CAUGHT on CAMERA

A community monitoring project in Wombat State Forest

VICTORIAN NATIONAL PARKS ASSOCIATION
Be part of nature

VICTORIAN NATIONAL PARKS ASSOCIATION

The Victorian National Parks Association (VNPA) helps to shape the agenda for creating and managing national parks, conservation reserves and other important natural areas across land and sea.

The VNPA works with all levels of government, the scientific community and the general community to achieve long term, best practice environmental outcomes.

The VNPA is also Victoria's largest bush walking club and provides a range of information, education and activity programs to encourage Victorians to get active for nature.

NATUREWATCH

The VNPA's NatureWatch program is a community-based biodiversity monitoring program which informs, educates and engages the community in conservation management and practices. The NatureWatch program actively builds links between community members, scientists and land managers, and develops scientifically based, practical projects that contribute to a better understanding of species and ecosystems, and the management of natural areas.

PROJECT PARTNERS

Wombat Forestcare

Wombat Forestcare is a community group dedicated to protecting and enhancing the natural ecosystems of the Wombat Forest and surrounding areas.

The Arthur Rylah Institute for Environmental Research (ARI)

ARI is the biodiversity research base for the Department of Sustainability and Environment (DSE) in Victoria and is a leading centre for applied ecological research.

ACKNOWLEDGMENTS

Ryan Chick (ARI) for designing and building bait stations. Jenny Nelson, Ryan Chick and Michael Scroggie (ARI) for developing training material. VNPA team leaders and volunteers for collecting the data and running trips. Wombat Forestcare. Fiona Hamilton, Kerryn McTaggert, Nicholas Bauer, Amber Connor, Department of Sustainability and Environment for project support and assistance in site selection. Phoebe Macak (ARI) provided helpful comments on this report.

Project supported by: Project funded by the Australian Governments Caring for our Country Community Action Grants.

CAUGHT on CAMERA

A monitoring project in the Wombat State Forest

Community monitoring of mammals in response to fire at Wombat State Forest, Victoria.

Prepared by Caitlin Griffith and John Kotsiaris, Victorian National Parks Association and Matt Bruce, Meredith Kirkham and Richard Loyn (Arthur Rylah Institute for Environmental Research).

CONTENTS

SUMMARY

The VNPA Caught on Camera project trial in Wombat State Forest involved working with local community groups and scientists to establish community based monitoring of fauna using motion sensing cameras.

The project addressed the question; 'What mammal species are located at 'Recently Burnt', 'Intermittently Burnt' and 'Long Unburnt' sites in Foothills Forest and Forby Forest in Wombat State Forest?

This has been established to contribute to the larger question, 'what is the impact of fire on mammals?'

The trial ran in 2012, with a view to carrying out annual monitoring over the long term (>10 years). One year of monitoring with this method could not possibly answer this question. However, this report outlines the results of the initial 1 year project trial.

Monitoring was carried out in two different forest types in Wombat State Forest, Forby Forest and Foothills Forest at sites categorised as 'Recently Burnt', 'Intermittently Burnt' and 'Long Unburnt'. A total of 10 native mammals and 4 exotic mammals were recorded.

10 native mammals:

- Short-beaked Echidna
- Agile Antechinus
- Koala
- Common Wombat
- Mountain Brushtail Possum
- Common Brushtail Possum

Mountain Brushtail Possums.

- Common Ringtail Possum
- Eastern Grey Kangaroo
- Black Wallaby
- Bush Rat

4 exotic mammals:

- Black Rat
- Red Fox
- Domestic Dog
- Feral Goat

After only one season of monitoring, no apparent trends have emerged, however monitoring has provided an improved understanding of the mammals inhabiting Wombat State Forest.

As the project continues to run long term, we hope to continue to address the project question.

Greater social outcomes

Caught on Camera has proven a very successful as a community building enterprise.

The VNPA was never short of volunteers and the images displayed on the VNPA's Facebook site have been a rich source of interest and delight to thousands of Victorians.

Moreover, the images were appropriated by artists, and in all the cultural aspects of the project have contributed to the wider community's awareness of, and enthusiasm for, the animals of Wombat.

1.0 INTRODUCTION

Caught on Camera project

The VNPA Caught on Camera project involves working with local community groups to establish long term monitoring by the community, using motion sensing cameras. In Wombat State Forest and Bunyip State Park, it involves looking at the impact of fire on fauna, however when developing the project in other locations, the project may look at variables other than fire such as revegetation efforts or vegetation type.

The Caught on Camera project objectives in Wombat State Forest and Bunyip State Park are:

- To provide crucial data on the long term impacts of control burning on Australian fauna to land managers, community groups, scientists and Government.
- To create working partnerships with Government, Researchers and Community Groups to establish and run monitoring.
- To demonstrate and promote to Government the need for ongoing, strategic and comprehensive monitoring in response to fire.

This project specifically asks the question:

'What mammal species are located at 'Recently Burnt', 'Intermittently Burnt' and 'Long Unburnt' sites in Foothills Forest and Forby Forest in Wombat State Forest?

This has been established to contribute to the larger question, 'what is the impact of fire on mammals?'

Project stages

Over March – June 2012 the VNPA's NatureWatch program ran a one-season trial of Caught on Camera, a citizen science project in Wombat State Forest in partnership with Wombat Forestcare, a local community group. This project has been established to run long term and following this project trial, the project will be set up to run annual fauna monitoring using motion sensing cameras.

This report

This report presents the results of the trial and recommendations for the development of ongoing monitoring.

1.1 Project background – fire ecology and monitoring

> *"Altered fire regimes threaten biodiversity and interact with other threats in complex ways that are not yet fully understood."* (Department of Environment, Water, Heritage and the Arts 2009)

In Australia, we have a limited understanding of the impacts of fire on our biodiversity (Clarke 2008 and MacHunter et al 2009). This is particularly the case when it comes to the impacts on fauna (Clarke 2008 and MacHunter et al 2009). Without effective, repeatable, ongoing monitoring there will continue to be limitations to how we understand the impacts of fire and how planned burning is used in the landscape.

> *"Much monitoring of fauna is of such a small scale and short duration that the statistical likelihood of detecting a positive or negative effect of the management regime is minute. Such shortcomings will only be overcome through broad-scale and/or long-term studies of fauna."* (Clarke 2008)

In order for land managers to improve planned burning techniques, particularly in response to our native fauna, it is essential to understand the impact of fire on all life forms, not just the impacts on the plants. This is particularly relevant when working in a fragmented landscape, such as Victoria.

> *"The ability of fire planners to meaningfully implement the dual aspirations of protecting life and property and achieving ecological goals is dependent on the availability of science and evidence that informs operational processes, and monitoring that influences future management."* (MacHunter *et al* 2009)

Through establishing long term projects with good scientific basis, that are linked to management of planned burning, it is possible for the community to be involved in carrying out this monitoring and to contribute to building our knowledge base on the impact of fire on fauna.

Common Wombat.

1.2 Motion sensing cameras

Monitoring of fauna can be highly labour intensive. Motion sensing cameras provide the opportunity to gather data on selected animal groups (e.g. small mammals, some arboreal mammals etc.) with much less labour than methods such as trapping. It is possible to select sites for cameras and place cameras in these locations at regular intervals. The method is also much less stressful for the fauna than trapping and can provide data on the presence of certain species that are unlikely to be caught in traps. However, motion sensing cameras do not have the ability to provide data on sizes of populations of particular fauna.

Given this, it is important to see camera monitoring as providing presence and absence data for particular species, rather than detailed data on the size of populations. It is also important to note that this camera monitoring would provide useful information on selected fauna in response to fire, but would not provide comprehensive data on population sizes etc. Camera monitoring is also a great community education tool, where images of the different species being 'caught on camera' in the local area can be regularly displayed.

2.0 METHODS

Methods

Study area

The study was conducted in Wombat State Forest in central-west Victoria. The forest covers about 70,000 ha and has had a history of timber harvesting. Large scale harvesting ceased in 2002 (Macak *et al.* 2010). The vegetation is characterised as a mixed eucalypt foothill forest with the dominant overstory species being Messmate (*Eucalyptus obliqua*) in combination with Peppermints (*E. dives* and *E. rubita*) and Candlebark Gum (*E. rubida*) (Leversha 1996). The Wombat State forest is inhabited by a number of native mammal species including key fire response species such as Mountain Brushtail Possum, Agile Antechinus and Black Wallaby (Macak *et al.* 2010; MacHunter *et al.* 2009).

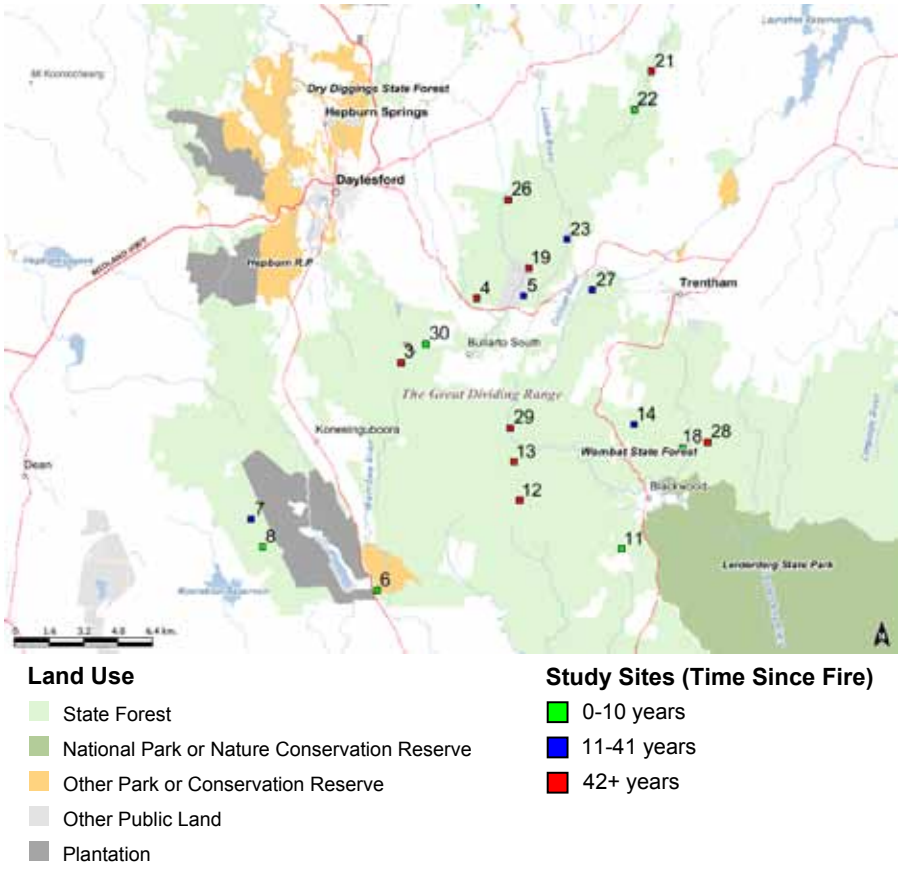

Figure 1. Map of the study sites in the Wombat State Forest and their time since fire category.

Sites

The sites selected were a subset of sites established by Wombat Forestcare and the Department of Sustainability and Environment as Community Research sites (*Macak et al.* 2010). These sites were established in a range of vegetation types and have a range of fire histories.

Due to time constraints 20 sites were selected for this study. Parameters for selection of sites included:

- Ease of site access for community volunteers.
- A range of fire histories.
- Inclusion of some sites with planned control burns.

Figure 1 shows the location of the sites.

The sites were selected to represent three different time since fire categories; recently burnt (RB: 0 - 10 years since the last fire), intermediately burnt (IB: 11 - 41 years since the last fire and long unburnt (LU: 42+ years since the last fire). Sites were located in two different vegetation communities; Foothills forest and Forby forest. Due to the constraints on site selection parameters it was not possible to achieve a balanced design with a similar number of sites in each time since fire and vegetation community categories. For example there were fewer sites in Forby forest and the IB category on Forby forest contained only one site.

	Foothills Forest			Forby Forest			All sites
	RB	IB	LU	RB	IB	LU	
Number of sites	3	4	6	3	1	3	20

Table 1. The number of sites in each fire category found in recently burnt (RB: 0-10 years since fire), intermediately burnt (IB: 11-41 years since fire) and long unburnt (LU: 42+ years since fire) forest for the two vegetation communities in this study.

Eastern Grey Kangaroo.

Table 1 shows the number of sites in each category.

Survey methods – methods of involving and training community

As this is a community project, volunteers undertook the on ground monitoring activities. This required coordination and training, led by the VNPA.

A community training activity took place on 10th of March 2012.

The objectives of the training activity were:

1. Participants learn how to use motion sensing cameras with this projects methods.
2. Participants sign up to carry out monitoring.
3. Participants feel part of a team.
4. Participants experience Wombat State Forest.
5. Participants are more informed about the VNPA and aware we are a donation supported organisation and more informed about Wombat Forestcare.

The training activity was attended by over 50 eager participants who were provided with project background, organisational details of VNPA and Wombat Forestcare, visited a site in Wombat State Forest and trained by ARI scientists in how to set-up bait stations and cameras at a site.

Following the training activity, community volunteers from VNPA and Wombat Forestcare volunteered every 3 weeks to pack down, move and set-up cameras and bait stations at the selected locations.

Two (motion sensing cameras, heat-in-motion type), Reconyx Hyperfire were installed at each site. At each site a 100m transect was established and the cameras were installed at the 20 and 80m points along the transect. They were attached to the nearest suitable tree to the designated point. A bait cage containing six stainless steel tea strainers was attached to a plastic garden stake and placed 2m from the camera with the base of the cage 20cm from the ground. Each tea strainer contained a mixture of rolled oats, peanut butter and golden syrup. The camera

Antechinus and Bush Rat.

was positioned 50cm from the ground and aligned so that the bait station appeared in the horizontal centre of the frame and the bottom of the bait cage was in the vertical centre of the frame. The vegetation between the camera and bait station, and one metre behind was cleared within the field of view of the camera to ensure that this did not obscure any photographs of animals. The cameras were left to operate for a minimum of 21 days. Upon collection cameras were checked to see if they were still operating and this was noted.

Initial photo identification was done by a trained VNPA volunteer. The photos were then sent to ARI for further identification. Where possible animals were identified to species level. In cases where some doubt existed they were assigned to a more generic category, for example "Unidentified Brushtail Possum". The data from both cameras at one site was combined and the percentage of sites in which each species was found was calculated for each fire category in each vegetation type.

Results

A total of 13,927 images contained at least one animal. Fourteen mammal species were identified from the photos (10 native and 4 introduced) along with 13 bird species (12 native and 1 introduced). The most commonly detected mammals were Black Wallaby (100% of sites), Common Wombat (85% of sites) and Agile Antechinus (75% of sites). Superb-fairy Wren (80% of sites) and Eastern Yellow Robin (60% of sites) were the most commonly detected birds.

Table 2 shows the percentage of sites at which each species was encountered in the three time since fire categories for each vegetation community. Some mammal species showed interesting patterns in the number of detections according to the time since fire at a site. The Short-beaked Echidna was only encountered in long unburnt sites, whereas the Common Ringtail Possum showed this trend in Foothills forest but the opposite trend in Forby forest. Mountain Brushtail Possums were encountered more often in recently and intermediately burnt sites in Foothills forest but not in Forby forest. The two rodent species

PERCENTAGE OF SITES IN WHICH EACH SPECIES WAS FOUND							
	Foothills Forest			Forby Forest			All sites
Species	RB	IB	LU	RB	IB*	LU	
Mammals							
Short-beaked Echidna	0	0	17	0	0	33	10
Agile Antechinus	67	100	83	67	0	67	75
Koala	33	25	0	0	0	33	15
Common Wombat	100	100	83	67	0	100	85
Mountain Brushtail Possum	67	75	17	67	0	100	55
Common Brushtail Possum	0	25	0	0	0	33	10
Unidentified Brushtail Possum	0	50	17	0	0	0	15
Common Ringtail Possum	0	0	33	33	0	0	15
Eastern Grey Kangaroo	33	50	17	33	0	33	30
Black Wallaby	100	100	100	100	100	100	100
Bush Rat	33	50	67	0	0	33	40
Black Rat	33	0	0	33	0	0	10
Red Fox	67	50	50	0	100	67	50
Domestic Dog	0	0	0	0	0	33	5
Feral Goat	0	0	0	33	0	0	5
Birds							
Laughing Kookaburra	0	50	0	33	0	0	15
Superb Fairy-wren	33	100	83	100	100	67	80
White-browed Scrubwren	33	50	50	33	0	33	40
Spotted Quail-thrush	0	0	0	0	100	0	5
Grey Shrike-thrush	33	50	67	33	100	67	55
Australian Magpie	33	25	0	0	0	33	15
Grey Currawong	33	25	0	0	100	33	20
White-winged Chough	0	25	33	0	0	33	20
Scarlet Robin	0	25	17	0	0	0	10
Flame Robin	0	0	0	0	0	33	5
Eastern Yellow Robin	0	100	83	67	0	33	60
Bassian Thrush	0	25	50	0	0	33	25
Common Blackbird	0	0	17	0	0	33	10
Unidentified bird	33	75	67	0	100	33	50
Unknown							
Unidentified animal	100	100	100	67	100	100	95

Table 2. The percentage of sites in which each species was found in recently burnt (RB), intermediately burnt (I) and long unburnt (LU) forest for the two vegetation communities in this study.

*There was only one site in this category.

showed opposite patterns regarding time since fire. Bush Rats were only encountered at long unburnt sites; whereas the introduced Black Rat was only encountered at recently burnt sites. Some species such as the Black Wallaby and Common Wombat were encountered at most (all in the case of Black Wallaby) regardless of time since fire.

There were also interesting patterns for some bird species. For example, both the Australian Magpie and the Grey Currawong were not encountered at long unburnt sites in Foothills forest which differed from Forby forest where they were not encountered at recently burnt sites. The results for White-winged Chough and Bassian Thrush were more consistent with both species not found in recently burnt sites in both forest types. The opposite pattern was observed for the introduced Common Blackbird, which was only encountered at long unburnt sites.

Discussion

Mammals

The results from this study showed some patterns of species presence with fire history and it will be interesting to see if they persist after more sites are surveyed. These patterns were inconsistent across species and forest types. The two rodent species detected showed opposite patterns suggesting different responses to fire. Encounters of the native Bush Rat were biased towards intermediately and long unburnt forest. This observation is consistent with the expert predictions made for the two forest types (Foothills

Feral Goat.

and Forby Forest) investigated in this study (MacHunter *et al.* 2009). It is also consistent with previous studies that show Bush Rat numbers decline post fire (Sutherland and Dickman 1999, Lindenmayer *et al.* 2008), possibly due to a reduction in arthropod food and habitat complexity (Sutherland and Dickman 1999). By contrast, the Black Rat is advantaged by disturbance and thus is more likely to be found at modified sites, such as those more recently affected by fire (Sutherland and Dickman 1999).

In this study the Short-beaked Echidna was more frequently encountered in long unburnt sites. There is sparse literature on the response of this species to fire. In a previous study (Macak *et al.* 2012) conducted in Foothills Forest suggested that, in contrast to the present study, they are equally likely to be encountered in recently burnt and long unburnt sites.

The arboreal mammals detected in this study showed differing patterns according to fire history. The Common Ringtail Possum was only encountered in long unburnt sites in Foothills forest but in recently burnt sites in Forby forest. This species is predicted to be more common at intermediate times since fire (MacHunter *et al.* 2009) however this prediction has not been confirmed by empirical data (Lindenmayer *et al.* 2008). For the Mountain Brushtail Possum the pattern also varied between forest types. This species was more frequently encountered in recently and intermediately burnt Foothills forest, but this pattern was not apparent in Forby forest. Expert judgement suggests that this species should slowly recover after fire, with abundance maximised at long unburnt sites (MacHunter *et al.* 2009).

Some species such as the Black Wallaby and the Common Wombat were found at most sites regardless of fire history. This is similar to findings for these species in the Victorian central highlands (Macak *et al.* 2012). There is, however evidence suggesting that Black Wallaby will be negatively impacted with increasing time since fire (Catling *et al.* 2001).

A number of introduced mammal species were detected in this study, of which the

Black Rat (see above) and Red Fox were the most commonly detected. The presence of Red Fox at most sites is a concern as they are implicated in the decline of a number of native mammals especially in the 35 – 5500 g weight range (DEH 2011). This includes a number of native species detected in this study such as the Common Ringtail Possum, Mountain Brushtail Possum and Bush Rat. It also includes species known from the Wombat State Forest but not detected in this study such as the Brush-tailed Phascogale which is listed as vulnerable in Victoria.

Birds

Although this survey was designed to detect ground-dwelling mammals a large number of birds were also detected. This is consistent with previous studies using similar lures and site preparation (e.g. Macak *et al.* 2012). Whilst there are some interesting trends for some species such as Australian Magpie, Grey Currawong, Bassian Thrush and White-winged Chough they should be interpreted with caution as this study was not designed to survey birds. A more robust approach would be to use indices of abundance such as that derived from the two hectare 20 minute count method (Loyn 1986).

Limitations of survey methods

The use of automated cameras, such as the motion sensing cameras used in this study, is becoming increasing widespread in wildlife research (*Meek et al.* 2012). They are well suited to studies conducted by volunteers due to the ease of installation and the feedback provided to volunteers via the photos produced (Macak *et al.* 2012). Therefore, the value of such citizen science initiatives should not be judged on their scientific merit alone, but also on their ability to inform and engage volunteers and the wider community.

There are sophisticated statistical techniques that enable the robust analyses of data from automated cameras (MacKenzie *et al.* 2002), but such analyses were beyond the scope of this project and thus it is not possible to draw a causal link between the observations in this study and the fire history variables.

Recommendations

This survey highlighted a number of interesting patterns with regard to fire history and native mammals in Wombat State Forest. However, further surveys are required to explore these patterns and statistical analyses are required to establish a link between fire history and native mammal occupancy in this system. Future work should focus on adding to the current data set by sampling new sites in the same forest types and with the same fire histories, rather than expanding the study to include new forest types and fire histories, which would limit the potential for robust data analyses.

It is hoped that this community research will be undertaken annually to continue to develop our understanding of anypatterns in relation to the impact of fire on fauna.

REFERENCES

Australian Native Plants Society (Australia) website – http://anpsa.org.au/

Biodiversity and Fire – Opportunities for VNPA volunteer monitoring programs

Catering for the needs of fauna in fire management: science or just wishful thinking? – Michael Clarke.

Catling, P.C., Coops, N.C., and Burt, R.J. (2001). The distribution and abundance of ground-dwelling mammals in relation to time since wildfire and vegetation structure in south-eastern Australia. Wildlife Research 28: 555-564.

Cheal, D. (2010) Growth stages and tolerable fire intervals for Victoria's native vegetation data sets. Fire and Adaptive Management Report No. 84. Department of Sustainability and Environment, East Melbourne, Victoria, Australia.

DEH. (2011). Predation by the European red fox - key threatening process listing. <http://www.environment.nsw.gov.au/determinations/EuropeanRedFoxKTPListing.htm> Department of Environment and Heritage, Sydney South, NSW. accessed on 04/02/2013.

Department of Sustainability and Environment Website, Fire and Other Emergencies, Fire Ecology – http://www.dse.vic.gov.au/fire-and-other-emergencies/fires-and-biodiversity

Lindenmayer, D.B., MacGregor, C., Welsh, A., Donnelly, C., Crane, M., Michael, D., Montague-Drake, R., Cunningham, R.B., Brown, D., Fortescue, M., Dexter, N., Hudson, M., and Gill, A.M. (2008). Contrasting mammal responses to vegetation type and fire. Wildlife Research 35: 395-408.

Loyn, R.H. (1986). The 20 minute search - A simple method for counting forest birds. Corella 10: 58-60.

Macak, P.V., Bruce, M.J., and Loyn, R.H. (2012). Community finding fauna - naturalist groups contributing to research on the response of fauna to fire. Black Saturday Victoria 2009 - Natural Values Recovery Program. Department of Sustainability and Environment, Heidelberg, Victoria.

Macak, P.V., Chick, RR., and Loyn, R.H. (2010). Aboreal Mammal Habitat Associations in Wombat State Forest. Arthur Rylah Institute for Environmental Resaerch Unpublised client report to the Wombat Biodiversity Working Group/ Wombat Forestcare Inc. Department of Sustainability and Environmnent, Heidelberg, Victoria.

MacHunter, J., Menkhorst, P., and Loyn, R. (2009). Towards a Process for Integrating Vertebrate Fauna into fire Management Planning. Arthur Rylah Institute for Environmental Research Technical Report Series No. 192. Department of Sustainability and Environmnent, Heidelberg, Victoria.

MacKenzie, D.I., Nichols, J.D., Lachman, G.B., Droege, S., Royle, J.A., and Langtimm, C.A. (2002). Estimating site occupancy rates when detection probabilities are less than one. Ecology 83: 2248-2255.

Meek PD, Ballard G and Fleming P (2012). An Introduction to Camera Trapping for Wildlife Surveys in Australia. PestSmart Toolkit publication, Invasive Animals Cooperative Research Centre, Canberra, Australia.

Sutherland, E.F., and Dickman, C.R. (1999). Mechanisms of recovery after fire by rodents in the Australian environment: a review. Wildlife Research 26: 405-419.

Wombat Forestcare Inc website – http://wombatforestcare.org.au

VICTORIAN
NATIONAL PARKS
ASSOCIATION
Be part of nature

Address: Level 3, 60 Leicester Street, Carlton, Victoria 3053.
Phone: 03 9347 5188.
Email: vnpa@vnpa.org.au
Website: www.vnpa.org.au