



# Discovering Walpole's spineless wonders

the Nuyts Wilderness Invertebrates Fire Research Project



People from around the world—and from all walks of life—have united in a mission to find out more about the special invertebrates of Western Australia's Walpole forests, many of which have an ancient lineage, and about their capacity to survive fire.



Volunteers participating in the project have undertaken tasks as diverse as making traps, running the length of the Bibbulmun Track to raise money, educating children, poring over microscopes and designing a website.

by Gary Muir, Garth Wilson, Jacquie Manning and Paul Van Heurck



The Walpole-Nornalup National Park contains large areas of old-growth karri, jarrah and tingle forest. These cool, moist forests are Western Australia's closest remaining link to the cool temperate rainforests that once covered most of the ancient Gondwanan supercontinent.

Today, about 75 per cent of the invertebrate species found in the forests of the Walpole-Nornalup area have Gondwanan affinities. Most species of snails, earthworms, velvet worms, trapdoor and other spiders, millipedes, slaters and freshwater crayfish that occur in these forests are found nowhere else in the world and are confined to a relatively small area ('short-range endemics'), and some of them are threatened. Little is known about the ability of these short-range endemic species and their litter communities to survive fires. Nor is much known about the long-term effects of fire on the species composition of the litter invertebrate communities.

### In the beginning

On 21 July 2001, Department of Conservation and Land Management (CALM) technical officer Paul Van Heurck gave a talk to the Walpole Nornalup National Parks Association at Tingledale Hall near the Valley of the Giants. He shared his findings on how the diversity of invertebrates in WA's



red tingle (*Eucalyptus jacksonii*) and karri (*Eucalyptus diversicolor*) forests varied according to the amount of time that had elapsed since the last fire.

Gary Muir, of WOW Wilderness EcoCruises, naturalist Ted Middleton, zoologist Dave Birk and Todd Ladanchuk, who had studied biology, attended the function just over four months after a hot wildfire caused by lightning had burnt through the Nuyts Wilderness Area near Walpole. Ted had volunteered his time to assess the fire's impact on plants and mammals, especially possums and quokkas. Much of this area was similar to Paul's study area of tingle and karri. That night—following Paul's enthusiastic presentation—they discussed how invertebrates could have survived the Nuyts fire. Paul had said that terrestrial invertebrates would often survive on the leese of logs, or buried underground, so they could continue to exist in areas that were not intensely burnt, or could recolonise intensely burnt areas after the fire. However,



nearly all of the area in the Nuyts fire was intensely burnt. There was little protection on any side of the logs and nearly all available forest fuel seemed to have been consumed, leaving almost nowhere to hide! How could invertebrate diversity survive such a fire? These queries led them to discuss the issue with Paul and to insist that he come and see the area himself.

### Community power

After visiting the area by boat the next morning, Paul recognised the issues being raised and indicated that it was an important area to monitor invertebrate survival and recolonisation following this intense wildfire. Hence, the Nuyts Wilderness Invertebrate Fire Research Project began. With Paul's guidance, training and enthusiasm the project was built from the ground up, involving interested community members and groups such as the Walpole Nornalup National Parks Association. The project was designed



Previous page

**Main** Belid weevil (*Belus suturalis*).

Photo – Jiri Lochman

**Insets** A velvet worm, a rare member of the insect group Onychophora.

Photo – Gary Muir

Nuyts Wilderness one year after the fire.

Photo – Garth Wilson

**Above (top)** Unnamed species in the Belidae and **(bottom)** Curculionidae insect families.

Photos – Colin Steele and Dallas Parkes

**Left** Lost Beach, Walpole-Nornalup National Park.

Photo – Jiri Lochman



to establish a comprehensive collection of local invertebrate species and to determine the tolerance to fire of each species. In the long term, it is hoped that the research will lead to improved fire management of Walpole's old-growth forest areas, aimed at conserving the full range of invertebrate diversity.

The project needed funding, so a partnership between the Nuyts Wilderness Research and Management Community Trust Fund and the Walpole Nornalup National Parks Association was established. Garth Wilson and Geoff Fernie of the park's association successfully applied for a major project grant from Lotterywest. In addition, Gary Muir ran the entire length of the Bibbulmun Track in 17 days to raise money, and also put a small percentage of every ticket purchased from WOW Wilderness EcoCruises into the fund.

### Around the traps

Even with funding, how could a project with limited people and technical resources, based in an isolated place like the Nuyts Wilderness Area, undertake a study to understand and research the diversity of invertebrates—a group of fauna containing 98 per cent of the world's animal species? To undertake the project, we needed to regularly trap a range of invertebrates in varying ecosystems of varying fire ages. Sites burnt in the Nuyts wildfire were matched with sites with similar vegetation and landforms but different burning histories, so that the diversity of invertebrates from similar areas could be compared. After much planning and consultation, it was



decided to set nearly 140 traps over a variety of sites every six months.

Ted spent two weeks with environmental biologist Nick Jones searching out possible sites for traps. Sixteen sites were chosen. Each site required 16 traps, nine centimetres in diameter and one-third filled with ethylene glycol, that were to be opened for 10 days at a time. Eight of these traps were to be dug into the forest floor and the other eight attached to a nearby log or dug inside a hollow tree butt. Volunteers started making up the traps. Teams of community volunteers and CALM personnel then headed into the wilderness to set the first traps. Collecting started in December 2001.

### Teaching classes

Paul indicated that the project could potentially collect more than 10,000 specimens in a few years. We would need to classify them, so as to

**Above left (top)** Longicorn beetle (*Hesthesis* sp.) and **(bottom)** ground beetle (*Scaraphites* sp.).  
*Photos – Paul Van Heurck*

**Top** CALM researcher Paul Van Heurck.

**Above** Jason Fletcher and Ted Middleton collect invertebrates from traps in the Nuyts Wilderness Area.  
*Photos – Gary Muir*

see and understand changes in biodiversity. Fortunately, Jacquie Manning, a former entomology technical officer at the Agriculture Research Centre in Manjimup, became involved in the next phase of the project, teaching local volunteers how to sort the specimens. Paul set up a couple of microscopes and they all packed into the kitchen of CALM's volunteer house. Exuding enthusiasm for the project and all the wonderful undescribed invertebrates they would





task and requires attention to detail. There are now about 6700 specimens and the collection is growing by the day.

### Putting a name to a bug

Despite these superb efforts, the process of naming specimens requires expert independent verification. After sorting the 2002 and 2003 collections, duplicate samples of 940 beetle specimens were identified to 310 'morphospecies' by Dulana Herath, a postgraduate student at Curtin University of Technology. These beetle 'morphospecies' were validated as true species by Andras Szito, a beetle taxonomist from the WA Agriculture Department. Jacquie and the volunteers then had to go back to the original beetle collections and assign them to a morphospecies. This process was at first hampered by the difficulty of having to compare the sample in question with 310 other specimens. However, with digital photography of the beetles nearing completion the whole page of thumbnails can now be viewed at once, and the process has become much easier. It is now easier to narrow the choice down to two or three beetles, which can then be



collect, Paul demonstrated the method he used for recording and classifying, then the volunteers all had a go.

At that stage, it was hard to key invertebrates past their order level using basic taxonomic keys in *Worms to Wasps* and CSIRO's *Insects of Australia*, as they were not written for the layperson. However, the team persisted and still meets one day each week to wade through the specimens. When funding became available through Lotterywest, Jacquie was employed for three days each week to curate the Nuyts Collection, with the help of volunteers Jeanne and Colin Steele.

As each field collection comes into the laboratory, each pit jar is sorted and every invertebrate is given a unique specimen number. Each jar averages about 30 specimens. The day-to-day recording of the collection is a major



**Top left** Year 7 students from Waipole Primary School sorting invertebrates.  
Photo – Gary Muir

**Above** The students' invertebrate research project.  
Photo – Paul Van Heurck

**Centre left (from top)** A jewel beetle, the Nuyts lucanid and a hairy scarab.  
Photos – Jane McRae

**Left** Leafy grasshopper.  
Photo – Gary Muir

looked at physically under the microscope and a decision made. This is relatively easy for beetles, which don't have noticeable differences between sexes, except maybe size.

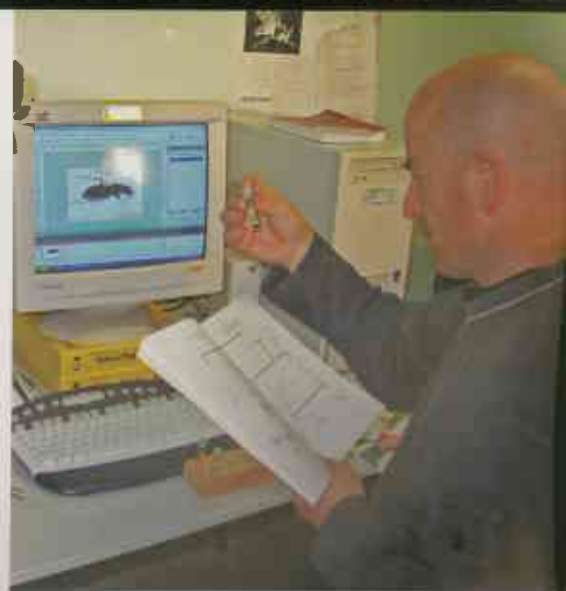
Ants, on the other hand, have a range of classes that can look different and exhibit polymorphism—having worker classes with multiple forms. Spiders also have different sizes and colouration according to sexes and habitat. These groups are also being validated by local taxonomists from the WA Museum and Curtin University of Technology, funded by the Lotterywest grant. It is hoped that various experts from around the world will help to identify other families from the collection, so we can further refine the sorting, and allow finer-scale analysis of the ecosystems from which they were collected.

The last formal collection for this project was made in April 2005, and the initial sort will soon be finished. Until now, the actual physical sorting has taken a lot of time, so there has been limited time to digest the information and explore invertebrates and their biology. It will be some time before this work will be completed to the level necessary to start analysing thoroughly, but we are getting there!

### The web

An important feature of the Lotterywest grant conditions was to make the knowledge gained accessible to the public and specialists. How could we make it easier for experts from all over the world to classify the invertebrates so we could get accurate results to analyse? How could we inform the various interest groups, community members and land managers of our progress? How could we show our results to those who supported and sponsored us? We needed a way to communicate information that was accessible to a range of individuals, groups, communities and organisations.

We decided to develop an accessible website that could be used both as a research tool and as a means of communicating with a range of people. To do this, we requested the skills of Austrian web designer Lukas Rimhofer, now studying environmental biology in Innsbruck. Lukas had fallen in love with Walpole's wilderness after



travelling around Australia in 2001. He had arrived just after the fire, and had volunteered to help survey possums in the Nuyts Wilderness to establish how many had survived the fire.

The website caters for a range of people—including access for children, so they could be involved in the future. With potential taxonomist volunteers in mind, a community-run EcoEducation program based on invertebrates, with its very own trapping area, was integrated into the curriculum of the local Walpole Primary School.

The website also needed to allow a range of people to administer, update, edit and contribute to the site's content, so a curator at the WA Museum could view the bug specimens at the same time volunteer Colin Steele was updating beetle photos taken through the digital microscope sponsored by Lotterywest, hooked up to the computer sponsored by the Trust Fund. Paul could be correcting field details and CALM's District Fire Officer could update fire ages on the site. All from their own offices! It has endless possibilities—and this is just the beginning!

### Achievements

The project has been successful because the community, from the

**Above left** Jacquie Manning examining specimens.

*Photo – Paul Van Heurck*

**Above** Gary Muir in the insectary.

*Photo – Jacquie Manning*

beginning, has had ownership of a project that will enable them to understand more, and ultimately help to make decisions in managing special areas to maintain their future biodiversity.

The project has produced long-term benefits by building community stewardship of the local environment, amalgamating many interest groups around the world in a common cause and getting people to feel responsible for their surroundings through gaining new knowledge. It has also been instrumental in recognising Walpole's international significance, in building a model that will help other communities do similar projects, in developing new scientists for the future and in improving understanding and awareness of our world and our role within it. The volunteers have gained enjoyment from their contributions in many different ways, and have been able to share their experiences with others in a way that assists in the perpetuation of biodiversity.

Gary Muir operates WOW Wilderness EcoCruises. He can be contacted on (08) 9840 1036 or by email ([wow@denmarkwa.net.au](mailto:wow@denmarkwa.net.au)).

Garth Wilson is President of the Walpole Nornalup National Parks Association. He can be contacted on (08) 9840 9306 or by email ([eboracum@westnet.com.au](mailto:eboracum@westnet.com.au)).

Jacquie Manning is Curator of the Nuyts Collection and is based in Walpole. She can be contacted by email on ([manninggib@westnet.com.au](mailto:manninggib@westnet.com.au)).

Paul Van Heurck is a technical officer in CALM's Science Division. He is based at CALM's Kensington Research Centre and can be contacted on (08) 9334 0298 or by email ([paulv@calm.wa.gov.au](mailto:paulv@calm.wa.gov.au)).

The website for the project is at [www.walpolewilderness.com.au](http://www.walpolewilderness.com.au).



- 48 Bald Island getaway for Gilbert's potoroos  
A 'holiday' for two critically endangered potoroos provides new information for scientists hoping to improve the status of the species.
- 56 Discovering Walpole's spineless wonders  
Local community members unite with scientists in an inspiring research project at Walpole.

## Regulars

- 3 Contributors and Editor's letter
- 9 Bookmarks  
The best of the South West  
Gogo fish!  
Rica Erickson – A Naturalist's Life
- 18 Feature park  
D'Entrecasteaux National Park
- 20 Endangered  
Western ringtail possum
- 62 Urban antics  
Lice, mites, ticks and crosses.

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**Executive editor** Caris Bailey  
**Editors** Carolyn Thomson-Dans, Rhianna Mooney  
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**Scientific/technical advice** Kevin Kenneally, Paul Jones, Chris Simpson, Keith Morris  
**Design and production** Tiffany Taylor, Maria Duthie, Gooitzen van der Meer  
**Illustration** Gooitzen van der Meer  
**Cartography** Promaco Geodraft  
**Marketing** Estelle de San Miguel  
*Phone* (08) 9334 0296 *Fax* (08) 9334 0432  
**Subscription enquiries**  
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