information has been added. The following species were significant new records resulting from this survey:

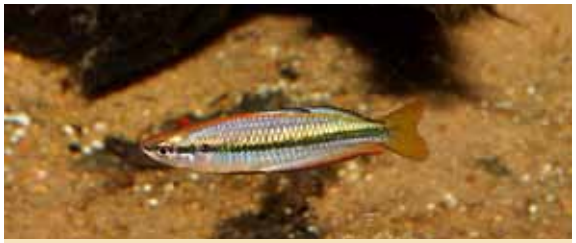
+ Delicate Blue Eye (*Pseudomugil tenellus*), a small wetland fish documented on Fish River Station that is likely to be a new cryptic species.
+ Blackbanded Rainbowfish (*Melanotaenia nigrans*) is a small rainbowfish previously known by only a few specimens from Beeboom Crossing. This survey identified large sustainable populations in upland stream habitats on Fish River Station.
+ Swamp Eel (*Ophisternon gutturale*), collected from wetland habitat on the reserve, was a rare find. The Daly River is currently the western-most catchment known for the Swamp Eel, with only a few other records from the system. Its core range is larger wetland systems in the Top End (for example in Kakadu National Park). It is seldom seen owing to its shy nature, burrowing into sediments and being active at night.

18 Woinarski, J. C. Z., Armstrong, M., Brennan, K., Fisher, A., Griffiths, A. D., Hill, B., Milne, D. J., Palmer, C., Ward S., Watson, M., Winderlich, S., and Young, S. 2010, 'Monitoring indicates rapid and severe decline of native small mammals in Kakadu National Park, northern Australia', *Wildlife Research* **37**: 116–126.



The golden form of the Delicate Blue-eye (*Pseudomugil tenellus*) recorded on Fish River Station could be an undescribed species © Copyright, D. Wilson

The Delicate Blue Eye specimens have an unusual gold colour form. Initial genetic evidence, together with the distinctive colouration, suggests that the specimens from the Daly Basin are an undescribed species, with most of its known range on Fish River Station. It was found at three sites during this survey: two on Fish River Station, and one just east and further upstream than previously recorded. One of the sites on Fish River Station was a spring-fed swamp that appears to be core habitat. These fish are usually found dispersed in low numbers. Morphological and genetic review is required to confirm that these specimens represent a new species. Additional voucher and tissue samples are needed, particularly from the East Alligator River system near Gunbalanya, from where the Delicate Blue Eye was first described.



The Blackbanded Rainbow Fish (*Melanotaenia nigrans*) was previously known by only a few specimens from Beeboom Crossing. This survey identified large sustainable populations in upland stream habitats on Fish River Station © Copyright, D. Wilson

Genetic and morphological material was collected from 21 species found during the survey. This will be used for future systematic reviews of northern Australian fishes, a group that looks set for substantial change. Fish diversity is high in the tropical north[19] [20] and more research is required. New taxa continue to be recorded from remote regions of Australia, and recent research using genetic techniques suggests that there are likely to be two to three times the number of species present than are currently recognised.[21] Quite a number of obligate freshwater fishes, for example, gudgeons (*Mogurnda* spp.), glassfishes (*Ambassis* spp.), catfishes (Ariidae and Plotosidae) and grunters (*Syncomistes* spp.), require revision based on the presence of likely cryptic taxa identified using genetic techniques.

Survey sites were spread across all major aquatic habitats, including large spring-fed rivers, lowland wetlands and an array of small streams (for example, limestone, earthen, sandstone and waterfalls). The species list for Fish River Station now covers all major habitats and detailed spatial coverage of the reserve. Areas that warrant further investigation include water bodies above waterfalls and sinkholes with exposed groundwater at the surface.

19 Unmack, P. J. 2001, 'Biogeography of Australian freshwater fishes', *Journal of Biogeography* **28**: 1053–1089.

20 Allen, G. R., Midgley, S. H. & Allen M. 2002, *Field Guide to the Freshwater Fishes of Australia*, Western Australian Museum, Perth.

21 Hammer, M. P., Adams, M. & Hughes, J. H. 2012, 'Evolutionary Processes and Biodiversity', in *Ecology of Australian Freshwater Fishes*, eds Humphries, P. and Walker, K. CSIRO Press, Melbourne.

One of the many waterholes on Fish River Station © Copyright, Department of the Environment

A variety of floodplain wetlands, different types of streams and water bodies isolated above waterfalls are significant attributes and focuses for management (for example, control of introduced vertebrates). The spring-fed Daly River flowing alongside and through Fish River Station has very high conservation value and supports larger fish species such as the EPBC listed Freshwater Sawfish (*Pristis pristis*), the recreationally and culturally important Barramundi (*Lates calcarifer*), Sooty Grunter (*Hephaestus fuliginosus*), fork-tailed catfishes (Ariidae), eel-tailed catfishes (Plotosidae), Freshwater Whipray (*Himantura dalyensis*) and Bull Shark (*Carcharhinus leucas*). Vigilance and proactive management to keep Fish River Station free of introduced fishes is highly recommended.

## Invertebrate Fauna

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 a third of the species collected in any area are found to be new to science.

### Butterflies and Moths

The large variety of habitats on Fish River Station supports breeding populations of many butterflies and diurnal moths and their food plants, resulting in high diversity. 277 butterfly and diurnal moth records were obtained for 74 species (71 butterflies and three diurnal moths), bringing the total number known for the reserve to 75. Prior to this survey only two species were recorded, the Northern Jezebel butterfly (*Delias argenthona*) and Gilbert's Blue butterfly (*Candalides margarita gilberti*)); the former was not identified during this survey.

Based on data from Daly River and Tipperary Station, Fish River Station is likely to support around 100 species (88 butterflies, 13 diurnal moths), i.e. about two thirds of the fauna recorded for the Top End. Most of the species expected at the time of the survey were found, but approximately 20 species were not recorded, probably because of their short seasonal activity (some have limited flight seasons and are present only during the early to mid wet season).

Although none of the butterflies or diurnal moths recorded are endemic to Fish River Station, the reserve contains populations of 23 taxa that are restricted in their geographic range to the Top End and/or north-western Australia. The remainder occur more widely across the monsoon tropics of northern Australia and/or the eastern coast of Australia.

The most noteworthy record from the study was an extant breeding population of the Australian Beak butterfly (*Libythea geoffroyi genia*), a rare species that was previously known from only two historic records in the Northern Territory (Darwin–Palmerston and Wessel Islands). Prior to this survey, its habitat requirements and larval food plant were unknown, and the female had not been recorded. At Fish River Station the butterfly was found breeding near the southern boundary 15 km south-east of the homestead in semi-deciduous monsoon vine thicket on a large dolostone outcrop that supported an extensive stand of the larval food plant Malaiino (*Celtis australiensis*).

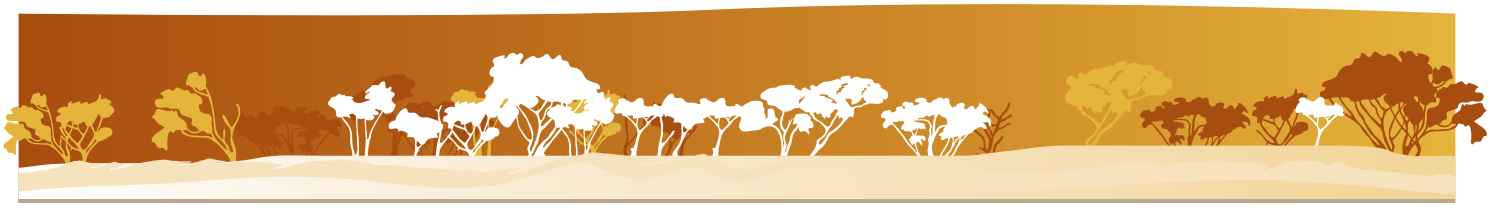
### Dung Beetles

Fifteen species of dung beetle representing five genera were collected. All were first records for Fish River Station, and three represent first records for the Daly Basin bioregion. Dung beetles were collected at six sites, including a recently burnt site, and two monsoon rainforest sites that had the highest species richness. *Onthophagus parrumbal* was the most common species and was found at all sites where pitfall traps were set. An undescribed species of *Lepanus* (NT4) was collected in rainforest and will be described in the near future.

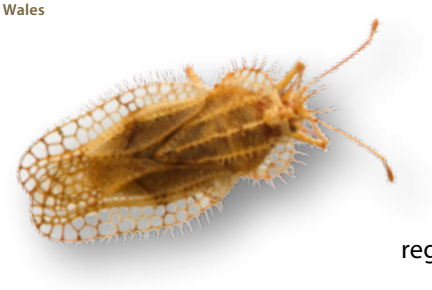
Dung beetles are important indicators of an ecosystem's health. They are associated with nutrient turnover and improve the soil by tunnelling which increases aeration, breaking up compacted soils and taking organic matter underground. Native dung beetles tend to use native dung or fungi as a resource; hence, dung beetle diversity relates to the vertebrate diversity in the region. In general, disturbed environments have more introduced than native dung beetle species.

Despite their usefulness as an ecosystem health indicator, little is known about the diversity and distribution of dung beetles in many of Australia's bioregions, including the Daly Basin. Prior to this survey, the ANIC had only three genera representing 14 species recorded from the Daly Basin with no records from Fish River Station. Nine genera representing almost 80 species have been recorded from the Northern Territory, and the apparently limited diversity in Daly Basin is likely to represent a lack of sampling effort. An additional genus (*Lepanus)* was recorded for the Daly Basin during this survey. BIOCLIM[22] modelling for the other five genera (*Amphistomus*, *Aptenocanthon*,

22 BIOCLIM is a bioclimatic analysis and prediction system, initially developed by H. A. Nix, that can be used to predict the spatial distribution of plant and animal species: Nix, H. A. 1986, 'Biogeographic analysis of Australian elapid snakes', in *Atlas of Elapid Snakes* (ed. R. Longmore), pp. 4–15, Australian Flora and Fauna Series No. 7, Australian Government Publishing Service: Canberra.



Another of the 40 putative new species of true bug collected on Fish River Station: (Tingidae) nr *Lasiacantha* n. sp., C. Symonds © Copyright, University of New South Wales



*Demarziella*, *Monoplistes*, *Tesserodon*) found in the Northern Territory indicates that the climate in the Daly Basin is suitable for all except *Aptenocanthon*.

### True Bugs

One-hundred and sixty-one true bug species from 34 families were recorded from Fish River Station over the two-week survey; all are new records for the reserve. Forty-seven named species have been identified and another 74 require further work to determine their status. Of these, four are un-named but previously known species for which suitable taxonomic information and keys are unavailable, and the others are possibly new species. Twelve true bug taxa are first records for the Northern Territory and three are new records for Australia: *Aconchus* (Tingidae), *Belenus* (Tingidae) and *Psallops* (Miridae).

True bugs were collected from 40 sites and 49 plant host species were identified. Although a range of methods (light traps, pitfall traps, foliage beating, sweeping and collection by hand) were used to capture true bugs, 60% of species were captured using a light trap, and almost half of those were not collected by any other method.

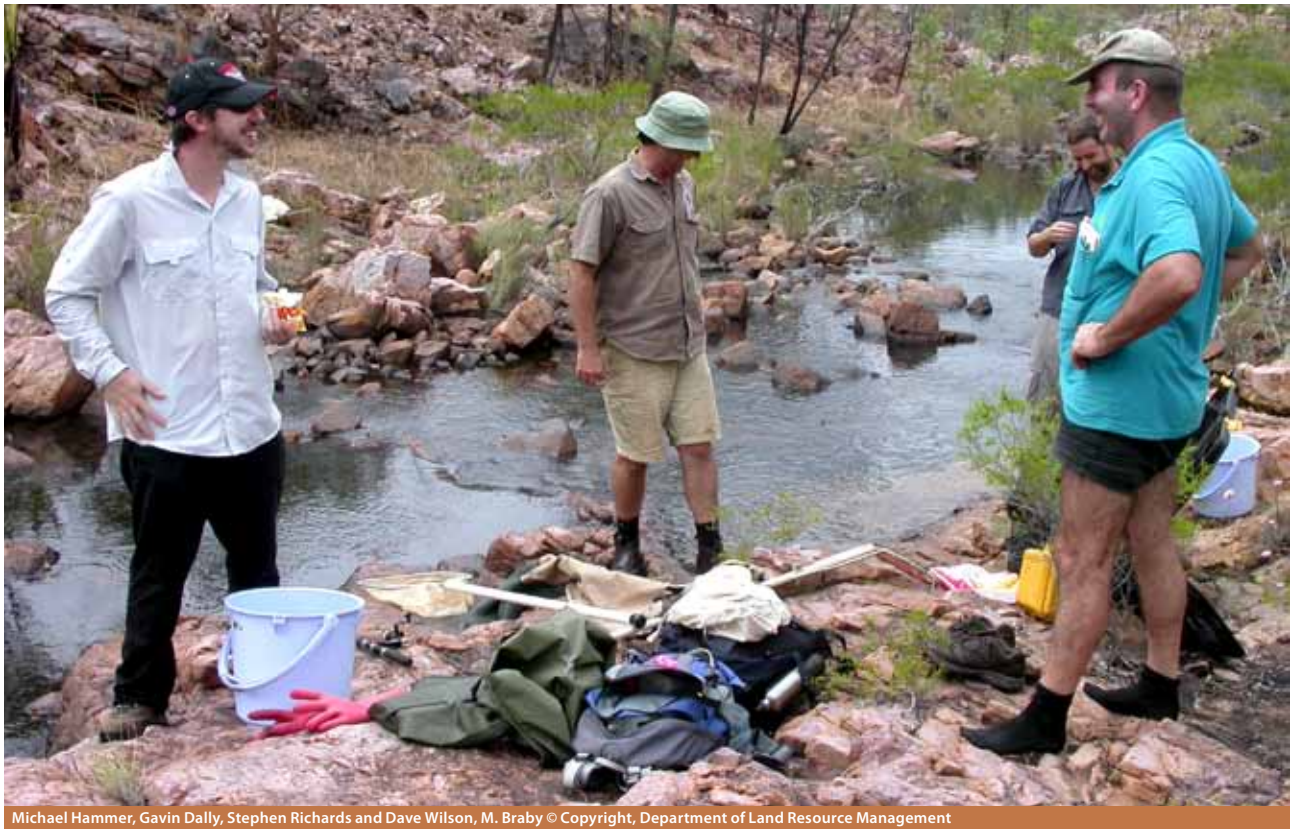
There has been inadequate surveying for true bugs in northern Australia. The collecting of true bugs has been more extensive across temperate, semi-arid and arid regions of Australia and to a much lesser extent in the tropical north of Queensland and the Gulf Country. The tropical vegetation of the Top End contains a distinctive assemblage of plant species, many found only in northern Australia and with which no true bug species have been associated. The Bush Blitz survey of Fish River Station provided the first intensive study of true bugs in the region and from a diversity of landscapes.

The species composition from collections on Fish River Station is quite different to Bush Blitz collections from southern Australia. The diversity of true bugs was higher than that recorded on other surveys, and spread more evenly across true bugs as a whole (34 families recorded). The number of putative new species (40) was almost equal to the number of named taxa (47) identified during the study, and the number of un-named species (74) was even greater, indicating that further survey and taxonomic work is warranted for true bugs in the Top End.

### Damselflies and Dragonflies

Thirty-eight odonates (13 damselflies (Zygoptera) and 25 dragonflies (Anisoptera)) were documented in what was the first survey of Fish River Station for these groups. The reserve supports a moderately high diversity of odonates typical of that in similar habitats in the Top End. Additional surveys, particularly in the wet season, are likely to expand the list.

Members of the pond damsel family (Coenagrionidae) and the skimmers/perchers family (Libellulidae) dominated the collections. One undescribed stream-dwelling species of damselfly, *Nosoticta* cf. *coelestina*, was recorded. Previously known from elsewhere in the Top End, it is currently being described as a new species. The material collected from this Bush Blitz will be used to describe the species. One species of damselfly from the narrow-wings family (Isostictidae), tentatively referred to as Kimberley Pondsitter (*Austrosticta soror*), was also collected.



Michael Hammer, Gavin Dally, Stephen Richards and Dave Wilson, M. Braby © Copyright, Department of Land Resource Management

However, the specimens from Fish River Station are unusual in having a number of characters typical of Northern Pondsitter (*A. fieldi*), and further studies are needed to confirm its taxonomic status.

### Spiders

Spiders from 11 target families were collected on Fish River Station, including curtain web spiders (Dipluridae), ground spiders (Gnaphosidae), white-tailed spiders (Lamponidae), wolf spiders (Lycosidae), wishbone spiders (Nemesiidae), goblin spiders (Oonopidae), water spiders (Pisauridae), long-spinneret ground spiders (Prodidomidae), jumping spiders (Salticidae), whistling spiders (Theraphosidae) and ant spiders (Zodariidae). To date, 33 species have been identified, all new records for the reserve. An important find was a male specimen of the ant spider *Spinasteron nigriceps*, which was collected once before at Daly River, being the specimen from which the species was described. As this expedition was conducted in the early dry season, most of the spiders normally active at other times of the year, such as most swift spiders (Corinnidae) and many wolf spiders, were seen only as juveniles.

### Land and Freshwater Snails

Twenty-one snail species (18 land snails and 3 freshwater snails) were recorded. There have been no previous comprehensive surveys of land and freshwater snails for Fish River Station. During the past two decades, opportunistic collections were made from an area between the Stuart Highway and Daly River just east of Fish River Station, but areas to the west of the reserve have never been sampled.

One of the most significant discoveries was the collection of Ribbed Pupasnail (*Glyptopupoides egregia*), which represents the first record of this species for the Northern Territory. It was recorded from the edges of vine thicket patches on the lower slopes of Mount Muriel. Previously, it was known only from the east coast of Queensland and the Mitchell Plateau in the northern Kimberley, Western Australia. Another important collection was Eastern Trumpetsnail (*Gyliotrachela australis*), being only the third record of this species in the Northern Territory with previous records from Katherine and Gregory National Park. At least four undescribed species of land snails were also collected.

The most serious threat to some of the land snails is the extent and timing of fire. At Mount Muriel, an extensive early season burn had destroyed most of the known habitat on Fish River Station for the Ribbed Pupasnail, *Torresitrachia weaberana* and *Xanthomelon* spp. Most of the individuals killed were still active when the fire at Mount Muriel occurred. During the dry season, *Torresitrachia weaberana* and *Xanthomelon* spp. of camaenid land snails aestivate deep in the soil, whereas the Ribbed Pupasnail aestivates in leaf litter or under logs at the surface. However, in April when conditions are still moist, the larger camaenids typically rest under tussocks of grass or close to the soil surface. The control burn at Mount Muriel penetrated the interior of vine thicket patches and was too early in the season, killing a substantial proportion of the snails. Limestone outcrops with patches of monsoon vine thicket support habitats for a number of specialised land snails—fire needs to be excluded from these areas.

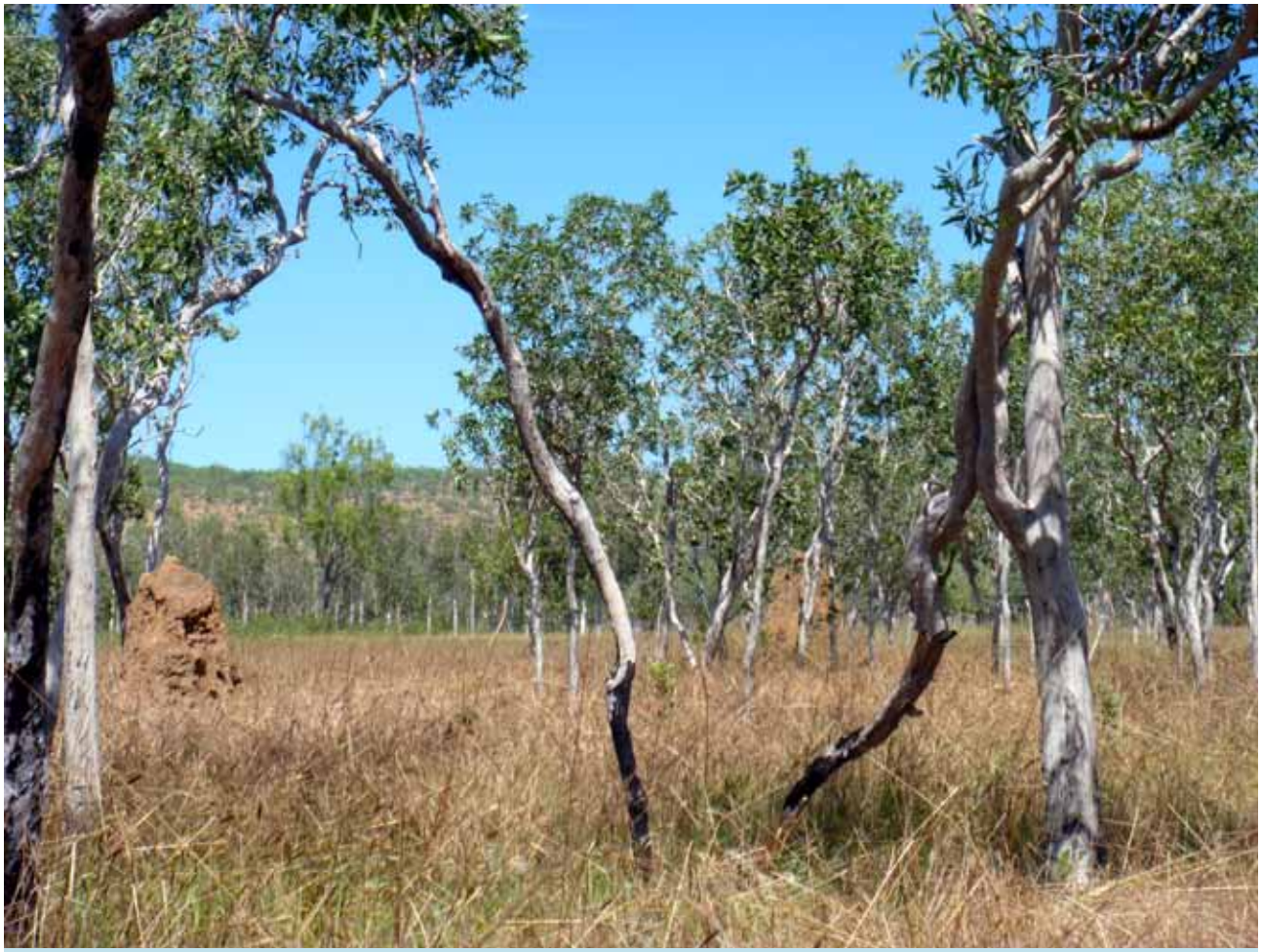
## Flora

### Vascular Plants

Three hundred and twenty-one vascular plant taxa were first records for Fish River Station. Another 380 species had been recorded previously, bringing the number of vascular plant taxa known for the reserve to 701. The flora is largely representative of the lower Daly Basin, and with much of the Daly Basin suitable for agricultural development the reserve provides an important reserve for the flora of this region. The reserve is notable for large areas of *Excoecaria parvifolia*/*Eucalyptus microtheca*/*Melaleuca*-dominated forest, a community not observed elsewhere, with *Excoecaria parvifolia* at the northern limit of their ranges. This community grows on poorly drained sites such as the lower part of Bamboo Creek. The reserve also includes the only extensive area conserving a number of species preferring clay-loam soils (for example, *Dendrolobium polyneurum*).

Additional localities were obtained for these rare species: the riparian tree *Croton* sp. aff. *dockrillii*; the vine *Glycine hirticaulis* subsp. *hirticaulis*; the shrubs *Abutilon* sp. Mataranka and *Hibiscus bacalusius*; and the herb *Stylidium aquaticum*. Additional distribution and abundance information was also recorded for the tree *Brachychiton* sp. Wangi, the herb *Dipteracanthus australasicus* subsp. *dalyensis*, and the vine *Glycine hirticaulis* subsp. *hirticaulis*. Much of the known distribution for all of these species is in the lower Daly Basin; as such, they are potentially affected by land clearing.

The collections included 11 taxa thought to be undescribed. Some of these, such as *Fimbristylis* sp. A Kimberley Flora, are relatively



The savannah woodlands of Fish River Station, J. Harding © Copyright, Department of the Environment

widespread, common and well known in the Northern Territory while others are of conservation significance, such as *Abutilon* sp. Mataranka. Further study by specialist taxonomists is necessary to determine if they are undescribed and how they are distinct from related taxa. In some cases (for example, *Galactia* sp. Katherine) they form part of a widespread species complex extending across the Northern Territory, and establishing species limits is a substantial task requiring examination of large numbers of specimens and populations in the field. In addition, several taxa were unplaced at the time of writing and require further study by specialists in those groups (for example, *Tephrosia brachyodon*); at least some of these may represent undescribed taxa. They have not been given formal phrase names at this stage as some are in groups for which the variation is poorly understood and the available broad species concepts may include several taxa. Until a preliminary working taxon concept is established, it is premature even to use phrase names for these taxa. Others such as *Corymbia* sp. aff. *chartacea* may represent intergrades between described taxa.

Further surveys at different times of year are likely to record more species on Fish River Station, especially during the early wet season. These may well include species of conservation significance restricted to clay loam soils such as *Brunoniella* sp. Daly River Road, known from only three locations in the Daly River Road–Litchfield Station area.

Early dry season burning of much of the reserve and seasonal conditions may have influenced the collection and recording of some taxa (for example, although identifiable at the time of survey, species such as *Cochlospermum* were sterile and therefore unsuitable for collecting). Some species, such as some ground orchids (*Typhonium*) are difficult to detect at most times, but are best detected during the early wet season. Others, such as *Amorphophallus, Sedopsis* and some *Utricularia*, can die back rapidly once the wet season ends and others need more survey effort.

### Liverworts, Hornworts and Mosses

Twenty-two species of bryophytes were collected. As far as is known, no bryophytes have been collected previously from Fish River Station, and only six species of liverworts and 11 mosses were known for the Daly Basin. Overall, the bryophyte diversity was quite low, but this was understandable given the harsh conditions experienced in the Top End. Even when habitat conditions appeared favourable to bryophytes (for example, vine thickets), the habitat was dominated by only one or two bryophyte species or totally dominated by vascular plants.

Highlights of the survey included a single hornwort, *Notothylas javanica*, which is a new record for Australia, and the thalloid liverwort, *Fossombronia* cf. *papillata*, which is a new record for the Northern Territory. Amongst the collections of *Riccia* spp. many could not be identified using current keys and descriptions. Some preliminary molecular data suggest that there may be new taxa in the collections from Fish River Station, but this cannot be assessed until a comprehensive revision of the northern Australian members of the genus is undertaken.

Many of the areas surveyed were open savannah grasslands or woodlands, and the soil was already too dry for bryophytes to survive. Habitats where bryophytes were relatively abundant included vine thicket, monsoon rainforest, Fish River Gorge and disturbed areas.

Biological soil crusts were probably the most important ecosystem service provided by bryophytes, and in some areas these were dominated by *Riccia* species. Biological soil crusts can stabilize the soil, increase its fertility, help it retain moisture, provide habitat for fauna and exclude weeds.

While the focus of this trip was to survey the bryophytes, a small number of other cryptogams were also collected, including the algae *Trentepohlia* sp. and *Chara* sp., and two corticioid fungi. One of the fungi has been identified as *Hjortstamia crassa*. Macrofungi were identified at least to genus where possible.

# Appendix A: Species Lists

Nomenclature and taxonomy used in this appendix are consistent with that from the Australian Faunal Directory (AFD), the Australian Plant Name Index (APNI) and the Australian Plant Census (APC).

Current at September 2013

# Fauna

## Vertebrates

| Mammals | | |
|---|---|---|
| Family | Species | Common name |
| Bovidae | *Bos taurus* ^ | European Cattle |
| | *Bubalus bubalis* ^ | Water Buffalo, Swamp Buffalo |
| Canidae | *Canis lupus* | Dingo |
| Dasyuridae | *Dasyurus hallucatus* # ~ | Northern Quoll |
| | *Pseudantechinus* cf. *roryi* | Rory Cooper's False Antechinus |
| | *Sminthopsis bindi* | Kakadu Dunnart |
| | *Sminthopsis macroura* | Stripe-faced Dunnart |
| | *Sminthopsis virginiae* | Red-cheeked Dunnart |
| Emballonuridae | *Saccolaimus flaviventris* | Yellow-bellied Sheathtail-bat |
| Equidae | *Equus asinus* ^ | Donkey |
| | *Equus caballus* ^ | Horse, Brumby |
| Felidae | *Felis catus* ^ | Cat |
| Macropodidae | *Macropus agilis* | Agile Wallaby |
| | *Macropus antilopinus* | Antilopine Wallaroo |
| | *Macropus robustus* | Common Wallaroo |
| | *Petrogale brachyotis* | Short-eared Rock-wallaby |
| Megadermatidae | *Macroderma gigas* | Ghost Bat |
| Molossidae | *Chaerephon jobensis* | Northern Freetail-bat, Northern Mastiff Bat |
| Muridae | *Hydromys chrysogaster* | Water-rat |
| | *Melomys burtoni* | Grassland Melomys |
| | *Mesembriomys gouldii* ~ | Black-footed Tree-rat |
| | *Pseudomys delicatulus* | Delicate Mouse |
| | *Pseudomys nanus* | Western Chestnut Mouse |
| | *Rattus tunneyi* ~ | Pale Field-rat |
| | *Zyzomys argurus* | Common Rock-rat |
| Peramelidae | *Isoodon macrourus* | Northern Brown Bandicoot |
| Petauridae | *Petaurus breviceps* | Sugar Glider |
| Phalangeridae | *Trichosurus vulpecula arnhemensis* | Northern Brushtail Possum |
| Pteropodidae | *Pteropus alecto* | Black Flying-fox |
| | *Pteropus scapulatus* | Little Red Flying-fox |
| Suidae | *Sus scrofa* ^ | Pig |
| Tachyglossidae | *Tachyglossus aculeatus* | Short-beaked Echidna |
| Vespertilionidae | *Pipistrellus adamsi* | Cape York Pipistrelle, Forest Pipistrelle |

Key

* = New record for this reserve

^ = Exotic/Pest

\# = EPBC listed

~ = TSP listed

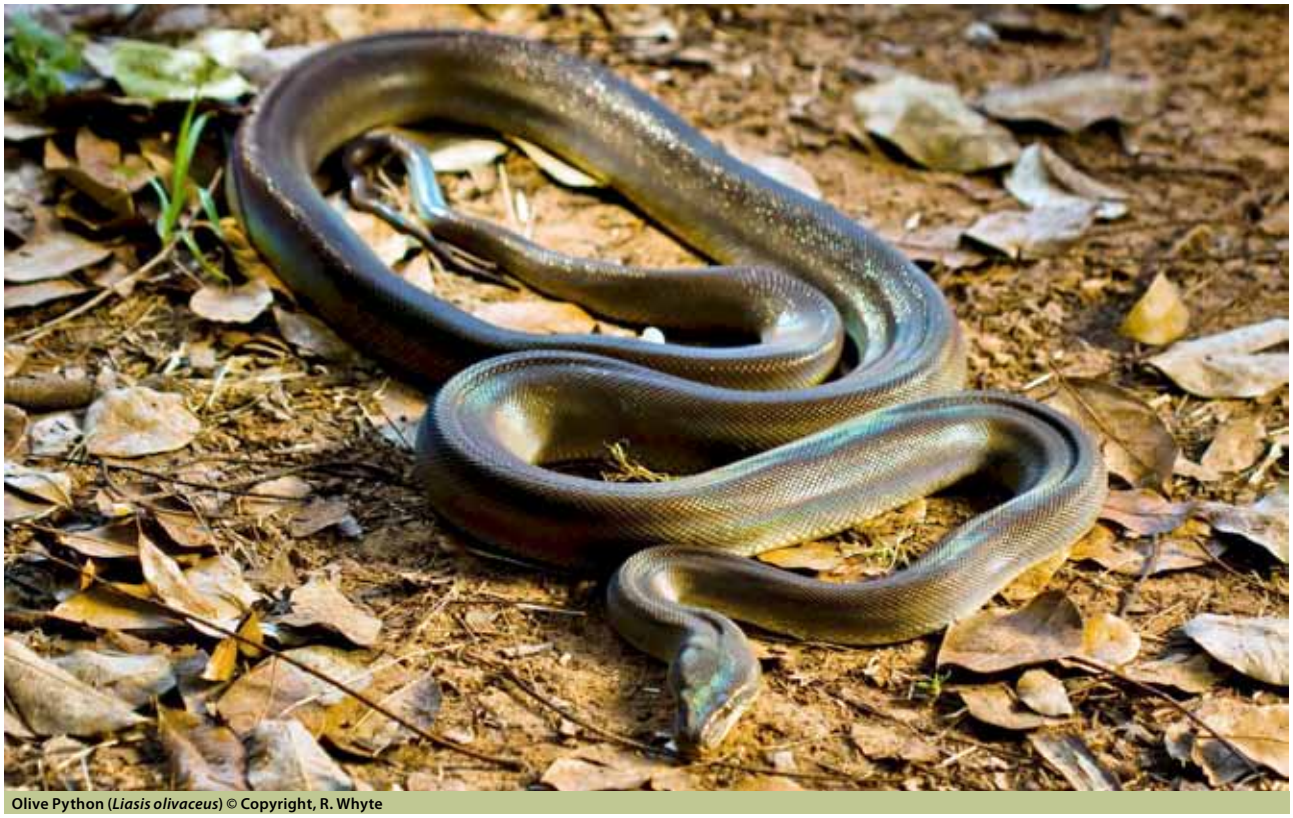
Colour coding for entries:

Black = Previously recorded on the reserve and found on this survey

**Brown** = **Putative new species**

Blue = Previously recorded on the reserve but not found on this survey

| Birds | | |
|---|---|---|
| Family | Species | Common name |
| Accipitridae | *Accipiter novaehollandiae* | Grey Goshawk |
| | *Aquila audax* | Wedge-tailed Eagle |
| | *Haliaeetus leucogaster* | White-bellied Sea-eagle |
| | *Haliastur sphenurus* | Whistling Kite |
| Alcedinidae | *Ceyx azureus* | Azure Kingfisher |
| | *Dacelo leachii* | Blue-winged Kookaburra |
| Ardeidae | *Egretta novaehollandiae* | White-faced Heron |
| Artamidae | *Cracticus nigrogularis* | Pied Butcherbird |
| Cacatuidae | *Cacatua galerita* | Sulphur-crested Cockatoo |
| | *Eolophus roseicapillus* | Galah |
| Campephagidae | *Coracina novaehollandiae* | Black-faced Cuckoo-shrike |
| | *Coracina papuensis* | White-bellied Cuckoo-shrike |
| | *Lalage sueurii* | White-winged Triller |
| Centropodidae | *Centropus phasianinus* | Pheasant Coucal |
| Climacteridae | *Climacteris melanura* | Black-tailed Treecreeper |
| Columbidae | *Geopelia humeralis* | Bar-shouldered Dove |
| | *Geopelia striata* | Peaceful Dove |
| Corvidae | *Corvus orru* | Torresian Crow |
| Estrildidae | *Taeniopygia bichenovii* | Double-barred Finch |
| Meliphagidae | *Conopophila rufogularis* | Rufous-throated Honeyeater |
| | *Entomyzon cyanotis* | Blue-faced Honeyeater |
| | *Myzomela obscura* | Dusky Honeyeater |
| | *Stomiopera unicolor* | White-gaped Honeyeater |
| Meropidae | *Merops ornatus* | Rainbow Bee-eater |
| Monarchidae | *Grallina cyanoleuca* | Magpie-lark |
| | *Myiagra alecto* | Shining Flycatcher |
| | *Myiagra inquieta* | Restless Flycatcher |
| | *Myiagra rubecula* | Leaden Flycatcher |
| Nectariniidae | *Dicaeum hirundinaceum* | Mistletoebird |
| Oriolidae | *Oriolus flavocinctus* | Yellow Oriole |
| | *Sphecotheres vieilloti* | Australasian Figbird |
| Pachycephalidae | *Pachycephala rufiventris* | Rufous Whistler |
| Petroicidae | *Microeca flavigaster* | Lemon-bellied Flycatcher |
| Psittacidae | *Trichoglossus haematodus* | Rainbow Lorikeet |
| | *Trichoglossus haematodus rubritorquis* | Red-collared Lorikeet |
| Ptilonorhynchidae | *Ptilonorhynchus nuchalis* | Great Bowerbird |
| Rhipiduridae | *Rhipidura leucophrys* | Willie Wagtail |
| | *Rhipidura rufiventris* | Northern Fantail |



Olive Python (*Liasis olivaceus*) © Copyright, R. Whyte

| Reptiles | | |
|---|---|---|
| Family | Species | Common name |
| Agamidae | *Chlamydosaurus kingii* | Frilled Lizard |
| | *Diporiphora albilabris* | White-lipped Two-line Dragon |
| | *Diporiphora bennettii* | Robust Two-line Dragon |
| | *Diporiphora bilineata* | Two-lined Dragon |
| | *Diporiphora magna* | Yellow-sided Two-line Dragon |
| | *Diporiphora* sp. | – |
| | *Lophognathus gilberti* | Gilbert's Dragon, Ta-ta Lizard |
| Boidae | *Antaresia childreni* | Children's Python |
| | *Liasis olivaceus* | Olive Python |
| Chelidae | *Chelodina oblonga* | Northern Snake-necked Turtle |
| | *Elseya dentata* * | Northern Snapping Turtle, Victoria River Snapper |
| | *Emydura victoriae* | North-west Red-faced Turtle, Victoria River Red-faced Turtle |

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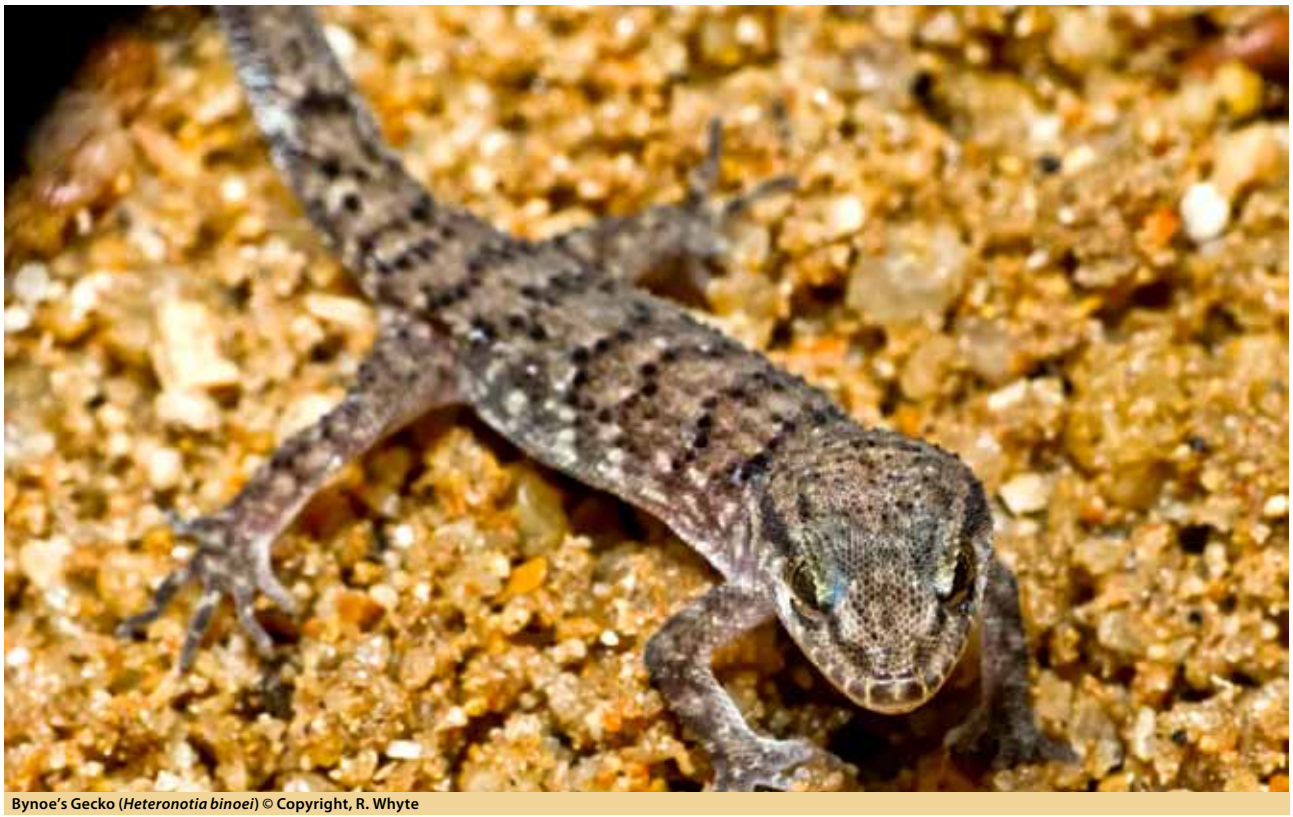
| Reptiles | | |
|---|---|---|
| Family | Species | Common name |
| Colubridae | *Boiga irregularis* | Brown Tree Snake, Night Tiger |
| | *Dendrelaphis punctulatus* | Common Tree Snake, Green Tree Snake |
| | *Stegonotus cucullatus* | Slaty-grey Snake |
| | *Tropidonophis mairii* | Freshwater Snake, Keelback |
| Crocodylidae | *Crocodylus johnstoni* | Freshwater Crocodile |
| | *Crocodylus porosus* | Saltwater Crocodile |
| Diplodactylidae | *Amalosia rhombifer* | Zigzag Velvet Gecko |
| | *Oedura marmorata* * | Marbled Velvet Gecko |
| | *Rhynchoedura ornata* | Western Beaked Gecko |
| | *Strophurus ciliaris* | Northern Spiny-tailed Gecko |
| Elapidae | *Brachyurophis roperi* | Northern Shovel-nosed Snake |
| | *Demansia papuensis* | Greater Black Whipsnake |
| | *Demansia vestigiata* | Black Whipsnake, Lesser Black Whipsnake |
| | *Pseudonaja nuchalis* | Northern Brown Snake |
| Gekkonidae | *Gehyra australis* | Northern Dtella |
| | *Gehyra nana* | Northern Spotted Rock Dtella |
| | *Gehyra* sp. cf. *koira* | Dtella |
| | *Heteronotia binoei* | Bynoe's Gecko |
| Pygopodidae | *Delma borea* | Rusty-topped Delma |
| | *Delma tincta* * | Excitable Delma |
| | *Lialis burtonis* | Burton's Snake-lizard |



Bynoe's Gecko (*Heteronotia binoei*) © Copyright, R. Whyte

| Reptiles | | |
|---|---|---|
| Family | Species | Common name |
| Scincidae | *Carlia amax* | Bauxite Rainbow-skink, Two-spined Rainbow Skink |
| | *Carlia gracilis* | Slender Rainbow-skink |
| | *Carlia munda* | Shaded-litter Rainbow-skink |
| | *Carlia rufilatus* | Red-sided Rainbow-skink |
| | *Carlia triacantha* | Desert Rainbow-skink |
| | *Cryptoblepharus cygnatus* | Swanson's Snake-eyed Skink |
| | *Cryptoblepharus metallicus* | Metallic Snake-eyed Skink |
| | *Ctenotus borealis* * | Northern Ctenotus, White-faced Ctenotus |
| | *Ctenotus decaneurus* | Ten-lined Ctenotus |
| | *Ctenotus essingtonii* | Port Essington Ctenotus |
| | *Ctenotus inornatus* | Bar-shouldered Ctenotus, Plain Ctenotus |
| | *Ctenotus robustus* | Robust Ctenotus |
| | *Ctenotus spaldingi* | Spalding's Ctenotus, Straight-browed Ctenotus |
| | *Ctenotus tantillus* | Dwarf Ctenotus, Kimberley Wedgesnout Ctenotus |
| | *Eremiascincus isolepis* | Northern Bar-lipped Skink, Smooth-scaled Skink |
| | *Glaphyromorphus darwiniensis* | Darwin Skink, Northern Mulch-skink |
| | *Lerista orientalis* | North-eastern Orange-tailed Slider |
| | *Menetia greyii* | Common Dwarf Skink, Grey's Menetia |
| | *Menetia maini* | Northern Dwarf Skink |
| | *Morethia ruficauda* | Lined Firetail Skink |
| | *Morethia storri* | Storr's Snake-eyed Skink, Top End Firetail Skink |
| | *Notoscincus ornatus* | Ornate Soil-crevice Skink |
| | *Proablepharus tenuis* | Northern Soil-crevice Skink, Slender Snake-eyed Skink |
| | *Tiliqua scincoides* | Eastern Blue-tongue |
| Typhlopidae | *Ramphotyphlops diversus* | Northern Blind Snake |
| | *Ramphotyphlops guentheri* | Top End Blind Snake |
| Varanidae | *Varanus acanthurus* | Ridge-tailed Monitor, Spiny-tailed Monitor |
| | *Varanus mertensi* ~ * | Mertens' Water Monitor |
| | *Varanus primordius* | Northern Ridge-tailed Monitor |
| | *Varanus scalaris* | Spotted Tree Monitor |
| | *Varanus tristis* | Black-headed Monitor |

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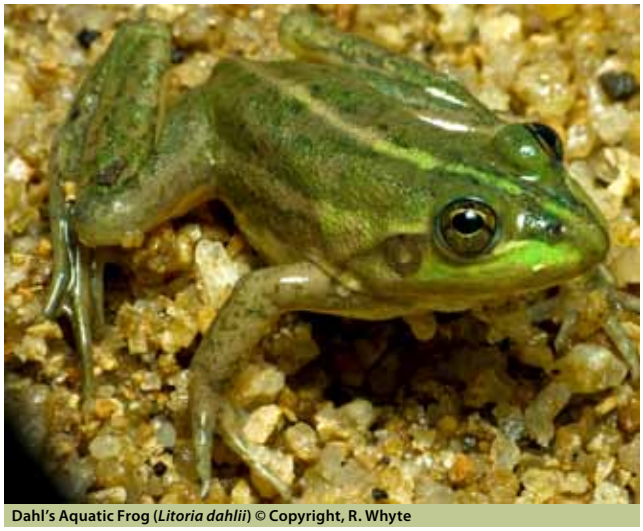
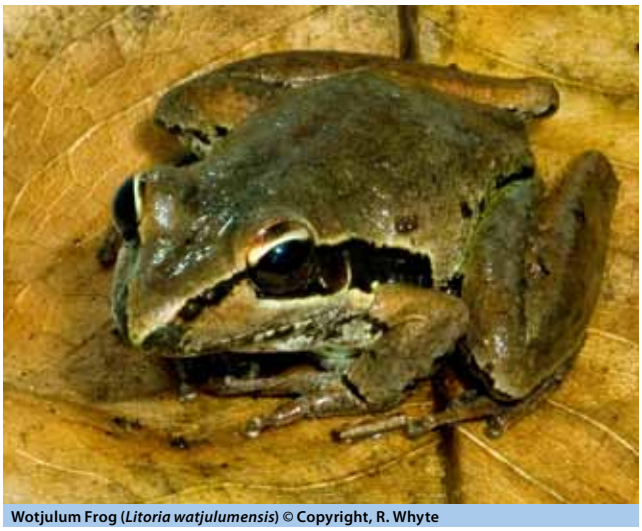
| Frogs and Toads | | |
|---|---|---|
| Family | Species | Common name |
| Bufonidae | *Rhinella marina* ^ | Cane Toad |
| Hylidae | *Litoria bicolor* | Northern Dwarf Tree Frog |
| | *Litoria caerulea* | Green Tree Frog |
| | *Litoria coplandi* | Copland's Rock Frog |
| | *Litoria dahlii* | Dahl's Aquatic Frog, Dahl's Frog |
| | *Litoria inermis* | Peters' Frog |
| | *Litoria meiriana* | Rockhole Frog |
| | *Litoria nasuta* | Rocket Frog |
| | *Litoria pallida* | Pale Fog |
| | *Litoria rothii* | Roth's Tree Frog |
| | *Litoria rubella* | Desert Tree Frog, Red Tree Frog |
| | *Litoria watjulumensis* | Wotjulum Frog |
| Myobatrachidae | *Crinia bilingua* | Bilingual Frog, Bilingual Froglet |
| | *Limnodynastes convexiusculus* | Marbled Frog |
| | *Limnodynastes depressus* | Flat-headed Frog |
| | *Platyplectrum ornatum* | Ornate Burrowing Frog |
| | *Uperoleia* sp. * | Uperoleia Toadlet |



Dahl's Aquatic Frog (*Litoria dahlii*) © Copyright, R. Whyte



Wotjulum Frog (*Litoria watjulumensis*) © Copyright, R. Whyte

| Fishes | | |
|---|---|---|
| Family | Species | Common name |
| Ambassidae | *Ambassis agrammus* | Sailfin Glassfish |
| | *Ambassis interrupta* | Longspine Glassfish |
| | *Ambassis macleayi* | Macleay's Glassfish |
| | *Ambassis* sp. *(muelleri)* | Northwest Glassfish |
| | *Denariusa australis* | Pennyfish |
| Apogonidae | *Glossamia aprion* | Mouth Almighty |
| Ariidae | *Neoarius berneyi* | Highfin Catfish |
| | *Neoarius graeffei* | Blue Catfish |
| | *Neoarius midgleyi* | Silver Cobbler |
| | *Sciades leptaspis* | Boofhead Catfish |
| Atherinidae | *Craterocephalus stercusmuscarum* | Flyspecked Hardyhead |
| | *Craterocephalus stramineus* | Blackmast |
| Belonidae | *Strongylura krefftii* | Freshwater Longtom |
| Carcharhinidae | *Carcharhinus leucas* | Bull Shark |
| Clupeidae | *Nematalosa erebi* | Bony Bream |
| Dasyatidae | *Himantura dalyensis* | Freshwater Whipray |
| Eleotridae | *Hypseleotris compressa* | Empire Gudgeon |
| | *Mogurnda mogurnda* | Northern Purplespotted Gudgeon |
| | *Oxyeleotris lineolata* | Sleepy Cod |
| | *Oxyeleotris selheimi* | Blackbanded Gudgeon |
| | *Prionobutis microps* | Smalleye Gudgeon |
| Gobiidae | *Glossogobius aureus* | Golden Flathead Goby |
| | *Glossogobius giuris* | Tank Goby |

Northern Purplespotted Gudgeon (*Mogurnda mogurnda*) © Copyright, R. Whyte

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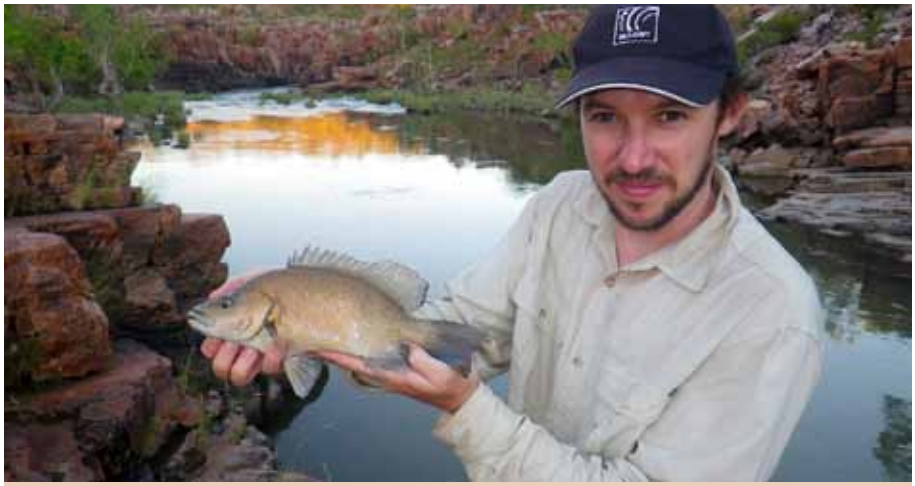
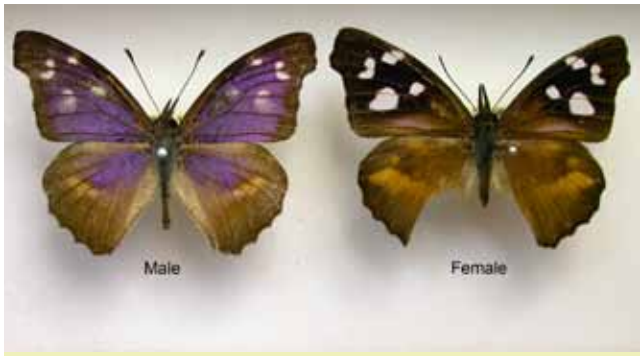


Icthyologist (fish scientist) Michael Hammer holding a Sooty Grunter (*Hephaestus fuliginosus*) © Copyright, D. Wilson

| Fishes | | |
|---|---|---|
| Family | Species | Common name |
| Hemiramphidae | *Arrhamphus sclerolepis* | Snubnose Garfish |
| Latidae | *Lates calcarifer* | Barramundi |
| Lutjanidae | *Lutjanus argentimaculatus* | Mangrove Jack |
| Megalopidae | *Megalops cyprinoides* | Oxeye Herring |
| Melanotaeniidae | *Melanotaenia australis* | Western Rainbowfish |
| | *Melanotaenia nigrans* * | Blackbanded Rainbowfish |
| Mugilidae | *Liza alata* | Diamond Mullet |
| Plotosidae | *Anodontiglanis dahli* | Toothless Catfish |
| | *Neosilurus ater* | Black Catfish |
| | *Neosilurus hyrtlii* | Hyrtl's Catfish |
| | *Porochilus rendahli* | Rendahl's Catfish |
| Pristidae | *Pristis pristis* ~ # | Freshwater Sawfish |
| Pseudomugilidae | *Pseudomugil tenellus* * | Delicate Blue Eye |
| Scatophagidae | *Scatophagus argus* | Spotted Scat |
| Soleidae | *Leptachirus triramus* | Three-line Sole |
| Synbranchidae | *Ophisternon gutturale* * | Swamp Eel |
| Terapontidae | *Amniataba percoides* | Barred Grunter |
| | *Hephaestus fuliginosus* | Sooty Grunter |
| | *Leiopotherapon unicolor* | Spangled Perch |
| | *Syncomistes butleri* | Sharpnose Grunter |
| Toxotidae | *Toxotes chatareus* | Sevenspot Archerfish |
| | *Toxotes lorentzi* | Primitive Archerfish |

# Invertebrates




A breeding population of the butterfly Australian Beak (*Libythea geoffroyi genia*) was an exciting discovery. This rare species was previously known from only two historic records in the Northern Territory (Darwin-Palmerston, Wessel Islands). It is endemic to the Top End and Kimberley regions, M. Braby © Copyright, Department of Land Resource Management

| Butterflies and Moths | |
|---|---|
| Family | Species |
| Geometridae | *Dysphania numana* * |
| Hesperiidae | *Badamia exclamationis* * |
| | *Cephrenes trichopepla* * |
| | *Chaetocneme denitza* * |
| | *Hesperilla crypsigramma* * |
| | *Hesperilla sexguttata* * |
| | *Ocybadistes flavovittatus vesta* * |
| | *Ocybadistes hypomeloma vaga* * |
| | *Ocybadistes walkeri olivia* * |
| | *Parnara amalia* * |
| | *Pelopidas lyelli lyelli* * |
| | *Proeidosa polysema* * |
| | *Suniana sunias sauda* * |
| | *Telicota augias krefftii* * |
| | *Telicota colon argea* * |
| Immidae | *Birthana cleis* * |

| Butterflies and Moths | |
|---|---|
| Family | Species |
| Lycaenidae | *Anthene lycaenoides godeffroyi* * |
| | *Anthene seltuttus affinis* * |
| | *Arhopala eupolis asopus* * |
| | *Candalides erinus erinus* * |
| | *Candalides margarita gilberti* |
| | *Catochrysops panormus platissa* * |
| | *Catopyrops florinda estrella* * |
| | *Deudorix smilis dalyensis* * |
| | *Euchrysops cnejus cnidus* * |
| | *Everes lacturnus australis* * |
| | *Famegana alsulus alsulus* * |
| | *Freyeria putli putli* * |
| | *Hypolycaena phorbas phorbas* * |
| | *Jamides phaseli* * |
| | *Nacaduba biocellata biocellata* * |
| | *Nacaduba kurava felsina* * |
| | *Nesolycaena urumelia* * |
| | *Ogyris zosine zosine* * |
| | *Prosotas dubiosa dubiosa* * |
| | *Theclinesthes miskini miskini* * |
| | *Zizina otis labradus* * |

Butterfly specimens collected at Fish River Station, M. Braby © Copyright, Department of Land Resource Management

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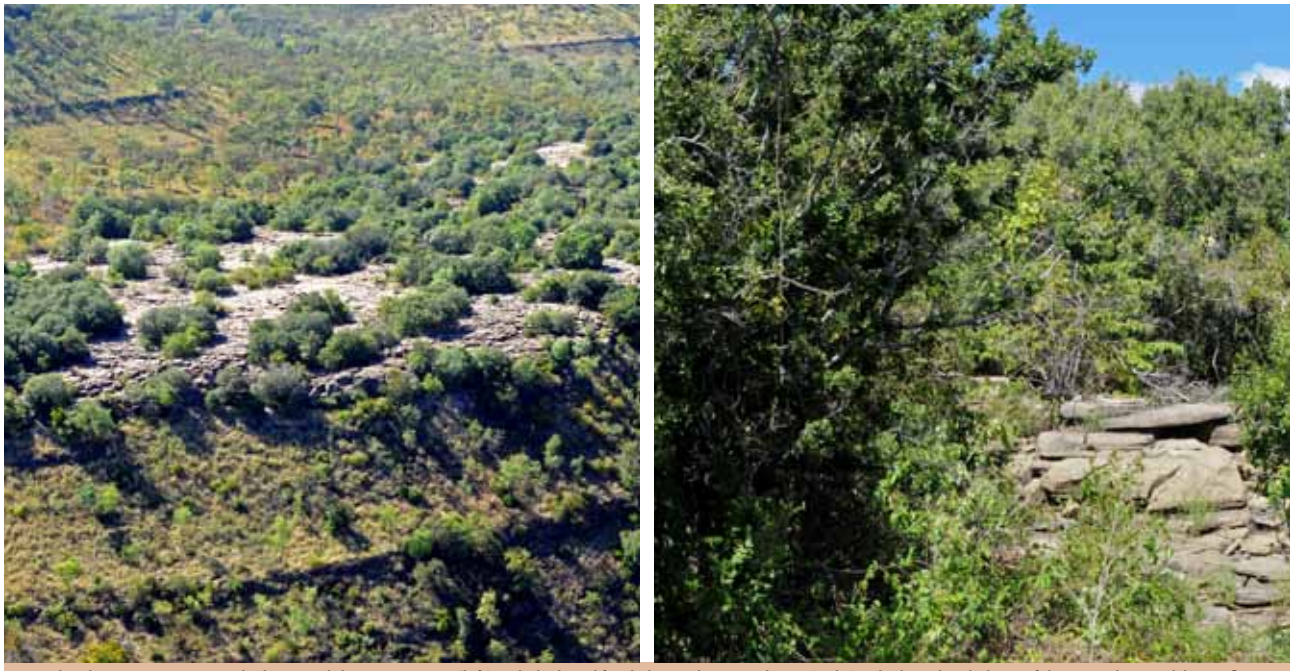

Semi-deciduous monsoon vine thicket on a dolostone outcrop (left) with the larval food plant *Celtis australiensis* (right) is the breeding habitat of the Australian Beak butterfly (*Libythea geoffroyi genia*), M. Braby © Copyright, Department of Land Resource Management

| Butterflies and Moths | |
|---|---|
| Family | Species |
| Noctuidae | *Idalima metasticta* * |
| Nymphalidae | *Acraea andromacha andromacha* * |
| | *Cethosia penthesilea paksha* * |
| | *Charaxes sempronius sempronius* * |
| | *Danaus affinis affinis* * |
| | *Danaus genutia alexis* * |
| | *Danaus petilia* * |
| | *Euploea corinna* * |
| | *Euploea darchia darchia* * |
| | *Euploea sylvester pelor* * |
| | *Hypocysta adiante antirius* * |
| | *Hypolimnas alimena darwinensis* * |
| | *Hypolimnas bolina nerina* * |
| | *Hypolimnas misippus* * |
| | *Junonia hedonia zelima* * |
| | *Junonia orithya albicincta* * |
| | *Junonia villida villida* * |
| | *Libythea geoffroyi genia* * |
| | *Melanitis leda bankia* * |

| Butterflies and Moths | |
|---|---|
| Family | Species |
| Nymphalidae | *Mycalesis perseus perseus* * |
| | *Mycalesis sirius sirius* * |
| | *Phalanta phalantha araca* * |
| | *Ypthima arctous* * |
| Papilionidae | *Cressida cressida* * |
| | *Graphium eurypylus nyctimus* * |
| | *Papilio demoleus sthenelus* * |
| | *Papilio fuscus canopus* * |
| Pieridae | *Belenois java teutonia* * |
| | *Catopsilia pomona* * |
| | *Catopsilia pyranthe crokera* * |
| | *Catopsilia scylla etesia* * |
| | *Cepora perimale* * |
| | *Delias argenthona* |
| | *Elodina walkeri* * |
| | *Eurema alitha novaguineensis* * |
| | *Eurema hecabe* * |
| | *Eurema herla* * |
| | *Eurema laeta sana* * |

| Beetles | |
|---|---|
| Family | Species |
| Scarabaeidae | *Anoplognathus brevicollis* |
| | *Anoplostethus roseus* |
| | *Ataenius spinipennis* |
| | *Australammoecius occidentalis* |
| | *Calloodes grayianus* |
| | *Digitonthophagus gazella* ^ * |
| | *Lepanus* NT4 * |
| | *Lepanus pygmaeus* * |
| | *Onitis alexis* ^ * |
| | *Onthophagus consentaneus* * |
| | *Onthophagus endota* * |
| | *Onthophagus fabricii* * |
| | *Onthophagus muticus* * |
| | *Onthophagus parrumbal* * |
| | *Onthophagus parvus* * |
| | *Onthophagus propinquus* * |
| | *Onthophagus sagittarius* ^ * |
| | *Onthophagus symbioticus* * |
| | *Onthophagus togeman* * |
| | *Tesserodon intricatum* * |
| | *Xylotrupes ulysses australicus* |

| True Bugs | |
|---|---|
| Family | Species |
| Alydidae | *Leptocorisa* sp. * |
| | *Melanacanthus scutellaris* ^ * |
| | *Mutusca* sp. * |
| | *Riptortus linearis* * |
| | *Riptortus* sp. * |
| Anthocoridae | *Orius* sp. * |
| Belostomatidae | *Diplonychus planus* * |
| Blissidae | *Heinsius* sp. * |
| | *Iphicrates* sp. * |
| Colobathristidae | *Phaenacantha australiae* ^ * |
| Coreidae | *Amorbus* sp. * |
| | *Clavigralloides* sp. * |
| | *Clavigralloides spinosus* * |
| | *Cletus minutus* * |
| | *Gralliclava australiensis* * |
| | *Mictis profana* ^ * |
| Corixidae | *Agraptocorixa* sp. * |
| Cydnidae | *Blaena setosa* * |
| | Cydnidae sp. 1 * |
| | Cydnidae sp. 2 * |
| | Cydnidae sp. 3 * |
| Cymidae | Cymodema sp. * |
| Gelastocoridae | *Nerthra walkeri* * |
| Geocoridae | *Geocoris* sp. * |
| | *Germalus* sp. 1 * |
| | *Germalus* sp. 2 * |
| Gerridae | *Limnogonus* sp. * |
| Hebridae | *Hebrus* sp. * |
| Heterogastridae | *Dinomachus* sp. * |
| Hydrometridae | *Hydrometra* sp. * |
| Largidae | nr *Delacampius* sp. * |
| | Largidae sp. * |
| Lygaeidae | *Graptostethus servus* ^ * |
| | *Nysius* sp. * |
| | *Nysius vinitor* ^ * |

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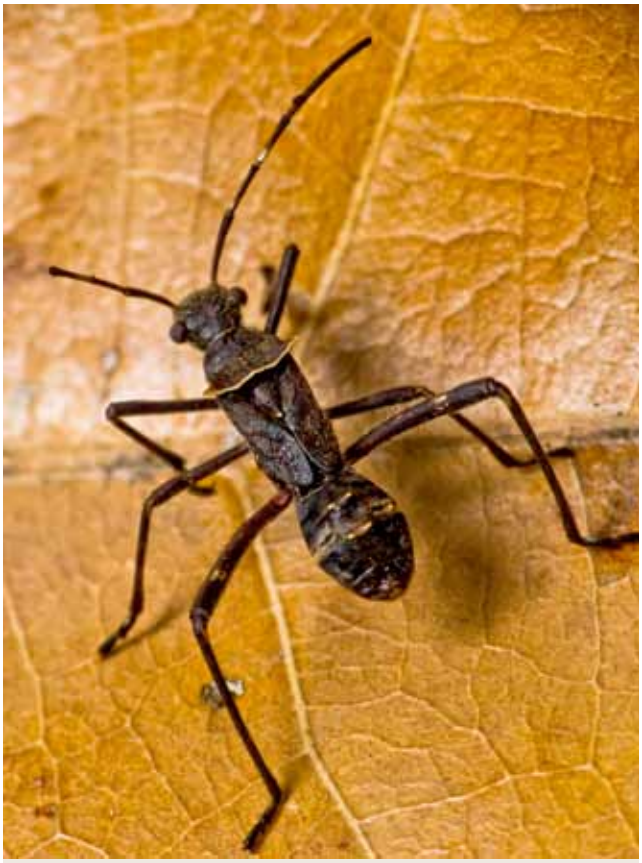
| True Bugs | |
|---|---|
| Family | Species |
| Micronectidae | *Micronecta* sp. 1 * |
| | *Micronecta* sp. 2 * |
| | *Micronecta* sp. 3 * |
| | *Micronecta* sp. 4 * |
| | *Micronecta* sp. 5 * |
| | *Micronecta* sp. 6 * |
| Miridae | *Ausejanus macrozonata* * |
| | *Austrocapsus* sp. * |
| | ***Blesingia* n. sp.** * |
| | *Campylomma* sp. * |
| | *Coridromius* sp. * |
| | *Creontiades dilutus* ^ * |
| | **Deraeocorini n. gen. n. sp.** * |
| | ***Hallodapus* n. sp.** * |
| | *Hyalopeplus loriae* * |
| | ***Irymplea* n. sp.** * |
| | *Jiwarli* sp. * |
| | *Kundakimuka queenslandica* * |
| | **Mirini n. gen. 1 n. sp. 1** * |
| | **Mirini n. gen. 2 n. sp. 1** * |
| | **Mirini n. sp. 1** * |
| | **Mirini n. sp. 2** * |
| | Mirini sp. * |
| | ***Morobea* group n. gen. n. sp.** * |
| | **Orthotylini n. sp. 1** * |
| | **Orthotylini n. sp. 2** * |
| | **Orthotylini n. sp. 3** * |
| | **Orthotylini n. sp. 4** * |
| | **Orthotylini n. sp. 5** * |
| | **Phylini n. sp. 1** * |
| | **Phylini n. sp. 2** * |
| | **Phylini n. sp. 3** * |
| | **Phylini n. sp. 4** * |
| | **Phylini n. sp. 5** * |
| | **Phylini n. sp. 6** * |
| | **Phylini n. sp. 7** * |
| | **Phylini n. sp. 8** * |
| | **Phylini n. sp. 9** * |
| | **Phylini n. sp. 10** * |
| | **Phylini n. sp. 11** * |



This *Riptortus* sp. is from a family known as broad-headed bugs © Copyright, R. Whyte

| True Bugs | |
|---|---|
| Family | Species |
| Miridae | **Phylini n. sp. 12** * |
| | **Phylini n. sp. 13** * |
| | Pilophorini sp. * |
| | ***Psallops* n. sp.** * |
| | ***Singhalesia* n. sp.** * |
| | ***Stenotus* n. sp.** * |
| | *Witchelinamiris* sp. * |
| Nabidae | *Alloeorhynchus* sp. * |
| | *Nabis kinbergii* * |
| Nepidae | *Goondnomdanepa weiri* * |
| Notonectidae | *Paranisops* sp. * |
| Oxycarenidae | *Oxycarenus arctatus* ^ * |
| Pachygronthidae | **nr *Darwinocoris* n. sp.** * |
| | *Pachygrontha austrina* * |
| | *Pachygrontha walkeri* * |
| | *Stenophyella macreta* * |

Larva of the shield bug *Spermatodes australis* © Copyright, R. Whyte

| True Bugs | |
|---|---|
| Family | Species |
| Pentatomidae | ***Antestiopsis* n. sp.** * |
| | *Asopinae* sp. * |
| | *Aspideurus flavescens* * |
| | *Avicenna inquinata* * |
| | *Bromocoris souefi* * |
| | *Cephaloplatus australis* * |
| | ***Cephaloplatus* n. sp.** * |
| | *Cephaloplatus pertyi* * |
| | *Eysarcoris distinctus* * |
| | *Eysarcoris lereddii* * |
| | **Halyini n. gen. n. sp.** * |
| | *Nezara viridula* ^ * |
| | *Novatilla* sp. * |
| | *Oncocoris* sp. 1 * |
| | *Oncocoris* sp. 2 * |
| | *Paramenestheus* sp. * |
| | *Parocirrhoe* sp. * |
| | *Pentatominae* sp. 1 * |
| | *Pentatominae* sp. 2 * |
| | *Piezodorus oceanicus* ^ * |
| | *Plautia affinis* ^ * |
| | *Spermatodes australis* * |
| Plataspidae | *Brachyplatys* sp. * |

| True Bugs | |
|---|---|
| Family | Species |
| Pyrrhocoridae | *Dysdercus cingulatus* * |
| Reduviidae | *Australcmena lineativentris* * |
| | *Gminatus* sp. * |
| | *Havinthus* sp. * |
| | *Oncocephalus* sp. 1 * |
| | *Oncocephalus* sp. 2 * |
| | *Opistoplatys fuscus* * |
| | *Peirates* sp. * |
| | *Ploiariolini* sp. * |
| | *Polytoxus* sp. * |
| | *Ptilocnemus* sp. * |
| | *Pygolampis* sp. * |
| | Reduviidae sp. * |
| Rhyparochromidae | Antillocorini sp. * |
| | *Appolonius territoralis* * |
| | ***Cligenes* n. sp.** * |
| | *Cligenes* sp. * |
| | *Dieuches* sp. * |
| | *Diniella glabrata* * |
| | Lethaeini sp. * |
| | *Meschia barrowensis* * |
| | Myodochini sp. 1 * |
| | Myodochini sp. 2 * |
| | *Neolethaeus* sp. * |
| | *Paraeucosmetus* sp. * |
| | *Paramyocara* sp. * |
| | *Paromius* sp. * |
| | *Remaudiereana nigriceps* ^ * |
| | *Remaudiereana* sp. * |
| | nr *Remaudiereana* sp. * |
| | *Stigmatonotum geniculatum* * |
| Schizopteridae | *Ogeria* sp. * |
| | Schizopteridae sp. * |
| Scutelleridae | *Lampromicra senator* * |
| Thaumastocoridae | *Baclozygum depressum* * |
| | *Onymocoris stysi* * |

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A shield bug *Novatilla virgata* © Copyright, R. Whyte

| True Bugs | |
|---|---|
| Family | Species |
| Tingidae | *Aconchus urbanus* ^ * |
| | ***Agramma* n. sp.** * |
| | *Belenus* sp. * |
| | ***Cysteochila* n. sp.** * |
| | **nr *Eritingis/Tingis* n. sp.** * |
| | **nr *Lasiacantha* n. sp.** * |
| | *Malandiola syscena* * |
| | ***Tingis* n. sp.** * |
| | *Urentius sarinae* * |
| Veliidae | *Austromicrovelia* sp. 1 * |
| | *Austromicrovelia* sp. 2 * |

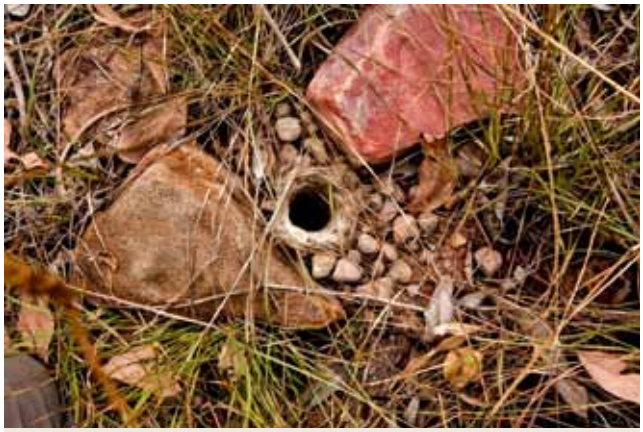
| Earwigs | |
|---|---|
| Family | Species |
| Labiduridae | *Nala lividipes* |

Painted Grasshawk (*Neurothemis stigmatizans*) © Copyright, R. Whyte

| Damselflies and Dragonflies | |
|---|---|
| Family | Species |
| Aeshnidae | *Austrogynacantha heterogena* * |
| Coenagrionidae | *Aciagrion fragilis* * |
| | *Argiocnemis rubescens* * |
| | *Austroagrion exclamationis* * |
| | *Ceriagrion aeruginosum* * |
| | *Ischnura heterosticta* * |
| | *Pseudagrion jedda* * |
| | *Pseudagrion lucifer* * |
| | *Pseudagrion microcephalum* * |
| Isostictidae | *Austrosticta soror* * |
| Lestidae | *Indolestes alleni* * |
| Libellulidae | *Aethriamanta circumsignata* * |
| | *Agrionoptera insignis* * |
| | *Brachydiplax denticauda* * |
| | *Crocothemis nigrifrons* * |
| | *Diplacodes bipunctata* * |
| | *Diplacodes haematodes* * |
| | *Diplacodes nebulosa* * |
| | *Diplacodes trivialis* * |
| | *Lathrecista asiatica* * |
| | *Macrodiplax cora* * |
| | *Nannodiplax rubra* * |
| | *Nannophlebia injibandi* * |
| | *Neurothemis stigmatizans* * |
| | *Orthetrum caledonicum* * |
| | *Orthetrum migratum* * |
| | *Orthetrum sabina* * |
| | *Pantala flavescens* * |
| | *Rhodothemis lieftincki* * |
| | *Rhyothemis braganza* * |
| | *Rhyothemis graphiptera* * |
| | *Tholymis tillarga* * |
| | *Tramea loewii* * |
| | *Zyxomma petiolatum* * |
| | *Ictinogomphus australis* * |
| Platycnemididae | *Nososticta baroalba* * |
| | *Nososticta cf. coelestina* * |
| | *Nososticta fraterna* * |

| Spiders | |
|---|---|
| Family | Species |
| Dipluridae | ***Cethegus* n. sp. 12** * |
| Gnaphosidae | **Gnaphosidae n. gen. n. sp. 16** * |
| | **Gnaphosidae n. gen. n. sp. 17** * |
| Lamponidae | *Lampona ampeinna* * |
| | *Notsodipus marun* * |
| | ***Notsodipus* n. sp. 10 revNP** * |
| Lycosidae | *Artoria parvula* * |
| | Lycosidae sp. 2 * |
| | Lycosidae sp. 7 * |
| | Lycosidae sp. 8 * |
| Nemesiidae | ***Aname* n. sp. 11** * |
| Oonopidae | ***Cavisternum attenboroughi* n. sp.** * |
| | ***Gamasomorpha* n. sp. 4** * |
| | ***Gamasomorpha* n. sp. 6** * |
| | *Ischnothyreus* sp. KE002 * |
| | ***Opopaea ephemera* n. sp.** * |
| | ***Opopaea fishriver* n. sp.** * |
| | ***Opopaea johardingae* n. sp.** * |
| | ***Opopaea preecei* n. sp.** * |
| | ***Pelicinus* n. sp. 1** * |
| | ***Pelicinus* n. sp. 5** * |
| | ***Xestaspis* n. sp. 9** * |
| Pisauridae | *Dolomedes* sp. * |
| Prodidomidae | *Nomindra gregory* * |
| | *Nomindra jarrnarm* * |
| | *Wydundra barrow* * |
| | *Wydundra gibb* * |
| Salticidae | ***Adoxotoma* n. sp. 15** * |
| | ***Evarcha* n. sp. 14** * |
| Theraphosidae | ***Phlogius* n. sp. 13** * |
| | *Selenotholus foelschei* * |
| Theridiidae | *Latrodectus hasseltii* ^ * |
| Zodariidae | *Spinasteron nigriceps* * |

Water spiders (*Dolomedes* sp.) can dive and remain underwater for up to an hour, hunting for tadpoles, small fish and aquatic insects © Copyright, R. Whyte



A tarantula (*Selenotholus foelschei*) and its burrow. Australian tarantulas make a fine whistling sound, hence they are also called whistling spiders © Copyright, R. Whyte

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| Snails and Slugs | |
|---|---|
| Family | Species |
| Camaenidae | *Torresitrachia weaberana* * |
| | *Trachiopsis victoriana* * |
| | *Xanthomelon interpositum** |
| | *Xanthomelon jannellei* * |
| Cerastidae | *Amimopina macleayi* * |
| Helicarionidae | *Westracystis fredaslini* * |
| Helicodiscidae | *Stenopylis coarctata* * |
| Planorbidae | *Amerianna* sp. * |
| | *Glyptophysa* sp. * |
| Pupillidae | *Gastrocopta pediculus* * |
| | *Gastrocopta* sp. * |
| | *Glyptopupoides egregia* * |
| | *Gyliotrachela australis* * |
| | *Nesopupa scotti* * |
| | *Pumilicopta kessneri* * |
| | *Pupisoma circumlitum* * |
| | *Pupisoma orcula* * |
| | *Pupoides pacificus* * |
| Subulinidae | *Eremopeas interioris* * |
| Succineidae | *Succinea* sp. * |
| Viviparidae | *Notopala* sp. * |

**The Ribbed Pupasnail (*Glyptopupoides egregia*) was recorded for the first time in the Northern Territory. It was observed on the edges of vine thickets on the lower slopes of Mount Muriel © Copyright, V. Kessner**

**Hundreds of *Westracystis fredaslini* gather in a cool and moist place. Snails return to the same location to aestivate during the dry season. They form a semi-permeable membrane made of saliva at the opening of their shell, which allows moisture in but not out © Copyright, R. Whyte**

***Xanthomelon interpositum* © Copyright, V. Kessner**

# Flora

*Gomphrena lacinulata*, I. Cowie © Copyright, Department of Land Resource Management

| Flowering Plants | |
|---|---|
| Family | Species |
| Acanthaceae | *Brunoniella australis* |
| | *Dicliptera armata* |
| | *Dipteracanthus australasicus* subsp. *dalyensis* * |
| | *Hygrophila angustifolia* * |
| | *Hypoestes floribunda* var. *varia* * |
| | *Nelsonia campestris* * |
| | *Pseuderanthemum variabile* |
| | *Rostellularia adscendens* * |
| Aizoaceae | *Trianthema rhynchocalyptra* |
| Alismataceae | *Caldesia oligococca* var. *oligococca* |
| Amaranthaceae | *Achyranthes aspera* * |
| | *Alternanthera nodiflora* * |
| | *Gomphrena canescens* |
| | *Gomphrena flaccida* * |
| | *Gomphrena lacinulata* * |
| | *Gomphrena parviflora* |
| | *Ptilotus corymbosus* * |
| | ***Ptilotus* n. sp. Fish River (D.L.Lewis 2249) Cowie & D.L.Lewis** * |

| Flowering Plants | |
|---|---|
| Family | Species |
| Anacardiaceae | *Blepharocarya depauperata* * |
| | *Buchanania arborescens* |
| | *Buchanania obovata* |
| Apocynaceae | *Alstonia spectabilis* subsp. *ophioxyloides* |
| | *Gymnanthera oblonga* * |
| | *Ichnocarpus frutescens* |
| | *Marsdenia angustata* * |
| | *Marsdenia geminata* |
| | *Tylophora cinerascens* |
| | *Tylophora erecta* |
| | *Tylophora flexuosa* * |
| Araceae | *Amorphophallus paeoniifolius* |
| | *Colocasia esculenta* |
| Arecaceae | *Carpentaria acuminata* |
| | *Livistona humilis* |
| Asparagaceae | *Chlorophytum laxum* |
| | *Thysanotus banksii* * |
| | *Thysanotus chinensis* * |
| Asteraceae | *Acmella grandiflora* var. *brachyglossa* * |
| | *Adenostemma lavenia* |
| | *Ageratum conyzoides* ^ |
| | *Bidens pilosa* ^ * |
| | *Blumea diffusa* * |
| | *Blumea integrifolia* * |
| | *Blumea saxatilis* |
| | *Blumea tenella* |
| | *Centipeda borealis* |
| | *Cyanthillium cinereum* * |
| | *Cyanthillium* sp. grey leaf (P.S.Short 4793) * |
| | *Eclipta prostrata* * |
| | *Eclipta* sp. Humpty Doo (H.S.McKee 8360) |

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| Flowering Plants | |
|---|---|
| Family | Species |
| Asteraceae | *Helichrysum luteoalbum* |
| | *Pentalepis ecliptoides* |
| | *Pterocaulon discolor* * |
| | *Pterocaulon serrulatum* var. *velutinum* * |
| | *Pterocaulon sphacelatum* * |
| | *Pterocaulon verbascifolium* * |
| | *Sphaeromorphaea australis* * |
| | *Wedelia* sp. * |
| | *Xanthium strumarium* ^ |
| Boraginaceae | *Heliotropium bracteatum* * |
| | *Heliotropium foliatum* * |
| | *Heliotropium prostratum* * |
| | *Heliotropium ventricosum* * |
| | *Trichodesma zeylanicum* var. *zeylanicum* * |
| Burmanniaceae | *Burmannia juncea* |
| Burseraceae | *Canarium australianum* |
| Byblidaceae | *Byblis filifolia* * |
| Campanulaceae | *Lobelia arnhemiaca* |
| Cannabaceae | *Celtis australiensis* |
| | *Trema tomentosa* var. *aspera* * |
| Capparaceae | *Capparis sepiaria* |
| Caryophyllaceae | *Polycarpaea corymbosa* * |
| | *Polycarpaea holtzei* * |
| | *Polycarpaea longiflora* |
| | *Polycarpaea violacea* * |
| Celastraceae | *Stackhousia intermedia* * |
| Cleomaceae | *Cleome tetrandra* * |
| | *Cleome viscosa* |
| Combretaceae | *Terminalia canescens* |
| | *Terminalia ferdinandiana* |
| | *Terminalia grandiflora* |
| | *Terminalia latipes* |
| | *Terminalia platyphylla* |
| | *Terminalia pterocarya* |

| Flowering Plants | |
|---|---|
| Family | Species |
| Commelinaceae | *Cartonema parviflorum* * |
| | *Cartonema spicatum* var. *spicatum* * |
| | *Cartonema trigonospermum* * |
| | *Commelina ciliata* * |
| | *Commelina ensifolia* * |
| | *Cyanotis axillaris* * |
| | *Murdannia graminea* * |
| | *Murdannia* sp. Top End (G.M. Chippendale 7726) |
| Convolvulaceae | *Bonamia media* * |
| | *Bonamia pannosa* * |
| | *Erycibe coccinea* |
| | *Evolvulus alsinoides* |
| | *Evolvulus alsinoides* var. *alsinoides* |
| | *Ipomoea eriocarpa* * |
| | *Ipomoea gracilis* |
| | *Ipomoea graminea* * |
| | *Ipomoea muelleri* * |
| | *Ipomoea nil* |
| | *Ipomoea plebeia* |
| | *Ipomoea polymorpha* * |
| | *Jacquemontia browniana* * |
| | *Jacquemontia paniculata* |
| | *Jacquemontia* sp. Douglas Daly (C.R.Michell 1124) |
| | *Merremia aegyptia* ^ * |
| | *Merremia gemella* * |
| | *Merremia hederacea* * |
| | *Merremia incisa* |
| | *Merremia quinata* * |
| | *Operculina aequisepala* * |
| | *Operculina brownii* |
| | *Polymeria ambigua* * |
| | *Xenostegia tridentata* * |

| Flowering Plants | |
|---|---|
| Family | Species |
| Cucurbitaceae | *Cucumis althaeoides* * |
| | *Cucumis melo* |
| | *Cucumis picrocarpus* * |
| | *Diplocyclos palmatus* |
| | *Trichosanthes cucumerina* |
| Cyperaceae | *Crosslandia setifolia* * |
| | *Cyperus aquatilis* |
| | *Cyperus bifax* * |
| | *Cyperus cuspidatus* |
| | *Cyperus decompositus* |
| | *Cyperus difformis* |
| | *Cyperus haspan* |
| | *Cyperus haspan* subsp. *juncoides* * |
| | *Cyperus iria* * |
| | *Cyperus microcephalus* |
| | *Cyperus orgadophilus* * |
| | *Cyperus portae-tartari* |
| | *Cyperus procerus* * |
| | *Cyperus pulchellus* * |
| | *Cyperus tenuispica* * |
| | *Cyperus zollingeri* |
| | *Eleocharis acutangula* |
| | *Eleocharis atropurpurea* |
| | *Eleocharis geniculata* |
| | *Eleocharis rivalis* * |
| | *Eleocharis sanguinolenta* * |
| | *Eleocharis spiralis* * |
| | *Fimbristylis acicularis* |
| | *Fimbristylis cephalophora* * |
| | *Fimbristylis cinnamometorum* * |
| | *Fimbristylis complanata* * |
| | *Fimbristylis dichotoma* * |
| | *Fimbristylis furva* |
| | *Fimbristylis lanceolata* |
| | *Fimbristylis littoralis* var. *littoralis* * |
| | *Fimbristylis microcarya* |
| | *Fimbristylis oxystachya* * |

| Flowering Plants | |
|---|---|
| Family | Species |
| Cyperaceae | *Fimbristylis pachyptera* |
| | *Fimbristylis pallida* * |
| | *Fimbristylis pauciflora* |
| | *Fimbristylis phaeoleuca* * |
| | *Fimbristylis punctata* * |
| | *Fimbristylis quinquangularis* * |
| | *Fimbristylis schultzii* * |
| | *Fimbristylis sieberiana* * |
| | *Fimbristylis simplex* * |
| | *Fimbristylis* sp. A Kimberley Flora (A.S. George 13584) * |
| | *Fimbristylis sphaerocephala* |
| | *Fimbristylis squarrulosa* * |
| | *Fimbristylis tetragona* |
| | *Fimbristylis trigastrocarya* |
| | *Fuirena ciliaris* |
| | *Fuirena umbellata* |
| | *Lipocarpha microcephala* * |
| | *Rhynchospora heterochaeta* * |
| | *Rhynchospora subtenuifolia* * |
| | *Rhynchospora wightiana* * |
| | *Schoenoplectus praelongatus* * |
| | *Schoenoplectus subulatus* |
| | *Scleria brownii* |
| | *Scleria levis* |
| | *Scleria lingulata* |
| | *Scleria pygmaea* |
| | *Scleria rugosa* |
| | *Scleria sphacelata* |
| Dilleniaceae | *Hibbertia brevipedunculata* * |
| | *Hibbertia candicans* |
| | *Hibbertia ciliolata* * |
| | *Hibbertia dilatata* |
| | *Hibbertia oblongata* subsp. *brevifolia* * |
| | *Hibbertia sphenandra* * |

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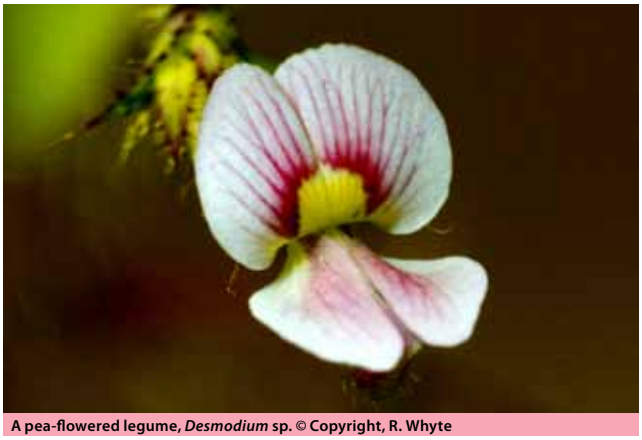
| Flowering Plants | |
|---|---|
| Family | Species |
| Dioscoreaceae | *Dioscorea bulbifera* |
| | *Dioscorea transversa* |
| Droseraceae | *Drosera fulva* * |
| | *Drosera indica* |
| Ebenaceae | *Diospyros calycantha* * |
| | *Diospyros rugosula* * |
| Elatinaceae | *Bergia pusilla* * |
| Eriocaulaceae | *Eriocaulon concretum* |
| | *Eriocaulon fistulosum* |
| | *Eriocaulon inapertum* |
| | *Eriocaulon odontospermum* |
| | *Eriocaulon pusillum* |
| | *Eriocaulon setaceum* |
| | *Eriocaulon tortuosum* |

| Flowering Plants | |
|---|---|
| Family | Species |
| Erythroxylaceae | *Erythroxylum ellipticum* |
| Euphorbiaceae | *Croton arnhemicus* |
| | *Croton* sp. aff. *dockrillii* * |
| | *Croton schultzii* |
| | *Euphorbia armstrongiana* * |
| | *Euphorbia mitchelliana* |
| | *Euphorbia schultzii* * |
| | *Euphorbia vachellii* * |
| | *Excoecaria parvifolia* |
| | *Homalanthus novoguineensis* |
| | *Microstachys chamaelea* |
| | *Petalostigma pubescens* |
| | *Petalostigma quadriloculare* |

Ian Cowie and Ben Firth sorting and pressing plant specimens after a long day in the field, M. Jambrecina © Copyright, Department of the Environment

| Flowering Plants | |
|---|---|
| Family | Species |
| Fabaceae | *Abrus precatorius* |
| | *Acacia auriculiformis* |
| | *Acacia difficilis* |
| | *Acacia gonocarpa* * |
| | *Acacia holosericea* * |
| | *Acacia humifusa* |
| | *Acacia lamprocarpa* |
| | *Acacia latescens* |
| | *Acacia multisiliqua* * |
| | *Acacia nuperrima* * |
| | *Acacia pellita* |
| | *Acacia tolmerensis* |
| | *Acacia tumida* |
| | *Acacia tumida* var. *tumida* * |
| | *Aeschynomene indica* * |
| | *Albizia canescens* |
| | *Alysicarpus brownii* |
| | *Alysicarpus muelleri* * |
| | *Alysicarpus ovalifolius* ^ * |
| | *Alysicarpus schomburgkii* * |
| | *Aphyllodium schindleri* * |
| | *Austrodolichos errabundus* var. *errabundus* * |
| | *Bauhinia malabarica* |
| | *Cajanus marmoratus* * |
| | *Cajanus reticulatus* var. *grandifolius* * |
| | *Canavalia papuana* |
| | *Cathormion umbellatum* |
| | *Chamaecrista absus* var. *absus* * |
| | *Chamaecrista mimosoides* |
| | *Chamaecrista nomame* var. *nomame* * |
| | *Christia australasica* * |
| | *Crotalaria alata* |
| | *Crotalaria brevis* * |
| | *Crotalaria goreensis* ^ * |
| | *Crotalaria juncea* ^ * |



A pea-flowered legume, *Desmodium* sp. © Copyright, R. Whyte

| Flowering Plants | |
|---|---|
| Family | Species |
| Fabaceae | *Crotalaria verrucosa* * |
| | *Cullen badocanum* |
| | *Dendrolobium multiflorum* |
| | *Dendrolobium polyneurum* |
| | *Desmodium brownii* |
| | *Desmodium filiforme* * |
| | *Desmodium flagellare* * |
| | *Desmodium glareosum* * |
| | *Desmodium heterocarpon* var. *strigosum* |
| | *Desmodium muelleri* * |
| | *Desmodium pullenii* |
| | *Desmodium trichostachyum* * |
| | *Dunbaria singuliflora* * |
| | *Erythrophleum chlorostachys* |
| | *Flemingia lineata* |
| | *Flemingia pauciflora* * |
| | *Flemingia* sp. Sericea (S.T.Blake 16726) |
| | *Flemingia trifoliastrum* |
| | *Galactia megalophylla* |
| | *Galactia muelleri* * |
| | *Galactia* sp. Katherine (J.R.Maconochie 517) * |
| | *Glycine hirticaulis* subsp. *hirticaulis* * |
| | *Glycine tomentella* * |
| | *Indigastrum parviflorum* * |

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| Flowering Plants | |
|---|---|
| Family | Species |
| Fabaceae | *Indigofera linifolia* * |
| | *Indigofera trifoliata* * |
| | *Jacksonia dilatata* |
| | *Macroptilium lathyroides* var. *semierectum* ^ * |
| | *Mucuna gigantea* |
| | *Neptunia gracilis* f. *glandulosa* * |
| | *Plagiocarpus axillaris* |
| | *Pycnospora lutescens* |
| | *Rhynchosia minima* * |
| | *Senna obtusifolia* ^ * |
| | *Senna occidentalis* ^ |
| | *Sesbania cannabina* |
| | *Sesbania cannabina* var. *cannabina* * |
| | *Tephrosia brachyodon* * |
| | *Tephrosia carriemichelliae* |
| | *Tephrosia coriacea* * |
| | *Tephrosia nematophylla* |
| | *Tephrosia oblongata* |
| | *Tephrosia phaeosperma* * |
| | *Tephrosia polyzyga* |
| | *Tephrosia remotiflora* * |
| | *Tephrosia* sp. G Kimberley Flora (G.J.Keighery 4828) |
| | *Tephrosia* sp. Muddy Bay (P.I.Forster+ PIF15313) * |
| | *Tephrosia subpectinata* |
| | *Tephrosia virens* |
| | *Uraria lagopodioides* * |
| | *Uraria* sp. Litchfield (C.R.Dunlop 5220) |
| | *Vachellia pachyphloia* subsp. *pachyphloia* * |
| | *Vachellia pallidifolia* |
| | *Vachellia valida* * |
| | *Vigna lanceolata* var. *lanceolata* * |
| | *Vigna radiata* var. *sublobata* * |
| | *Zornia areolata* |
| | *Zornia chaetophora* |

| Flowering Plants | |
|---|---|
| Family | Species |
| Flagellariaceae | *Flagellaria indica* |
| Gentianaceae | *Fagraea racemosa* * |
| | *Schenkia australis* |
| Goodeniaceae | *Goodenia armstrongiana* * |
| | *Goodenia heppleana* * |
| | *Goodenia hispida* * |
| | *Goodenia holtzeana* * |
| | *Goodenia janamba* * |
| | *Goodenia leiosperma* |
| | *Goodenia pilosa* * |
| | *Goodenia pumilio* * |
| | *Goodenia purpurascens* * |
| | *Goodenia redacta* |
| Haloragaceae | Gonocarpus leptothecus * |
| Hydrocharitaceae | *Blyxa aubertii* |
| | *Najas* sp. * |
| | *Vallisneria annua* |
| | *Vallisneria rubra* |
| Hypericaceae | *Hypericum gramineum* |
| Hypoxidaceae | *Curculigo ensifolia* |
| Isoetaceae | *Isoetes coromandelina* subsp. *macrotuberculata* |
| Juncaginaceae | *Triglochin dubia* |
| | *Triglochin procera* |
| Lamiaceae | *Anisomeles malabarica* * |
| | *Basilicum polystachyon* * |
| | *Callicarpa candicans* |
| | *Gmelina schlechteri* |
| | *Hyptis suaveolens* ^ * |
| | *Plectranthus scutellarioides* * |
| Lauraceae | *Cassytha capillaris* * |
| | *Cassytha filiformis* * |
| | *Cryptocarya cunninghamii* |
| | *Litsea glutinosa* |
| Leeaceae | *Leea indica* |
| | *Leea rubra* |

| Flowering Plants | |
|---|---|
| Family | Species |
| Lentibulariaceae | *Utricularia caerulea* |
| | *Utricularia chrysantha* |
| | *Utricularia circumvoluta* |
| | *Utricularia fulva* |
| | *Utricularia gibba* |
| | *Utricularia kimberleyensis* * |
| | *Utricularia lasiocaulis* |
| | *Utricularia limosa* |
| | *Utricularia odorata* |
| | *Utricularia uliginosa* |
| Linderniaceae | *Lindernia aplectra* * |
| | *Lindernia lobelioides* * |
| | *Lindernia plantaginea* |
| | *Lindernia scapigera* |
| | *Microcarpaea minima* |

| Flowering Plants | |
|---|---|
| Family | Species |
| Loganiaceae | *Mitrasacme connata* * |
| | *Mitrasacme exserta* * |
| | *Mitrasacme gentianea* * |
| | *Mitrasacme multicaulis* * |
| | *Mitrasacme nidulifera* |
| | *Mitrasacme nudicaulis* var. *nudicaulis* * |
| | *Mitrasacme nummularia* |
| | *Mitrasacme scrithicola* |
| | *Mitrasacme subvolubilis* * |
| | *Mitreola petiolata* |
| | *Strychnos lucida* |
| Loranthaceae | *Amyema sanguinea* |
| | *Decaisnina signata* subsp. *cardiophylla* * |
| | *Dendrophthoe glabrescens* |
| Lythraceae | *Ammannia baccifera* |
| | *Ammannia multiflora* |
| | *Nesaea muelleri* * |
| | *Rotala mexicana* |

Vine thicket on limestone, I. Cowie © Copyright, Department of Land Resource Management

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| Flowering Plants | |
|---|---|
| Family | Species |
| Malvaceae | *Abelmoschus moschatus* subsp. *tuberosus* * |
| | *Abutilon hannii* subsp. *erect* (J.Russell-Smith 7032) |
| | *Abutilon indicum* var. *australiense* |
| | *Abutilon* sp. Mataranka (R.M.Barker 877) * |
| | *Adansonia gregorii* |
| | *Brachychiton megaphyllus* * |
| | ***Brachychiton* n. sp. Fish River (I.D.Cowie 13260) Cowie** * |
| | *Brachychiton* sp. Wangi (S.E.Pickering 20) * |
| | *Corchorus aestuans* |
| | *Corchorus fascicularis* |
| | *Gossypium australe* |
| | *Grewia breviflora* |
| | *Grewia retusifolia* * |
| | *Helicteres integrifolia* subsp. *dentata* * |
| | *Hibiscus bacalusius* |
| | *Hibiscus lobatus* |
| | *Hibiscus meraukensis* |
| | *Hibiscus multilobatus* * |
| | *Hibiscus sabdariffa* ^ |
| | *Malvastrum americanum* ^ |
| | *Melhania oblongifolia* |
| | *Melochia corchorifolia* * |
| | *Melochia pyramidata* * |
| | *Sida acuta* ^ * |
| | *Sida cordifolia* ^ |
| | *Sida spinosa* * |
| | *Sterculia holtzei* |
| | *Sterculia quadrifida* |
| | *Thespesia thespesioides* * |
| | *Triumfetta albida* * |
| | *Triumfetta micracantha* |
| | *Triumfetta pentandra* ^ * |
| | *Triumfetta rhomboidea* ^ * |
| | *Urena lobata* * |
| | *Waltheria indica* |
| Melastomataceae | *Melastoma affine* |
| | *Memecylon pauciflorum* |
| | *Osbeckia australiana* |

| Flowering Plants | |
|---|---|
| Family | Species |
| Meliaceae | *Owenia vernicosa* |
| Menispermaceae | *Pachygone ovata* |
| | *Tinospora smilacina* |
| Menyanthaceae | *Nymphoides aurantiaca* |
| | *Nymphoides crenata* |
| | *Nymphoides indica* * |
| | *Nymphoides minima* |
| | *Nymphoides parvifolia* |
| | *Nymphoides quadriloba* |
| Molluginaceae | *Glinus oppositifolius* |
| Moraceae | *Ficus aculeata* var. *aculeata* * |
| | *Ficus brachypoda* * |
| | *Ficus cerasicarpa* * |
| | *Ficus congesta* * |
| | *Ficus coronulata* * |
| | *Ficus virens* |
| | *Ficus virens* var. *virens* |
| Myristicaceae | *Myristica insipida* var. *insipida* |
| Myrtaceae | *Asteromyrtus symphyocarpa* * |
| | *Calytrix achaeta* |
| | *Calytrix exstipulata* |
| | *Corymbia abbreviata* * |
| | *Corymbia bella* |
| | *Corymbia bleeseri* |
| | *Corymbia chartacea* |
| | *Corymbia confertiflora* |
| | *Corymbia dichromophloia* |
| | *Corymbia dunlopiana* |
| | *Corymbia ferruginea* |
| | *Corymbia ferruginea* subsp. *ferruginea* * |
| | *Corymbia foelscheana* |
| | *Corymbia grandifolia* |
| | *Corymbia jacobsiana* * |
| | *Corymbia kombolgiensis* |
| | *Corymbia latifolia* |
| | *Corymbia polycarpa* |
| | *Corymbia polysciada* |
| | *Corymbia ptychocarpa* |
| | *Corymbia ptychocarpa* subsp. *ptychocarpa* |
| | *Corymbia* sp. aff. *chartacea* |

| Flowering Plants | |
|---|---|
| Family | Species |
| Myrtaceae | *Corymbia terminalis* * |
| | *Eucalyptus alba* var. *australasica* |
| | *Eucalyptus apodophylla* subsp. *apodophylla* |
| | *Eucalyptus bigalerita* |
| | *Eucalyptus brachyandra* |
| | *Eucalyptus camaldulensis* |
| | *Eucalyptus camaldulensis* subsp. *obtusa* |
| | *Eucalyptus microtheca* |
| | *Eucalyptus miniata* |
| | *Eucalyptus oligantha* |
| | *Eucalyptus patellaris* |
| | *Eucalyptus phoenicea* |
| | *Eucalyptus tectifica* |
| | *Eucalyptus tetrodonta* |
| | *Eucalyptus tintinnans* |
| | *Lithomyrtus retusa* * |
| | *Lophostemon grandiflorus* |
| | *Lophostemon lactifluus* |
| | *Melaleuca argentea* * |
| | *Melaleuca dealbata* |
| | *Melaleuca leucadendra* |
| | *Melaleuca minutifolia* * |
| | *Melaleuca nervosa* |
| | *Melaleuca sericea* * |
| | *Melaleuca viridiflora* |
| | *Syzygium angophoroides* |
| | *Syzygium eucalyptoides* |
| | *Syzygium eucalyptoides* subsp. *bleeseri* |
| | *Syzygium minutuliflorum* |
| | *Syzygium nervosum* |
| | *Verticordia cunninghamii* |
| | *Xanthostemon eucalyptoides* |
| | *Xanthostemon paradoxus* |

| Flowering Plants | |
|---|---|
| Family | Species |
| Nyctaginaceae | *Boerhavia gardneri* |
| | *Boerhavia paludosa* |
| Nymphaeaceae | *Nymphaea violacea* |
| Oleaceae | *Jasminum molle* * |
| Onagraceae | *Ludwigia hyssopifolia* * |
| | *Ludwigia octovalvis* |
| | *Ludwigia perennis* |
| Opiliaceae | *Opilia amentacea* |
| Orchidaceae | *Cymbidium canaliculatum* |
| | *Dendrobium dicuphum* |
| | *Nervilia aragoana* |
| Orobanchaceae | *Buchnera linearis* |
| | *Buchnera ramosissima* * |
| | *Centranthera cochinchinensis* |
| Passifloraceae | *Adenia heterophylla* subsp. *australis* * |
| Phyllanthaceae | *Antidesma ghaesembilla* |
| | *Breynia cernua* |
| | *Bridelia tomentosa* |
| | *Glochidion apodogynum* |
| | *Glochidion sumatranum* |
| | *Glochidion xerocarpum* |
| | *Notoleptopus decaisnei* * |
| | *Phyllanthus amarus* |
| | *Phyllanthus arnhemicus* * |
| | *Phyllanthus carpentariae* * |
| | *Phyllanthus eutaxioides* * |
| | *Phyllanthus lacerosus* * |
| | *Phyllanthus maderaspatensis* * |
| | *Phyllanthus minutiflorus* * |
| | *Phyllanthus reticulatus* |
| | *Phyllanthus virgatus* * |
| Picrodendraceae | *Petalostigma banksii* * |
| | *Petalostigma pubescens* |
| | *Petalostigma quadriloculare* * |
| Pittosporaceae | *Pittosporum ferrugineum* subsp. *ferrugineum* * |

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|---|---|
| Family | Species |
| Plantaginaceae | *Adenosma muelleri* |
| | *Bacopa floribunda* * |
| | *Dopatrium junceum* |
| | *Limnophila brownii* * |
| | *Limnophila chinensis* |
| | *Limnophila fragrans* |
| | *Scoparia dulcis* ^ * |
| | *Stemodia lythrifolia* |
| | *Stemodia viscosa* |
| Plumbaginaceae | *Plumbago zeylanica* |
| Poaceae | *Andropogon gayanus* ^ * |
| | *Aristida holathera* var. *holathera* * |
| | *Aristida inaequiglumis* * |
| | *Arundinella nepalensis* |
| | *Bambusa arnhemica* * |
| | *Bothriochloa bladhii* |
| | *Brachyachne convergens* * |
| | *Capillipedium parviflorum* * |
| | *Cenchrus elymoides* |
| | *Cenchrus pedicellatus* subsp. *pedicellatus* ^ * |
| | *Chloris lobata* * |
| | *Chrysopogon latifolius* |
| | *Cymbopogon bombycinus* * |
| | *Cymbopogon procerus* |
| | *Cynodon dactylon* |
| | *Cynodon radiatus* ^ * |
| | *Dichanthium fecundum* * |
| | *Dichanthium sericeum* subsp. *humilius* * |
| | *Dichanthium sericeum* subsp. *polystachyum* * |
| | *Digitaria ciliaris* ^ * |
| | *Digitaria gibbosa* |
| | *Digitaria stenostachya* |
| | *Dimeria ornithopoda* * |
| | *Ectrosia agrostoides* * |
| | *Ectrosia leporina* * |
| | *Ectrosia schultzii* var. *schultzii* * |
| | *Enteropogon dolichostachyus* * |

| Flowering Plants | |
|---|---|
| Family | Species |
| Poaceae | *Eragrostis cumingii* * |
| | *Eragrostis fallax* |
| | *Eragrostis schultzii* |
| | *Eragrostis spartinoides* * |
| | *Eragrostis stagnalis* * |
| | *Eragrostis tenellula* * |
| | *Eriachne avenacea* |
| | *Eriachne ciliata* * |
| | *Eriachne festucacea* |
| | *Eriachne filiformis* * |
| | *Eriachne minuta* * |
| | *Eriachne schultziana* |
| | *Eriachne sulcata* * |
| | *Eriachne triseta* |
| | *Eulalia annua* * |
| | *Eulalia aurea* |
| | *Eulalia mackinlayi* |
| | *Germainia grandiflora* |
| | *Germainia truncatiglumis* |
| | *Heterachne abortiva* * |
| | *Heteropogon contortus* |
| | *Isachne confusa* |
| | *Ischaemum decumbens* * |
| | *Ischaemum tropicum* * |
| | *Iseilema fragile* * |
| | *Leptochloa neesii* |
| | *Mnesithea rottboellioides* |
| | *Ophiuros exaltatus* * |
| | *Panicum mindanaense* * |
| | *Panicum trichoides* |
| | *Paspalum scrobiculatum* * |
| | *Perotis rara* * |
| | Poaceae sp. |
| | *Pseudopogonatherum contortum* |
| | *Pseudopogonatherum irritans* |
| | *Sacciolepis indica* |
| | *Sacciolepis myosuroides* |
| | *Schizachyrium crinizonatum* * |
| | *Schizachyrium pachyarthron* |
| | *Schizachyrium pseudeulalia* * |

| Flowering Plants | |
|---|---|
| Family | Species |
| Poaceae | *Sehima nervosum* * |
| | *Setaria apiculata* * |
| | *Setaria oplismenoides* |
| | *Sorghum laxiflorum* * |
| | *Sorghum plumosum* |
| | *Sorghum stipoideum* * |
| | *Thaumastochloa major* * |
| | *Themeda arguens* * |
| | *Themeda triandra* * |
| | *Triodia bitextura* |
| | *Triodia bynoei* |
| | *Triodia microstachya* |
| | *Urochloa polyphylla* * |
| | *Whiteochloa airoides* * |
| | *Whiteochloa semitonsa* * |
| | *Yakirra majuscula* * |
| | *Yakirra pauciflora* |
| Podostemaceae | *Podostemaceae* sp. * |
| Polygalaceae | *Polygala barbata* * |
| | *Polygala bifoliata* |
| | *Polygala integra* * |
| | *Polygala petrophila* var. *petrophila* * |
| | *Polygala pterocarpa* * |
| | *Polygala succulenta* var. *congesta* * |
| Polygonaceae | *Persicaria attenuata* subsp. *attenuata* * |
| | *Persicaria barbata* * |
| Portulacaceae | *Calandrinia uniflora* |
| Primulaceae | *Embelia curvinervia* |
| Proteaceae | *Banksia dentata* |
| | *Grevillea benthamiana* |
| | *Grevillea decurrens* |
| | *Grevillea dryandri* subsp. *dryandri* * |
| | *Grevillea pluricaulis* |
| | *Grevillea pteridifolia* |

| Flowering Plants | |
|---|---|
| Family | Species |
| Proteaceae | *Grevillea refracta* |
| | *Hakea arborescens* |
| | *Hakea lorea* subsp. *borealis* |
| | *Helicia australasica* |
| | *Persoonia falcata* |
| | *Stenocarpus acacioides* |
| Rhamnaceae | *Alphitonia excelsa* * |
| | *Ziziphus oenopolia* |
| Rhizophoraceae | Carallia brachiata |
| Rubiaceae | *Aidia racemosa* * |
| | *Dentella dioeca* * |
| | *Gardenia resinosa* subsp. *resinosa* |
| | *Ixora timorensis* * |
| | *Psydrax attenuata* f. *myrmecophila* * |
| | *Spermacoce auriculata* |
| | *Spermacoce breviflora* * |
| | *Spermacoce calliantha* * |
| | *Spermacoce constricta* * |
| | *Spermacoce dolichosperma* * |
| | *Spermacoce erythrosepala* * |
| | *Spermacoce leptoloba* * |
| | *Spermacoce stenophylla* * |
| | *Timonius timon* |
| Rutaceae | *Boronia lanceolata* * |
| | *Glycosmis trifoliata* |
| | *Melicope elleryana* |
| | *Micromelum minutum* |
| | *Zanthoxylum parviflorum* * |
| Salicaceae | *Flacourtia territorialis* |
| Santalaceae | *Exocarpos latifolius* * |
| | *Santalum lanceolatum* * |
| Sapindaceae | *Allophylus cobbe* |
| | *Cupaniopsis anacardioides* |
| | *Dodonaea hispidula* |
| | *Dodonaea platyptera* |

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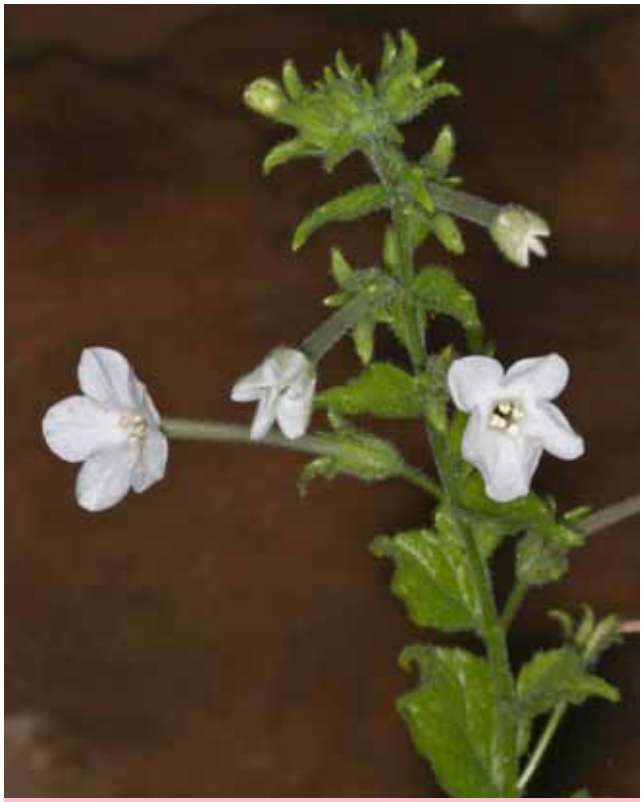
|---|---|
| Family | Species |
| Smilacaceae | *Smilax australis* |
| Solanaceae | *Nicotiana monoschizocarpa* |
| | *Physalis angulata* |
| | *Solanum lucani* |
| Stylidiaceae | *Stylidium aquaticum* * |
| | *Stylidium ceratophorum* |
| | *Stylidium lobuliflorum* |
| | *Stylidium muscicola* |
| | *Stylidium pachyrrhizum* |
| | *Stylidium schizanthum* * |
| | *Stylidium semipartitum* |
| | *Stylidium turbinatum* |
| Taccaceae | *Tacca leontopetaloides* |
| Thymelaeaceae | *Thecanthes concreta* |
| | *Thecanthes punicea* |
| Typhaceae | *Typha domingensis* * |
| Urticaceae | *Pouzolzia zeylanica* |
| Verbenaceae | *Phyla nodiflora* * |
| Violaceae | *Hybanthus enneaspermus* * |
| Vitaceae | *Ampelocissus frutescens* * |
| | *Cissus reniformis* * |
| Xyridaceae | *Xyris cheumatophila* |
| | *Xyris complanata* |
| | *Xyris oligantha* |
| Zygophyllaceae | *Tribulopis pentandra* * |

| Conifers | |
|---|---|
| Family | Species |
| Cupressaceae | *Callitris intratropica* |

| Cycads | |
|---|---|
| Family | Species |
| Cycadaceae | *Cycas armstrongii* ~ |
| | *Cycas calcicola* |
| | *Cycas canalis* |
| | *Cycas maconochiei* |



***Nicotiana monoschizocarpa*** **is known only from the Daly River and Reynolds River region in north-western Northern Territory, I. Cowie © Copyright, Department of Land Resource Management**

| Ferns | |
|---|---|
| Family | Species |
| Blechnaceae | *Blechnum orientale* * |
| Pteridaceae | *Ceratopteris thalictroides* * |
| | *Cheilanthes brownii* * |
| | *Cheilanthes nitida* * |
| | *Cheilanthes tenuifolia* |

| Liverworts | |
|---|---|
| Family | Species |
| Fossombroniaceae | *Fossombronia* cf. papillata * |
| Ricciaceae | *Riccia* cf. *gangetica* * |
| | *Riccia* cf. *inflexa* * |
| | *Riccia* cf. *limbata* * |
| | *Riccia* cf. *sorocarpa* * |
| | *Riccia lamellosa* * |
| | *Riccia multifida* * |
| | *Riccia* sp. * |

| Hornworts | |
|---|---|
| Family | Species |
| Notothyladaceae | *Notothylas javanica* * |

| Mosses | |
|---|---|
| Family | Species |
| Archidiaceae | *Archidium birmanicum* * |
| Bryaceae | *Gemmabryum exile* * |
| Calymperaceae | *Octoblepharum albidum* * |
| | *Syrrhopodon trachyphyllus* * |
| Erpodiaceae | *Erpodium coronatum* var. *australiense* * |
| Fissidentaceae | *Fissidens linearis* var. *linearis* * |
| | *Fissidens serratus* * |
| | *Fissidens victorialis* * |
| Hypnaceae | *Isopterygium minutirameum* var. *minutirameum* * |
| Meesiaceae | *Leptobryum pyriforme* * |
| Pottiaceae | *Hyophila involuta* * |
| Pterigynandraceae | *Trachyphyllum inflexum* * |
| Pylaisiadelphaceae | *Taxithelium planum* * |

**Five species of fungi, including this *Hygrocybe* sp., were incidental observations made during the survey, C. Cargill © Copyright, Department of the Environment**

***Erpodium coronatum* var. *australiense* is one of the few epiphytic bryophytes found on Fish River Station, C. Symonds © Copyright, University of New South Wales**

| Green Algae | |
|---|---|
| Family | Species |
| Characeae | *Chara* sp. * |
| | *Nitella* sp. * |
| Trentepohliaceae | *Trentepohlia* sp. * |

| Fungi | |
|---|---|
| Family | Species |
| Coprinaceae | *Coprinus* sp. * |
| Hygrophoraceae | *Hygrocybe* sp. * |
| Hymenochaetaceae | *Phellinus* sp. * |
| Lentinaceae | *Panus fasciatus* * |
| Phanerochaetaceae | *Hjortstamia crassa* * |

Key

* = New record for this reserve

^ = Exotic/Pest

\# = EPBC listed

~ = TSP listed

Colour coding for entries:

Black = Previously recorded on the reserve and found on this survey

**Brown = Putative new species**

Blue = Previously recorded on the reserve but not found on this survey

# Appendix B: Threatened Species

Nomenclature and taxonomy used in this appendix are consistent with that from the Australian Faunal Directory (AFD), the Australian Plant Name Index (APNI) and the Australian Plant Census (APC).

Current at September 2013

# Fauna

Freshwater sawfish (*Pristis pristis*) have been recorded in recent surveys on Fish River Station © Copyright, D. Wilson

| Mammals | | | |
|---|---|---|---|
| Family | Species | Common name | Status |
| Dasyuridae | *Dasyurus hallucatus* | Northern Quoll | EPBC — Endangered; TPWC — Critically Endangered |
| Muridae | *Mesembriomys gouldii* | Black-footed Tree-rat | TPWC — Vulnerable |
| | *Rattus tunneyi* | Pale Field-rat | TPWC — Vulnerable |

| Reptiles | | | |
|---|---|---|---|
| Family | Species | Common name | Status |
| Varanidae | *Varanus mertensi* * | Mertens' Water Monitor | TPWC — Vulnerable |

| Fish | | | |
|---|---|---|---|
| Family | Species | Common name | Status |
| Pristidae | *Pristis pristis* | Freshwater Sawfish | EPBC — Vulnerable; NTFA — Vulnerable |

# Flora

| Cycads | | | |
|---|---|---|---|
| Family | Species | Common name | Status |
| Cycadaceae | *Cycas armstrongii* | Zamia Palm | TPWC — Vulnerable |

EPBC = Refers to the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
TPWC = Refers to the *Territory Parks and Wildlife Conservation Act 2000* (Northern Territory)
Blue = Previously recorded on the reserve but not found on this survey
* = New record for this reserve

# Appendix C: Exotic and Pest Species

Nomenclature and taxonomy used in this appendix are consistent with that from the Australian Faunal Directory (AFD), the Australian Plant Name Index (APNI) and the Australian Plant Census (APC).

Current at September 2013

# Fauna

## Vertebrates

| Mammals | | |
|---|---|---|
| Family | Species | Common name |
| Bovidae | *Bos taurus* | European Cattle |
| | *Bubalus bubalis* | Water Buffalo, Swamp Buffalo |
| Equidae | *Equus asinus* | Donkey |
| | *Equus caballus* | Horse, Brumby |
| Felidae | *Felis catus* | Cat |
| Suidae | *Sus scrofa* | Pig |

Blue = Previously recorded on the reserve but not found on this survey

| Frogs and Toads | | |
|---|---|---|
| Family | Species | Common name |
| Bufonidae | *Rhinella marina* | Cane Toad |

Cane Toads (*Rhinella marina*) were common throughout Fish River Station © Copyright, R. Whyte

# Invertebrates

| Beetles | | |
|---|---|---|
| Family | Species | Common name |
| Scarabaeidae | *Digitonthophagus gazella* * | Gazella Dung Beetle |
| | *Onitis alexis* * | Bronze Dung Beetle |
| | *Onthophagus sagittarius* * | Sri Lankan Dung Beetle |

| True Bugs | | |
|---|---|---|
| Family | Species | Common name |
| Alydidae | *Melanacanthus scutellaris* * | Brown Bean Bug, Podsucking Bug |
| Colobathristidae | *Phaenacantha australiae* * | Linear Bug |
| Coreidae | *Mictis profana* * | Crusader Bug |
| Lygaeidae | *Graptostethus servus* * | Seed Eating Bug |
| | *Nysius vinitor* * | Rutherglen Bug |
| Miridae | *Creontiades dilutus* * | Green Mirid |
| Oxycarenidae | *Oxycarenus arctatus* * | Coon Bug |
| Pentatomidae | *Nezara viridula* * | Green Vegetable Bug |
| | *Piezodorus oceanicus* * | Redbanded Shield Bug |
| | *Plautia affinis* * | Green Stink Bug |
| Rhyparochromidae | *Remaudiereana nigriceps* * | Swan Plant Seed Bug |
| Tingidae | *Aconchus urbanus* * | Lace Bug |

| Spiders | | |
|---|---|---|
| Family | Species | Common name |
| Theridiidae | *Latrodectus hasseltii* * | Redback Spider |

* = New record for this reserve

# Flora

Coffee Senna (*Senna occidentalis*) is a gazetted weed that was recorded on Fish River Station © Copyright, C. Wilson

| Flowering Plants | | |
|---|---|---|
| Family | Species | Common name |
| Asteraceae | *Ageratum conyzoides* | Nightshade |
| | *Bidens pilosa* * | Cobbler's Pegs |
| | *Xanthium strumarium* | Noogoora Burr |
| Convolvulaceae | *Merremia aegyptia* * | Hairy Morning Glory |
| Fabaceae | *Alysicarpus ovalifolius* * | Oval-leafed Alysicarpus |
| | *Crotalaria goreensis* * | Gambia Pea |
| | *Crotalaria juncea* * | Sunhemp |
| | *Macroptilium lathyroides* var. *semierectum* * | Wild Bushbean |
| | *Senna obtusifolia* * | Arsenic Weed |
| | *Senna occidentalis* | Coffee Senna |
| Lamiaceae | *Hyptis suaveolens* * | Hyptis |
| Malvaceae | *Hibiscus sabdariffa* | Rosella |
| | *Malvastrum americanum* | Spiked Malvastrum |
| | *Sida acuta* * | Spinyhead Sida |
| | *Sida cordifolia* | Flannel Weed |
| | *Triumfetta pentandra* * | Fivestamen Burrbark |
| | *Triumfetta rhomboidea* * | Chinese Burr |
| Plantaginaceae | *Scoparia dulcis* * | Scoparia |
| Poaceae | *Andropogon gayanus* * | Gamba Grass |
| | *Cenchrus pedicellatus* subsp. *pedicellatus* * | Annual Mission Grass |
| | *Cynodon radiatus* * | Giant Couch Grass |
| | *Digitaria ciliaris* * | Summer Grass |

* = New record for this reserve

Blue = Previously recorded on the reserve but not found on this survey

# Glossary

## C

### Cryptic species (Cryptospecies)

Species that are physically similar but reproductively isolated from each other.

### Cryptogams

A plant that reproduces by spores, without flowers or seeds. Includes bryophytes (hornworts, liverworts, mosses), lichens, fungi, slime moulds and algae.

## D

### Diurnal

Active during the day.

## H

### Hill-topping

The congregation of butterflies and other insects at the top of hills and ridges to facilitate mate location.

## M

### Macrofungi

Fungi that produce large fruiting bodies, i.e. those visible to the naked eye and generally one centimetre or more in width or height.

## P

### 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.

## T

### 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.

## U

### Undescribed taxon

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

The spectacular Daly River forms the northern boundary of Fish River Station, M. Braby © Copyright, Department of Land Resource Management

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**FRONT COVER** Two species of true bug inspect each other: *Pachygrontha* sp. (left) and an unidentified shield bug (Pentatomidae) larva (right) © Copyright, R. Whyte

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BushBlitz
SPECIES DISCOVERY PROGRAM

Bush Blitz survey report

# Fish River Station Northern Territory + 23 April–3 May 2012

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