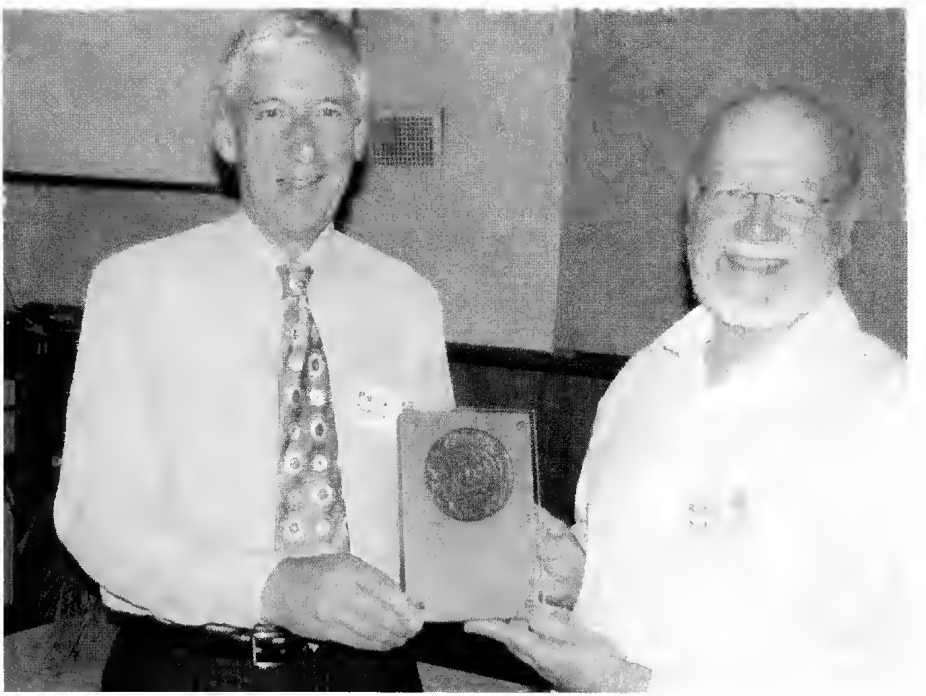
The Victorian Naturalist

Volume 127 (1) February 2010



Published by The Field Naturalists Club of Victoria *since 1884*

Thank you from the Editors

The Victorian Naturalist could not be published, and would not be successful without the enormous amount of time and effort given voluntarily by a large number of people who work behind the scenes.

As always, we particularly thank our authors, who provided us with excellent material for publication.

One of the most important editorial tasks is to have papers refereed. The Editors would like to say 'thank you', therefore, to the following people who refereed manuscripts that were published during 2009:

Graeme Ambrose
Melanie Birtchnell
Kevin Bonham
Ian Endersby
Ross Field
Maria Gibson
Linden Gillbank
Jamie Harris
Wayne Longmore
Richard Loyn
Paul McDonald
Peter Menkhorst
Janette Norman
Ken Walker
Rob Wallis
Mike Weston
Desley Whisson

The Victorian Naturalist publishes articles for a wide and varied audience. We have a team of dedicated proofreaders who help with the readability and expression of our articles. Our thanks in this regard go to:

Lucy Bastecky
Arthur Carew
Chantal Carrigan
Leon Costermans
Arnis Dzedins
Ian Endersby
Ken Green
Pat Grey
Murray Haby
Virgil Hubregtse
Michael McBain
David Meagher
Geoffrey Paterson
Berndaette Sinclair
Rob Wallis
Alan Yen

Sincere thanks go to our book reviewers for 2009 who provided interesting and insightful comments on a wide range of books and other materials:

Mark Antos
Angus Martin
Melanie Archer
Martin O'Brien
Emma Carlos
Roger Pierson
Rohan Clarke
Gary Presland
Leon Costermans
Michael Snedic
Cecily Falkingham
Rob Wallis
Lucy Gibson
Desley Whisson
Virgil Hubregtse
Alan Yen
Luke Kelly
Jian Yen
Wayne Longmore

On the production side, thank you to:
Ken Bell, who prepares the annual index,
Virgil Hubregtse for editorial assistance,
Helen McNally and Hali Ferguson for printing the mailing labels,
Dorothy Mahler for administrative assistance, and
Printers, BPA Print Group, especially Tom Markovski.

Erratum

We have been advised by Dr Michael Braby that the name *Trapezites genevieveae,* which was given for the butterfly featured on the back cover of *The Victorian Naturalist* 126(6), December 2009, is incorrect. It should be a hesperine, probably *Suniana sunias*, which occurs along the eastern coast (but not in Victoria). Another possibility is that it is *Ocybadistes walkeri*, another hesperine closely allied to *Suniana* and which occurs in Victoria.

The Victorian Naturalist

Volume 127 (1) 2010 February

ISSN 0042-5184

Front cover: Richard Shine *AM* is presented with the Australian Natural History Medallion 2009 by J Patrick Greene. Photo by Joan Broadberry.

Community attitudes toward possums in metropolitan Melbourne

Amy E Whiting[1], Kelly K Miller[1,3] and Ian Temby[2]

[1] School of Life and Environmental Sciences, Deakin University, 221 Burwood Highway, Burwood ,Victoria 3125
[2] Department of Sustainability and Environment, 30 Prospect St, Box Hill Victoria, 3128
[3]Corresponding author Dr Kelly Miller, School of Life and Environmental Sciences, Deakin University, 221 Burwood Highway, Burwood, Victoria 3125. Email: kelly.miller@deakin.edu.au

Abstract
Community attitudes toward urban possums in Victoria were examined. 500 questionnaires were sent to a random sample of residents from metropolitan Melbourne (n=103) as well as people who had had experiences with possums (n=340). Negative attitudes toward possums were found to exist in the community and these attitudes were not restricted to those who have had problems with possums. However, the extent of possum problems may be less than commonly believed, as over half of the respondents to newspaper stories calling for people with 'possum experiences' reported positive experiences with possums. Increasing media emphasis on positive experiences with possums and school-based education programs are identified as possible strategies for reducing conflicts and learning to live with possums in urban environments. (*The Victorian Naturalist* **127** (1) 2010, 4-10)

Keywords: possums, urban wildlife, attitudes, human dimensions

Introduction

A recent study (Hill *et al.* 2007) suggested that attitudes toward urban possums in Sydney were influenced by perceptions of possums more so than direct negative experience. However, the same study also suggested the presence of possums in ceiling cavities is important in determining attitudes. This highlights the fact that attitudes are shaped by a number of different factors including knowledge/awareness, socioeconomic status, past experience and social norms (Kellert 1996; Tarrant *et al.* 1997; Manfredo *et al.* 2003). Circumstantial factors can also influence attitudes toward wildlife. For example, the abundance of the species in question has been shown to influence attitudes (West and Parkhurst 2002); and almost any species, once it reaches high population numbers, can be regarded as a pest (Decker *et al.* 2001; DeStefano and Desblinger 2005).

Understanding public attitudes toward wildlife is important if we wish to minimise human-wildlife conflicts and encourage the community to live harmoniously with the local fauna. In Victoria, there is a need to understand public attitudes toward two species of possum, the Common Brushtail Possum *Trichosurus vulpecula* and Common Ringtail Possum *Pseudocheirus peregrinus*. Both species have thrived in the urban environment and are the most widespread and abundant native mammals throughout Melbourne (van der Ree 2004). In contrast to its abundance in the urban environment, the Common Brushtail Possum has vanished from much of its former range in arid Australia (Temby 2005), highlighting the need for conservation of this species.

The Common Brushtail Possum, a nocturnal marsupial, utilises hollow branches, tree trunks, and fallen logs as den sites during the day. However, in urban areas such naturally occurring sites are often limited, resulting in the use of house roof cavities as den sites (How and Kerle 1995). This often results in conflict between humans and possums for a variety of reasons: possums often do not emerge from the roof until well after dark, resulting in their loud vocalisations and thumping noises disturbing the household; they sometimes leave urine stains on ceilings; and they can create cracks or holes in plaster ceilings and walls (Temby 2005). In contrast, the Common Ringtail Possum usually constructs its own nest, or drey, a ball of leaves and twigs placed in a shrub, tree or vine, but will occasionally utilise house roof cavities.

Problems commonly associated with both species include: noise resulting from possums walking or jumping on roofs during the night; indirect noise from dogs barking at possums; damage to gardens as a result of possums defoliating trees and eating flowers; and aesthetic annoyances such as droppings in the driveway and general odour (Temby 2005). Conflicts between human neighbours are also known to

arise in situations where one enjoys the presence of possums and encourages them to their yard through feeding, and the other dislikes the presence of possums and objects to their encouragement (Temby 2005). In response to these problems, the Victorian Department of Natural Resources and Environment (now the Department of Sustainability and Environment) implemented the Victorian *Living with Possums* policy in 1997. The policy was intended to help alleviate the human-possum conflict and promote a humane approach to sharing the urban environment with possums.

Trapping and translocating nuisance possums had previously been the preferred method of management in Victoria (Department of Natural Resources and Environment 1997). However, translocation studies showed that translocated possums tend to have very low survival rates (Augee *et al.* 1996; Pietsch 1994) so this was not considered a humane management option. In response, a Governor in Council Order made the translocation of trapped possums illegal, and the *Living with Possums* policy stated that 'trapped possums must be released after sunset on the day of capture on the same property within 50 metres of the capture site or taken to a veterinarian for euthanasia' (Department of Natural Resources and Environment 1997, p.11). It has been shown that non-compliance with the *Living with Possums* policy is widespread within the Victorian community and that those with negative attitudes are less likely to adhere to the policy (Whiting and Miller 2008). This is a concern given the animal welfare issues associated with translocation.

Previous studies by Miller *et al.* (1999), Matthews *et al.* (2004) and Wilks *et al.* (2008) have revealed negative attitudes toward possums in urban areas in Australia. Miller *et al.* (1999) examined attitudes toward possums in the Melbourne suburban municipality of Knox and found that 33.1% of respondents had negative attitudes toward possums. Work done by the NSW National Parks and Wildlife Service (2002) found that 39% of respondents from across NSW would not like to have possums in their backyard. Negative attitudes toward urban wildlife are not limited to possums nor are they specific to Australia. Studies focusing on community attitudes toward wildlife consistently find that many people have negative attitudes toward local wildlife. For example, West and Parkhurst (2002) found that negative attitudes toward deer existed in Virginia; and DeStefano and Desblinger (2005) discuss negative attitudes toward beavers in Massachusetts and mountain lions throughout the western U.S.A.

Considering urbanisation results in dramatic losses of indigenous species (Collinge 1996), the willingness of the community to live alongside wildlife is important in such areas if we are to move towards more biodiverse urban landscapes. The *Living with Possums* policy is aimed at working towards this vision, as it encourages the community to live with possums, and, therefore, has the potential to facilitate the development of positive attitudes toward urban wildlife. However, non-compliance with the policy is common (Whiting and Miller 2008) and if a significant portion of the community has negative attitudes toward possums, the vision of the policy may not be obtainable. In addition, severe ill-treatment of brushtail possums has been reported (Wilks *et al.* 2008), highlighting the need for a greater understanding of attitudes, as knowledge about public attitudes toward wildlife is essential to accomplishing many management goals (Pierce *et al.* 2001). Therefore, understanding community attitudes toward urban possums and what determines these attitudes is important if the management aim of 'living with possums' is to be achieved. The aim of this study was to examine community attitudes toward possums in Melbourne, and to determine whether the management vision of 'living with possums' is obtainable.

Methods

This study was part of a review of the Victorian *Living with Possums* policy and had two main aims: to determine the level of community awareness and compliance with the policy, and to gauge community attitudes toward possums. This paper focuses on community attitudes toward possums, with community awareness and compliance the subject of a separate paper (Whiting and Miller 2008).

General Public Sample

A self-administered, mail questionnaire was developed in order to gauge community attitudes toward possums and the policy. The eight-page survey consisted of three sections, focusing on key elements of the value-attitude-behaviour hierarchy (Fulton *et al.* 1996). The

first section asked for demographic information such as age bracket and level of education. This was included to determine whether these factors are related to attitudes toward possums. The second section was concerned with determining community awareness of the policy. The third section concentrated on respondent attitudes toward possums and wildlife in general and included questions regarding attitudes toward possums in suburbia and possums as pests. This section was included to gauge public attitudes toward possums and is the focus of this paper.

A total of 500 people from across metropolitan Melbourne were selected using systematic random sampling of the *Melbourne 2006 Residential White Pages* telephone directory. The number of surveys was determined by economic and time constraints, but was comparable to similar studies (see Miller *et al.* 1999; FitzGibbon and Jones 2006). Participants received a covering letter, consent form, and reply-paid envelope with their survey. In an effort to increase the response rate, surveys were addressed to a specific person, rather than the 'The Resident'; participants were offered the chance to win a $50 book voucher; and reminder letters were sent approximately two weeks after the first mail-out (method adapted from Dillman 2000).

Possum Experience Sample

This sample consisted of people who had had experiences with possums, defined as either in the past or currently having possums living in their house/roof or garden, or either in the past or currently having possums that visit their property. Although this sample was originally designed to gauge the level of community compliance with the *Living with Possums* policy, the data yielded important information on community attitudes toward possums. The Victorian *Information Privacy Act 2000* did not allow us to contact individuals known to have had possum experiences. To overcome this, print media were contacted and an article outlining the research and asking readers with possum experiences to contact the researcher to request a survey appeared in both local and state-wide newspapers. The survey was an eight-page, self-administered questionnaire developed to assess the actions taken primarily by people with possum problems. The first section focused on demographic information such as age bracket and level of education. The second section concentrated on information about the respondent's experiences with possums on their property and methods used to deal with those possums. The third section was concerned with respondents' knowledge of the policy and general knowledge about possums. The fourth section asked about the respondent's views and attitudes towards possums.

The story first appeared in local *Leader* community newspapers and called for people with possum experiences, 'be they good or bad' to take part in the study. In total, eight *Leader community* newspapers ran the article and the response saw more callers with positive attitudes toward possums than negative. All callers were sent a survey to complete; however, the subsequent survey response from these callers saw this ratio dramatically change; the most likely reason being that the survey was designed for people with possum problems and this may have discouraged people with positive attitudes from completing it. Therefore, it was decided that any further articles should concentrate on only recruiting those with negative possum experiences. One month later, a small article was published in the state-wide *Herald Sun* newspaper, calling for people who had experienced problems with possums. As a result of the *Herald Sun* newspaper coverage, a radio announcement on ABC radio in Melbourne resulted in further recruitment of participants for the study. A substantial number of respondents still reported positive experiences, which led to such respondents being interviewed over the phone rather than sent a survey that was not designed for their situation. All phone interviews were conducted by the same researcher who asked five questions designed to obtain a general overview of the caller's experience. The questions focused on species involved, feeding, nest boxes, damage to the garden, and possums in the roof.

Data Analysis

Quantitative questionnaire data were coded and entered into SPSS (Statistical Package for the Social Sciences) version 12.0. Qualitative data obtained from open-ended survey questions and phone interviews were analysed by the principal author for key themes and then coded and entered into SPSS for statistical analysis. Descriptive statistics were used in the analysis and, due to the categorical nature of

the data and lack of continuous variables, the chi-squared test for independence and Fisher's exact test were used for examining differences and relationships between groups. Comparative data were considered statistically significant at $P \leq 0.05$.

Results

General Public Sample

A total of 103 completed surveys were received and 61 were returned to sender, resulting in a response rate of 23%. Despite this low response rate, key findings were comparable to findings of previous studies on possum attitudes (Miller *et al.* 1999; Matthews *et al.* 2004). Furthermore, when the demographic profile of the sample was compared to 2001 Census data (Australian Bureau of Statistics 2001), it was found that the sample and Census data did not differ significantly in gender ($\chi^2 = 2.761$, df= 1, $p = 0.097$), or country of birth ($\chi^2 = 2.956$, df= 1, $P = 0.086$). However, the age structure of the sample was found to differ significantly from the 2001 Census data ($\chi^2 = 44.466$, df= 3, $p < 0.001$), with higher percentages of those over 49 years of age. Despite this departure from the Census data, a range of ages displaying approximately equal divisions of gender, education, and country of birth responded to the survey. Considering these factors, the sample was considered adequate for the purposes of this study. However, non-response bias could not be ruled out and the results have been interpreted with this in mind.

Overall, 32% of respondents had negative attitudes toward possums, 63.1% indicated their attitudes towards possums were positive and 4.9% did not indicate their attitude. 23.5% of respondents with no direct possum experiences considered them to be a pest and had negative attitudes toward them.

Of respondents, 38.9% indicated wildlife should be encouraged in the suburbs, 16.5% thought that only certain species should be encouraged, 40.8% were opposed to encouraging wildlife, and 2.9% did not respond to the question. Those who believed wildlife should be encouraged were significantly more likely to approve of possums in suburbia ($\chi^2 = 30.121$, df= 2, $p < 0.001$). Despite this relationship, believing that wildlife should be encouraged did not guarantee that a respondent would feel similarly about possums, as 34.1% of those who felt wildlife should be encouraged in the suburbs did not believe possums belonged there. In addition, 76.5% of respondents who indicated that only certain species of wildlife should be encouraged also felt that possums did not belong in the suburbs.

Possum Experience Sample

In total, 340 people were surveyed for this aspect of the research. As a result of the stories in local newspapers, 120 phone calls were received and all were sent surveys. Of these callers, 67% indicated positive experiences with possums with the remainder reporting negative experiences (no respondents reported both). Of 87 surveys completed and returned, only 36% had positive experiences. A total of 253 individuals responded to the story that appeared in the *Herald Sun;* 43% reported negative experiences and 57% reported positive experiences.

Discussion

This study has shown that, whilst about one third of the community has negative attitudes towards possums, the number of people experiencing problems with possums may not be as high as commonly perceived. The majority of respondents to local *Leader* newspaper articles calling for 'good or bad experiences' were positive about possums. This is further supported by the fact that the *Herald Sun* article calling for people with possum problems resulted in approximately half of the respondents expressing positive experiences with possums. Despite this, it is extremely common for the negative aspects of urban possums to be highlighted by the Victorian media (e.g. Edwards, *Frankston Standard Leader;* Tullberg, *Waverley Leader;* Fawcett, *Sunday Herald Sun;* Hudson, *Herald Sun*). Why should this be the case? Those who hold negative views on possums may do so extremely strongly, as demonstrated by the following quotes taken from *Possum Experience* surveys:

> … garden ruining, sleep wrecking, filthy, faeces dropping, unmentionable of god's mistakes.

> They should be treated as they are in other parts of the world by being made in to garments.

Perhaps those with such strong attitudes against possums are more vocal about their views and, as such, their views find their way into the community through word of mouth, which is then disproportionately reported in the media. If this is the case, then it may be that the situation has

developed into what media scholars call a *spiral of silence* (Noelle-Neumann 1991). A spiral of silence occurs when the media attributes a particular viewpoint as being predominant in the community, leaving those with opposing viewpoints feeling in the minority, making them less likely to speak their minds. This situation can lead to certain views, eventually exerting little influence despite the fact they are actually widely held (Noelle-Neumann 1991). A spiral of silence can alter a person's attitude to an issue, as it has been shown that people tend to express attitudes in line with what they perceive to be the public consensus (Eveland *et al.* 1995, cited in Sparks 2006) and when uninformed or unsure about an issue, their opinions can be heavily influenced by the opinions of others (Decker *et al.* 2001).

Additionally, the attitudes of others have been theorised to influence people's actual behaviour. Fishbein and Ajzen (1975) developed a theoretical model which suggested that attitudinal and normative social influences can be viewed as determinants of behaviour. That is, our behaviour is influenced by our own attitudes toward the behaviour in addition to our beliefs about other people's attitudes (McKnight and Sutton 1994).

This may contribute to why many people who have no experiences with possums consider them to be a pest and have negative attitudes toward them. Considering Papadakis' (1996, p.164) statement that 'information from the media is crucial in framing and forming public opinion' it seems highly likely that the concentration of negative possum stories has influenced public opinion. A shift in the way the media presents possums to the community may help improve the chance of the public accepting their presence in suburbia.

It is concerning to find that almost two thirds of the community either did not feel that wildlife should be encouraged in the suburbs or felt that only certain species should be encouraged. Residents in Sydney, Australia, have shown a similar division in willingness to enjoy the presence of urban wildlife (NSW National Parks and Wildlife Service 2002) indicating that this is not a local phenomenon but that the problem is more widespread. It is interesting to note that of those who did feel wildlife should be encouraged in suburbia, a large proportion felt that possums did not belong there. This may be explained by the fact that some people only wish to encourage certain species of wildlife. Indeed, the majority of people who only wished to encourage certain species felt that possums did not belong in the suburbs, which indicates that possums do not fit their description of a desired species. This leads to the questions: what types of wildlife are desired in suburbia and why some people consider possums undesirable?

These questions were not addressed in the present study; however, research conducted by the NSW National Parks and Wildlife Service (2002) has provided some insight. Their study found that possums were among the most unwelcome species in suburban backyards, with undesirable species attributes being 'noisy', 'potential to cause damage to home or gardens' and 'annoying'. Conversely, desirable species attributes included 'cute appearance' and 'good image/reputation'. This information may assist in changing public attitudes toward possums in the suburbs. When you consider that a 'good image/reputation' is deemed a desirable factor, it may partially explain why possums are considered unwelcome by some sections of the community. As previously discussed, a 'good image/reputation' is something that has generally not been associated with possums.

Perhaps if the media focused on the positive attributes of possums their acceptance in suburbia would improve. The image portrayed at the moment is that of 'urban pest'. This needs to give way to an image of a native species whose presence can be enjoyed. This is a view of possums shared by a significant proportion of the community, even those who may have previously had negative experiences, as illustrated from the following quote taken from a *Possum Experience* survey:

> We blocked the holes in the house but had ready 2 possum boxes in trees around the garden. It seemed a fair compromise ... A fantastic learning experience for my young daughter.

This quote also demonstrates the ability of positive interactions with wildlife to change attitudes and contribute to learning. Attitudinal and behavioural changes are often stronger if they are achieved through hands-on experiences compared to traditional learning (Baldwin 1995). However, although interacting with wildlife may lead to more positive attitudes, if individuals are not willing to allow for such

interaction, there is little hope for attitudinal and behavioural change. Community education programs can only go so far because such programs tend to attract only informed and enthusiastic members of the community, missing those most in need of education. (Davies and Webber 2004). This problem is evident from the study by Miller *et al.* (1999), which found that respondents with negative attitudes toward possums had less interest in learning about possums. Thus, changing their attitudes through education may prove difficult, as such individuals have low levels of interest in learning more. For these reasons, education of children may be a more effective way of shaping community attitudes toward possums.

The attitudes of children are still forming and studies have shown that children are able to alter the environmental attitudes of their parents (Ballantyne *et al.* 2001; Vaughan *et al.* 2003; Volk and Cheak 2003). In addition, adults will often change their environmental behaviours to satisfy their children's wishes (Ballantyne *et al.* 2001). If we are able to create hands-on learning experiences for children that emphasise the positive aspects of living with possums, we may be able to influence community attitudes as a result of this intergenerational transfer of knowledge. Therefore, children's education programs focusing on the enjoyment possums can bring may go a long way to increase positive attitudes. Educating children about living with possums also has another positive outcome: shaping community attitudes of the future. The benefits of childhood education cannot be underestimated and school based urban wildlife programs could be useful in helping to ensure all children are exposed to the message.

Conclusion

Considering such a large number of people have positive attitudes toward possums, it appears that the 'living with possums' vision is achievable. However, many people still have a negative perception of possums, and this needs to be addressed. It is concerning that a large proportion of the community can have negative attitudes toward possums, despite having no direct experiences with them. A positive representation of possums in the media, focusing on positive experiences and learning to live with possums may help improve the willingness of the greater community to live alongside possums. However, it is not just possums that urbanites need to learn to live with, nor is the situation unique to Australia; communities across the globe need to learn to live with and connect with urban biodiversity. To this end, the media may have an important role to play, along with school-based educators; with both having potential to shape future attitudes toward wildlife in urban landscapes.

Acknowledgements

The study was funded by Deakin University's School of Life and Environmental Sciences and approved by the Deakin University Human Research Ethics Sub-Committee (Faculty of Science and Technology) (reference #004-06). Special thanks to all participants who gave up their time to participate in this research.

References

Augee ML, Smith B and Rose S (1996) Survival of wild and hand-reared Ringtail Possums (*Pseudocheirus peregrinus*) in bushland near Sydney. *Wildlife Research* **23**, 99-108.

Australian Bureau of Statistics (2001) *2001 Census QuickStats: Melbourne (Statistical Division).* Retrieved October 4, 2006 from <www.abs.gov.au>

Baldwin R (1995) Changes in attitude not enough. *Conservation Biology* **9**, 240-241.

Ballantyne R, Fien J and Packer J (2001) Program effectiveness in facilitating intergenerational influence in environmental education: Lessons from the field. *The Journal of Environmental Education* **32**, 8-15.

Collinge SK (1996) Ecological consequences of habitat fragmentation: implications for landscape architecture and planning. *Landscape and Urban Planning* **36**, 59-77.

Davies R and Webber L (2004) Enjoying our Backyard Buddies – Social research informing the practice of mainstream community education for the conservation of urban wildlife. *Australian Journal of Environmental Education* **20**, 77-87.

Decker DJ, Brown TL and Siemer WF (2001) *Human Dimensions of Wildlife Management in North America.* (The Wildlife Society: Bethesda, Maryland)

Department of Natural Resources and Environment (1997) *Living with Possums.* (Department of Natural Resources and Environment, Special Publication, Melbourne)

DeStefano S and Desblinger RD (2005) Wildlife as valuable natural resources vs. intolerable pests: a suburban wildlife management model. *Urban Ecosystems* **8**, 179-190.

Dillman DA (2000) *Mail and Internet Surveys: The Tailored Design Method.* (John Wiley: New York)

Edwards G (2006) Possums under fire. *Frankston Standard Leader*, 6/2/06 p. 13.

Fawcett T (2002) Days of playing possum over. *Sunday Herald Sun*, 4/8/02 p. 6.

Fishbein M and Ajzen I (1975) *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research.* (Addison-Wesley Publishing Company: Reading, Massachusetts)

FitzGibbon SI and Jones DN (2006) A community-based wildlife survey: the knowledge and attitudes of residents of suburban Brisbane, with a focus on bandicoots. *Wildlife Research* **33**, 233-241.

Fulton DC, Manfredo MJ and Lipscomb J (1996) Wildlife value orientations: a conceptual and measurement approach. *Human Dimensions of Wildlife* **1**, 24-47.

Hill NJ, Carbery KA and Deane EM (2007) Human-Possum

conflict in urban Sydney, Australia: Public perceptions and implications for species management. *Human Dimensions of Wildlife* **12**, 101-113.
How RA and Kerle JA (1995) Common Brushtail Possum, *Trichosurus vulpecula*. In *Mammals of Australia*, pp. 273-275. Ed R Strahan. (Smithsonian Institution Press: Washington, DC)
Hudson S (2002) Under Siege. *Herald Sun*, 6/7/02 p. 21.
Kellert SR (1996) *The Value of Life: Biological Diversity and Human Society*. (Island Press: Washington, DC)
Manfredo MJ, Teel TL and Bright AD (2003) Why are public values toward wildlife changing? *Human Dimensions of Wildlife* **8**, 287-306.
Matthews A, Lunney D, Waples K, and Hardy J (2004) Brushtail Possums: Champion of the suburbs or Our tormentors? In *Urban Wildlife: More Than Meets The Eye*, pp. 159-168. Eds D Lunney and S Burgin. (Royal Zoological Society of NSW: Sydney)
McKnight J and Sutton J (1994) *Social Psychology*. (Prentice Hall: Sydney)
Miller KK, Brown PR and Temby I (1999) Attitudes towards possums: A need for education? *The Victorian Naturalist* **116**, 120-126.
NSW National Parks and Wildlife Service (2002) *Urban wildlife renewal "Growing conservation in urban communities"*. (NSW National Parks and Wildlife Service: Hurstville). Retrieved March 22, 2006, from <http://www.nationalparks.nsw.gov.au/pdfs/urban_wildlife_research_ report.pdf>
Noelle-Neumann E (1991) The theory of public opinion: The concept of the spiral of silence. In *Communication Yearbook, 14* pp. 256-287. Ed JA Anderson (Sage: Newbury Park, CA)
Papadakis E (1996) *Environmental Politics and Institutional Change*. (Cambridge University Press: New York)
Pierce CL, Manfredo MJ and Vaske JJ (2001) Social science theories in wildlife management. In *Human Dimensions of Wildlife Management in North America*, pp. 39-56. Eds DJ Decker, TL Brown and WF Siemer. (The Wildlife Society: Bethesda, MD)
Pietsch RS (1994) The fate of urban Common Brushtail Possums translocated to sclerophyll forest. In *Reintroduction biology of Australian and New Zealand Fauna*, pp. 239-246. Ed M Serena. (Surrey Beatty & Sons: Sydney)
Sparks GG (2006) *Media Effects Research: a Basic Overview*. (Thomson Wadsworth: Belmont, CA)
Tarrant MA, Bright AD and Cordell HK (1997) Attitudes toward wildlife species protection: assessing moderating and mediating effects in the value-attitude relationship. *Human Dimensions of Wildlife* **2**, 1-20.
Temby I (2005) *Wild Neighbours: The Humane Approach to Living with Wildlife*. (Citrus Press: Broadway, NSW)
Tullberg J (2005) Gobbling up gardens. *Waverley Leader*, 12/7/05 p. 13.
van der Ree R (2004) The impact of urbanisation on the mammals of Melbourne – do atlas records tell the whole story or just some of the chapters? In *Urban Wildlife: More Than Meets the Eye*, pp. 159-168. Eds D Lunney and S Burgin. (Royal Zoological Society of NSW: Sydney)
Vaughan C, Gack J, Solorazano H and Ray R (2003) The effect of environmental education on school children, their parents, and community members: A study of intergenerational and intercommunity learning. *Journal of Environmental Education* **34**, 12-21.
Volk TL and Cheak MJ (2003) The effects of an environmental education program on students, parents, and community. *Journal of Environmental Education* **34**, 12-15.
West BC and Parkhurst JA (2002) Interactions between deer damage, deer density, and stakeholder attitudes in Virginia. *Wildlife Society Bulletin* **30**, 139-147.
Whiting AE and Miller KK (2008) Examining the *Living with Possums* policy in Victoria, Australia: Community knowledge, support and compliance. *Pacific Conservation Biology* **14**, 169-176.
Wilks S, Russell T and Eymann J (2008) Valued guest or vilified pest? How attitudes towards urban brushtail possums *Trichosurus vulpecula* fit into general perceptions of animals. In *Too close for comfort: Contentious issues in human-wildlife encounters*, pp. 33-44. Eds D Lunney, A Munn and W Meikle. (Royal Zoological Society of New South Wales: Sydney)

Received 26 February 2009; accepted 15 October 2009

One Hundred Years Ago

EXCURSION TO ALEXANDRA-AVENUE, &c.

BY F. CHAPMAN

NINETEEN members and friends, assembled at Prince's Bridge on Saturday afternoon, 26th February, for the purpose of examining the geological features of the lower Yarra and the instructive road-sections exposed on the south side of the river. The weather was all that could be desired, being delightfully fine and cool. Turning to the left from the St. Kilda-road, past the Immigrants' Home, the chief geological features of the locality were pointed out by the aid of a sketch map. The former course of the Yarra towards South Melbourne was remarked upon, as seen in the site of swamps formerly crossing the St. Kilda-road and the present Albert Park Lagoon. The prominent rivercliffs of the South Yarra Silurian were noticed, where they begin to rise in front of the artificially truncated mound on which stands the Queen's statue. Some of the red sands from the capping of the Silurian hills had been excavated and thrown down at the back of the home aforesaid, and there was also a small heap of rubbly Silurian at the same place, probably a remnant of the heaps of *debris* which had already afforded one of our members some choice specimens of the slender Orthoceras-like shell, *Protobactrites*, and a *Craniella*. The old pumping station was located, and the quarry at the side, which had in former times yielded quite a rich harvest to a few of our indefatigable collectors.

From *The Victorian Naturalist* **XXVI**, p. 184, April 7, 1910

Seeds and shopping centres

H Trevor Clifford

Honorary Associate, Queensland Herbarium, Environment and Resource Management, Brisbane Botanic Gardens, Mt Coot-tha Rd, Toowong, Queensland 4066.

Abstract
Shopping centres are a rich source of viable seeds and in this study 58 species were raised from sources not intended for cultivation. The species represented 50 genera, belonging to approximately 40% of the currently recognised angiosperm clades. (*The Victorian Naturalist* **127** (1) 2010, 11–14)

Keywords: Shopping centres, viable seeds, seed banks, plant quarantine

Many seeds (and small fruits) present in soils are viable and as such can be regarded as constituting a global seed-bank, the species composition of which varies from place to place. The existence of seed banks long has been recognised and were referred to by Theophrastus (370–288 BCE) who reported that 'in some places, if the ground is merely lightly worked and stirred, the plants native to the district spring up, for instance the cypress, *Cupressus sempervirens*, in Crete.' He also noted that plants other than those native to an area may spring up after heavy rain. For example, Silphium *Ferula tingitans* had been known to appear from such cause (heavy rain), where there was none before (Hort 1948). However, it is debatable as to whether the appearance of these plants was due to the germination of seeds that had been long dormant in the soil, or had washed in with flood waters.

In an elegant pioneer paper, Carroll and Ashton (1965) studied the seed-banks of nine Victorian soils. Over a period of six months, beginning in April, they recorded both the numbers and identities of seedlings that sprouted from samples which had been placed on a sterile substrate in a glasshouse and regularly watered.

Though shopping centres are in no sense plant communities, they may be regarded as seed-banks, for on the shelves of some merchants' premises there are products that contain large numbers of viable seeds. Many of these seeds are sources of food for people or animals, especially birds. Accordingly, the diversity of seeds present on the shelves is far from a random sample of the Earth's flora.

Seeds tested for viability were purchased in Brisbane shopping centres. They derived from the following sources: dried fruits, bird-seed, pulses, muesli, spice seeds, grains, nuts, sprouting mixtures, herbal medicines, and soil adhering to root vegetables. The seeds extracted from fresh fruits, if imported from overseas, were also tested for viability.

Depending upon the time that has elapsed between their harvest and purchase, the treatment received during storage or to satisfy quarantine regulations, the viability of the seeds tested differed considerably from sample to sample. For example, the percentage germination of several samples of Sweet Basil seeds tested was zero. In contrast, some samples of sesame seed failed to germinate while others were nearly 100% viable. Furthermore, the seeds of some species, including those of Opium Poppy, appeared to be quite fertile, as judged from the proportion of those that germinated and developed to the cotyledon stage, but most seedlings failed to produce more than a few leaves before dying. Rarely, as with the seeds of a few avocados imported from New Zealand, the seedlings produced grew into monstrous chlorophyll-deficient plants.

It is remarkable that a few seeds remain viable despite the damage sustained during processing. Healthy plants have been raised from seeds of pearl barley *Hordeum vulgare*, polished rice *Oryza sativa*, and split peas *Pisum sativum*.

All seeds were tested at ambient temperatures and none, other than those of legumes, were subjected to any pretreatment. Boiling water was poured over the latter to soften any hard seeds. Seed samples which did not promptly germinate were kept under test conditions for many months to allow for the breakdown of dormancy. Soil associated with root crops was maintained under conditions similar to those for testing seed viability. Seedlings from all seed sources were grown until their identities could be confirmed.

From the Appendix it is clear that, from the labelling on packages, viable seeds came from ten countries including Australia. It is likely other countries should be added to the list, for several samples were labelled as deriving from either 'Imported' or 'Local and Imported' sources and so their origin must be regarded as indeterminate. Unlabelled samples were probably sourced in Australia but may have come from overseas.

Although the specific identities of all the seeds purchased were known, the same was not true for the few contaminants encountered. Their identities were determined by germinating the seed and growing the resulting seedlings to maturity.

Two other seed sources encountered in shopping centres were those incorporated in the soil attached to root crops and in Sphagnum Moss. Because these seeds were not part of the product purchased they were regarded as contaminants. The soil samples contained up to six germinable seeds per 100 g of dry soil and these without exception were of Australian adventive species. The most common fellow traveller with the Sphagnum Moss was *Juncus bassianus* whose seeds germinated to produce healthy plants. After several years' cultivation in Brisbane these plants failed to flower but they did so within a few weeks of being transferred to Hobart.

The species raised are listed in the Appendix. About 80% of these are members of Australia's adventive flora. A few of the species, including Variegated Thistles *Silybum marianum*, are noxious weeds (Randall 2002) but most are relatively benign (Anon 2009). However, this does not preclude them from belonging to genotypes that do not occur locally and with which they could compete or interbreed to become aggressive weeds.

Therefore, imported seeds and fruits are subject to strict quarantine regulations (Ebbels 2003), but as noted by Heather and Hallman (2008, p.6) 'Phytosanitary barriers cannot offer absolute security against the entry of a pest species but risk management will reduce the possibility of entry and establishment to acceptable levels.' The concept of what is an acceptable risk level has been the subject of much debate, centred largely on the need to ensure that quarantine regulations do not become a substitute for trade barriers in the form of protectionism.

In this study, 58 species were raised and these represented 50 genera and 19 of the 42 orders and eight other terminal clades recognised by Soltis *et al.* (2005) in their classification of angiosperms. Because the samples tested excluded not only species intended for cultivation but also those locally grown for fresh fruit, this number must be much less than the total available in Brisbane shopping centres. Furthermore, the requirements of customers vary from place to place, as is evidenced by seeds of Lupini Bean being sold only in suburbs with large Greek communities. It would be expected that at a world level the diversity of seeds sold in shopping centres would far exceed those that are available in Brisbane. These centres may, therefore, be regarded collectively as constituting an immense world seed bank, biased in favour of species useful for feeding humankind.

Acknowledgements

This paper is dedicated to the memory of David Ashton, a distinguished ecologist and sometime member of the Field Naturalists Club of Victoria. It is a pleasure to thank Natalie Papworth of the Royal Tasmanian Botanical Gardens, Hobart, for cultivating plants of *Juncus bassianus,* forwarded from Brisbane, and Dr DI Morris of the Tasmanian Herbarium for its identification.

References

Anon. (2009) Introduced Flora of Australia and its weed status. <http://weeds.cbit.uq.edu.au>

Carroll EJ and Ashton DH (1965) Seed storage in soils of several Victorian plant communities. *The Victorian Naturalist* **82**, 102-110.

Ebbels DL (2003) *Principles of Plant Health and Quarantine.* (CABI Publishing: Wallingford)

Heather NW and Hallman GJ (2008) *Pest Management and Phytosanitary Trade Barriers.* (CABI Publishing: Wallingford)

Hort A (1948) *Theophrastus – Enquiry into Plants and minor works on Odours and Weather Signs.* (parallel Greek and English texts) (William Heinemann Ltd: London)

Randall RP (2002) *A Global Compendium of Weeds.* (RG & FJ Richardson: Meredith, Vic.)

Soltis DE, Soltis PS, Endress PK and Chase MW (2005) *Phylogeny and evolution of angiosperms.* (Smithsonian Books: Washington)

Wiersema JH and Léon B (1999) *World Economic Plants: A Standard Reference.* (CRC Press: Boca Raton, Florida)

Received 27 November 2008; accepted 1 October 2009

Appendix

Species grown from seeds sold in Brisbane Shopping Centres, for human or animal consumption, plus the contaminants thereof, and those from a few imported fruits. The vernacular names given are those widely used in Australia and the countries from which sourced as given on the packaging. Species names according to Wiersema and Léon (1999).
* = species not known as adventives in Australia (Anon 2009); L&I = Local and Imported.

Species	Vernacular Name	Seed Source
Amaranthus caudatus	Inca-Wheat	Bolivia
Arachis hypogaea	Peanut	Australia
Avena sativa	Oats	Australia
Brassica nigra	Canola	Australia
Carthamus tinctorius	Safflower	Australia, L&I
*Castanea sativa**	Chestnut	Australia
Chenopdium quinoa	Quinoa	Bolivia
*Cicer arientinum**	Chick Pea	Australia
Citrus limon	Lemon	USA
*Citrus paradisi**	Grapefruit	Israel
*Citrus reticulata**	Mandarine	USA
Coriandrum sativum	Coriander	India
Cucurbita pepo	Pepitas	China
Cuminum cyminum	Cumin	India
Echinochloa esculenta	Japanese Millet	Australia
Fagopyrum esculentum	Buckwheat	China
Foeniculum vulgare	Fennel	India
*Glycine max**	Soya Bean	India
Helianthus annuus	Sunflower	Australia
Hordeum vulgare	Barley	Australia
Juglans regia	Walnut	Australia
Lens culinaris	Lentil	L&I
*Litchi chinensis**	Lychee	Thailand, China
Linum usitatissimum	Flax	Australia, China
Lupinus albus	White Lupin	Australia
Lycium barbarum	Gogji or Wolf Berry	China
Lycopersion esculentum	Sundried Tomato	Turkey
Medicago polymorpha	Medick	India
Medicago sativa	Alfalfa, Lucerne	L&I
Nigella sativa	Black cumin	India
Oryza sativa	Rice	Italy
Panicum miliaceum	Millet Panic	Australia
Papaver somniferum	Opium Poppy	India
Persea gratissima	Avocado	New Zealand
Peucedanum graveolens	Dill	India
Phalaris canariensis	Canary Grass	Australia
*Phaseolus limensis**	Lima Bean	USA
Phaseolus vulgaris	Kidney Bean	USA
Phoenix dactylifera	Date Palm	Turkey
*Pimpinella anisum**	Anise	Turkey
Pisum sativum	Garden Pea	New Zealand
*Prunus dulcis**	Almond	Australia
Punica granatum	Pomegranate	USA
*Salvia hispanica**	Chia	Australia
Secale cereale	Rye	Australia
Sesamum indicum	Sesame Seed	Australia
Silybum marianum	Variegated Thistle	Australia
Sorghum bicolor	Grain Sorghum	Australia
*Trachyspermum copticum**	Caraway	India
Trigonella foenum-graecum	Fenugreek	India
Triticum aestivum	Wheat	Australia
*Vaccinium corymbosum**	Highbush Blueberry	New Zealand

Appendix cont.

Species	Vernacular Name	Seed Source
Vicia faba	Broad Bean	Australia
*Vigna angularis**	Adzuki Bean	Australia
*Vigna radiata**	Mung Bean	Australia, L&I
Vigna sinensis	Cow Pea	USA
Zea mays	Maize	L&I

One Hundred Years Ago

VICTORIAN VEGETATION IN THE MELBOURNE BOTANIC GARDENS

BY F. PITCHER.

(Read before the Field Naturalists' Club of Victoria, 11th Jan., 1910.)

IT is hardly to be expected that one could find anywhere within a radius of 2½ miles of the centre of so prosperous a State capital as Melbourne even the smallest area of land in anything like the natural condition in which it existed seventy years earlier, to say nothing of ever hoping to trace within such an area a mass of vegetation anything approaching the natural condition in which it existed prior to that time. It may, however, be remarked with a great deal of pleasure, and to the credit of the persons concerned, whether they have passed away or are still living, that there are' yet to be seen, within a very short distance of Melbourne, in our Royal, Studley, Richmond and Yarra parks, numerous specimens of Eucalyptus, Casuarina, and Acacia, now, perhaps, of very limited species, which serve to indicate, in part, the character of the natural vegetation which existed on the site of our city prior to its discovery and subsequent settlement. In addition, there yet remain to-day along the banks of the River Yarra, on which our city is built, and its tributary creeks, within a very short distance of the metropolis, Acacia, Bursaria, Melaleuca, and other plants in their natural condition, which afford additional evidence of the character of the vegetation which previously occupied the site of Melbourne and its flourishing suburbs.

Now, when we consider that in the small area so wisely selected by the first Lieutenant-Governor of Victoria, the Hon. Charles Joseph La Trobe, in 1840 as a Botanic Gardens site, since increased to about 100 acres, there have been going on continuous changes and transformations of the surface conditions, such as by the erection of a stately vice-regal residence in its vicinity; the providing of suitable approaches and thoroughfares to and from the city for its population living in the adjoining southern suburbs; the improvements of the course and southern bank of the Yarra, which forms one of the boundaries of the site; and, last but not least, the remodelling and improving of the Gardens themselves according to the varying ideas of the different directors from time to time during the period, named, it is almost unreasonable to think that any native vegetation would remain of that which existed prior to the discovery of the State, yet there are still: a few trees living within our Botanic Gardens which were flourishing on the site before the advent of the first of our white, population. It is to draw attention to these, with the hope of their being retained as long as ever possible as memorials of such original vegetation, that they are here referred to and their condition at this date mentioned.

For a number of years after 1869, when the writer was first introduced to the office and service of the late Baron von Mueller by Mr. A. C. Neate, a faithful former official of the Gardens staff for. over* 40 years, there remained in the north-eastern portion of the grounds an island area cut off from the surrounding land by a narrow strip of the then lagoon waters. This area was densely covered with the Swamp Tea-tree, *Melaleuca ericifolia*, which in many parts was surmounted with the Scrub Vine, *Cassytha melantha*. Clumps of the Sword Rush, *Lepidosperma elatius*, were scattered amongst this tea-tree, and several Red Gum trees, *Eucalyptus rostrata*, were striking objects in the vicinity, while around the margins and in the adjoining lagoon-waters were thriving luxuriantly, in their natural condition, numerous aquatic plants, including the Native Bulrush, *Typha angustifolia*. Patches of the tea-tree are still to be found growing in this locality, and are shown in the photographs here to-night. These I had taken some time ago with the object of retaining a remembrance of the existence of this wild corner should those patches be found to vanish by reason of further artificial alteration of the surface, or by the requirements of exotic vegetation in their vicinity.

From *The Victorian Naturalist* **XXVI**, pp. 164-165, March 10, 1910

Extended range of bobucks *Trichosurus cunninghami* in south-west Gippsland, Victoria

D Hynes[1] and M Cleeland[2]

[1]PO Box 285 Burwood 3125
[2] RMB 6080 Cowes 3922

Abstract
Automatic camera-traps were used to investigate the distribution of Mountain Brushtail Possum or Bobuck *Trichosurus cunninghami* in diverse habitats in south-west Gippsland, Victoria. Bobucks occur widely in lowland south-west Gippsland, with an apparent tendency to aggregate near the coast. There appeared to be no association between bobucks and the presence or absence of *Acacia* spp. or with old-growth *Eucalyptus* spp. A new designation of the common names for the short-eared possum, *Trichosurus caninus*, and the mountain brushtail possum, *Trichosurus cunninghami*, to northern bobuck and southern bobuck, respectively, is proposed. (*The Victorian Naturalist* **127** (1) 2010, 15-19)

Keywords: *Trichosurus caninus*; *Trichosurus cunninghami*; mountain brushtail possum; short-eared possum; bobuck; camera trap

Introduction

The Bobuck *Trichosurus cunninghami* and the Short-eared Possum *Trichosurus caninus* are reported to inhabit forested country along and to the south and east of the Great Dividing Range of eastern Australia, from southern Victoria to south-eastern Queensland (Lindenmayer *et al.* 2002; Menkhorst and Knight 2001). They dwell typically at altitudes greater than 300 m (Martin 2005). Bobucks are medium-sized (2.5 – 4.5 kg), semi-arboreal, nocturnal marsupials (Menkhorst and Knight 2001).

In 2002, based upon morphometric differences, it was proposed that the Mountain Brushtail Possum *T. caninus* be reclassified into two distinct species (Lindenmayer *et al.* 2002). The northern form was to retain the binomial name *T. caninus* but was henceforth to be known as the 'short-eared possum'. The southern population, prevalent in the Victorian Alps and elsewhere in Victoria, such as at Wilsons Promontory National Park, was to retain its already designated common name 'mountain brushtail possum' but was given a new binomial, *T. cunninghami*. However, genetic divergence between *T. caninus* and the putative *T. cunninghami* may not support a case for the establishment of a new species. Collins (2003) noted that the degree of intra-specific variation within the common brushtail possum, *T. vulpecula*, would if interpreted similarly, justify the replacement of that one taxon by ten. It seems unlikely that ten new species of common brushtail possum would represent a practical improvement in that animal's designation.

The authors previously reported the presence of Bobucks *T. caninus* living in atypical coastal habitat in south-west Gippsland, namely at The Gurdies Reserve (Hynes and Cleeland 2005), north of Grantville on Western Port, Victoria, and in a creek adjoining the Bass River south of Grantville (Hynes 2006). In view of the lack of consensus surrounding the proper classification of the northern and southern populations of short-eared or mountain brushtail possums, the authors now provisionally revert to the usage of *T. cunninghami* to refer to the population found in The Gurdies Reserve and in broader Gippsland and will speak of these animals simply as 'bobucks'.

As a result of the 2005-2006 discovery in The Gurdies Reserve, the question arose as to how widespread bobucks of the Western Port shore really were. Did they exist as isolated population 'islands' only near The Gurdies Reserve itself or were they perhaps to be found far and wide in lowland Gippsland?

In order to discover more about these animals' distribution, automatic camera-traps were placed at a range of locations over a 12 month period beginning early 2006 and continuing to the present. We discovered that bobucks are widely distributed and apparently numerous in south-west Gippsland. This discovery was surprising in view of the previous absence of reports of them in the literature and the paucity of anecdotal reports about them.

Methods

Between early 2006 and April 2007 automatic camera traps were deployed at 11 sites in south-west Gippsland. Specific locations are presented in Fig. 1. Sites were selected in state parks and on public land where native vegetation was present. Five cameras were purpose built for this survey. After initial deployment at each site, cameras were usually retrieved after one to two weeks. If a site was fruitful (Gurdies) or, alternatively, if a site appeared barren of bobucks (Outtrim) after one or two visits, the cameras might be changed over several times in order to ascertain with reasonable surety whether bobucks were present or not. A failure to detect might be because bobucks were absent from the general area, or an apparent absence could be due to their failure to appear before the instruments. The interval between camera retrievals or change-overs depended upon opportunities to travel to Gippsland for the purpose.

The instruments detect animals by means of the heat radiation their bodies emit (Hynes and Cleeland 2005). A passing animal is detected by means of an infrared sensor, an algorithm programmed into an embedded microcontroller then assesses the validity of the contact, taking into account factors such as ambient light conditions, the target's rate of movement and duration of the contact. If the algorithm decides that a valid target has been acquired, the controller activates a digital camera and a useful image is captured. When the target moves away, the instrument reverts to a 'sleep mode' in which very little electric current is drawn from the system's battery. By so conserving the battery's charge, the instrument is able to remain active in the field for long periods. Because the instruments attempt a 'shot' only when the chances of a useful picture are good, the proportion of photos with an actual animal in the frame instead of empty space are higher than with systems that fire on first contact (Hynes 2007).

The camera used was a Kodak DC50, one of the earliest commercially available digital cameras. A severe limitation of these cameras is the fact that they do not have a date-time recorder as part of their instruction set. Another limitation of the DC50 is that it lacks any practical means of remote operation. A particular advantage of the DC50 is its short focal length: it can focus on objects as close as 12 cm out to infinity. This means that small animals stay in focus at close range which helps with their identification.

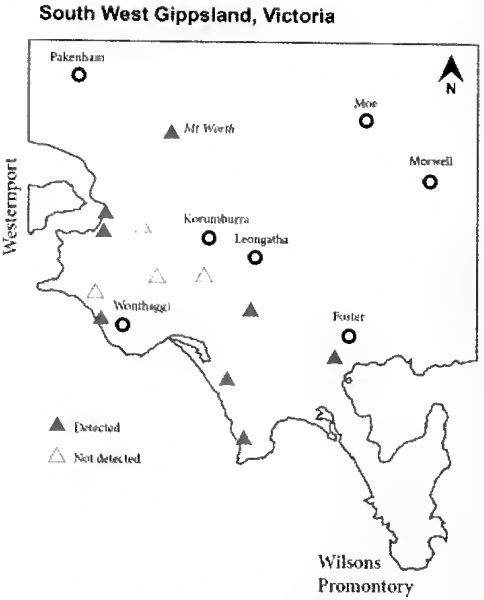


Fig. 1. Camera-trap sites in south-west Gippsland. Solid red triangles = Bobucks detected; empty red triangles = Bobucks not detected.

The designer's dilemma in this type of photography is to find a camera that is both cheap and technically suitable, as the outdoors environment is unforgiving to electronic instrumentation. A major design criterion for this project was to develop a photographic system that was both robust and inexpensive.

In addition to camera placements at suitable locations, local information about Bobucks in Gippsland was sought by means of print media coverage of the survey, direct personal communication and by means of the Survey's website (http://www.thylacoleo.com/bobuck_underground/).

Results

Bobucks occur widely throughout lowland south-west Gippsland. Locations of camera-trap sites and the results obtained along with brief notes about the soils and vegetation at each site are presented in Table 1.

Previous sightings

Surprisingly little local knowledge of bobucks was revealed after efforts were made to deter-

FNCV

The Victorian Naturalist

PRINT POST
342975/00007

POSTAGE PAID AUSTRALIA

313
The Librarian
MUSEUM VICTORIA
PO Box 666E
MELBOURNE VIC 3001

If undeliverable return to:
FNCV
Locked Bag 3
PO Blackburn
Victoria 3130

CHANGING YOUR ADDRESS?

NEW ADDRESS: .....

..... POSTCODE ☐☐☐☐

New Telephone: ..... New Email: .....

PLEASE RETURN WHOLE SHEET TO FNCV

Table 1. Locations of camera-trap sites. Latitude and longitude were estimated in Google Earth. Multiple deployments within a few metres of one another are designated at # = A, * = B, + = C. Note: Bobucks detected post-survey at Candowie Reservoir North Arm on 18/02/2008.

	Latitude	Longitude	Altitude (m)	Date Retrieved	Soils	Vegetation	Bobucks Detected?
Gurdies	38° 22' 51.89"S	145° 33' 24.41"E	<7	4/9/2004 21/8/2004 25/1/2008 18/2/2008 7/2/2008	Humus rich sand overlying gravel substrate	Messmate *Eucalyptus obliqua*, Bracken *Pteridium esculentum*, Common reed *Phragmites australis*	Yes
Bass River	38° 26'32.11"S	145° 32' 56.23"E	~50	24/11/2005	Humus rich sand overlying gravel substrate	Messmate *E. obliqua*, Bracken *Pteridium esculentum*, some Prickly Tea Tree *Leptospermum continentale*	Yes
St Heliers	38° 23'46.93"S	145° 34' 8.36"E	~90	28/7/2006	Humus-rich duplex	Messmate *E. obliqua* verging onto paddocks, with pasture grass	No
Koonwarra	38° 33'40.46"S	145° 55' 16.77"E	~60	24/3/2007 27/4/2007 13/4/2007 1/4/2006	Sandy, disturbed after quarrying	Prickly Tea Tree *L. continentale* scrub, sparse ground cover, grasses. Silver Wattle *Acacia dealbata* virtually absent: only two Silver Wattles were noted within 200 m of the camera site	Yes
St Alveys	38° 31' 35.54"S	145° 41' 59.76"E	~80	6/10/2006	Duplex clay	Messmate *E. obliqua*, Blue gum *E. globulus*, Silver Wattle *A. dealbata*	No
Outtrim	38° 30' 47.49"S	145° 46' 39.37"E	~60	3/3/2007 *8/4/2007 *8/4/2007 *3/7/2007 10/3/2007 18/3/2007	Shallow duplex clay	Swamp Gum *E. ovata*, Peppermint *E. radiata*, Prickly Tea Tree *L. continentale*	Yes
Foster	38° 44' 14.68"S	146° 9' 48.00"E	~20	16/6/2006	Duplex clay	Messmate *E. obliqua*, Bracken *P. esculentum*, grassed areas	Yes
Bald Hills	38° 44' 0.76"S	145° 56' 27.68"E	~20	14/9/2006		Tea Tree *Melaleuca ericifolia*, no ground cover	Yes
Ten Mile Scrub	38° 48'16.62"S	145° 56' 27.54"E	~50	14/9/2006	Sandy clay duplex	Messmate *E. obliqua*, Bracken *P. esculentum*	Yes
Powlett River No. 1	38° 35' 1.24"S	145° 31' 12.05"E	<7	18/9/2007	Coastal sand	Coastal Tea Tree *L. laevigatum*	Yes
Powlett River No. 2	38° 34' 3.56"S	145° 30' 19.08"E	<7	25/1/2008 #18/9/2007 *18/9/2007	Coastal sand	Coastal Manna Gum *E. pryoriana*, Coastal Tea Tree *L. laevigatum*	No
Mount Worth	38° 18' 0.34"S	145° 58' 42.53"E	~400	+11/2/2007 *11/2/2007 #11/2/2007 23/2/2007	Duplex clay	Mountain Ash *E. regnans*, Black wood *A. melanoxylon*, Silver Wattle *A. dealbata*, Soft Tree Fern *Dicksonia antarctica*	Yes

mine awareness of the species' presence. Apart from the authors' initial camera survey in The Gurdies Reserve (Hynes and Cleeland 2005), Gippsland bobucks do not appear to have been previously reported in peer reviewed literature (Kutt and Yugovic 1996; Wilson 1990).

J Hillyard (pers. comm.) informed the authors that the Inverloch Animal Refuge took in an injured bobuck that had been found on the Bass Highway near Grantville. It was the first and remains the only bobuck ever seen at this refuge. P Westwood (pers. comm.) photographed a bobuck near the Bass River at Grantville in 1992. G Wallace (pers. comm.) photographed one on his property at Foster in 1978. Thus our survey was able to determine only three sightings, spanning a time frame of 29 years, with definite identification of bobucks in south-west Gippsland. Apart from a single report (J Hillyard), there was no response from the general public as a result of stories about this survey in regional print media (news coverage 2006). No response was received via the survey's associated web site.

Discussion

The broad distribution of bobucks in Gippsland was unexpected because their habitat requirements are reported to be more restricted than for their close relatives the common brushtail possums (Kerle 2001) which have been able to colonise a greater variety of habitats than the bobuck. For example, unlike common brushtails, bobucks are not known in urban areas and are thought of as having evolved in stable forest environments (Tyndale-Biscoe 2005). In view of the range of (human) activities that take place there, from farming to extractive industries to land clearing and re-vegetation, Gippsland can hardly be thought of as providing a stable natural environment.

The Bobuck is reported to depend upon *Acacia* spp., particularly Silver Wattle *Acacia dealbata*, for its diet (Burchfield *et al.* 2005; Seebeck *et al.* 1984; Martin and Handasyde 2007). However, Silver Wattle was present at only two camera sites and was not dominant at any site. Bobucks are known to feed at ground level (Kavanagh 1984; Seebeck *et al.* 1984; Martin *et al.* 2004) and various authors have previously noted their ability to use not only ground-level plants but also hypogeal and epigeal fungi as food resources (Seebeck *et al.* 1984; Claridge and Lindenmayer 1998; Martin *et al.* 2004). There appeared to be no association of Gippsland bobucks with any particular type of vegetation; they are to be found in a variety of Eucalypt stands or in Tea Tree. Their habitats can be either older growth such as at The Gurdies or, more usually, in comparatively recent regrowth (e.g. Koonwarra, Bald Hills).

Although there are anecdotes about their presence in south-west Gippsland for almost the last 30 years (Hynes and Cleeland 2005) the paucity of such knowledge leads the authors to surmise that bobucks were rare in the survey area until relatively recent times. Biodiversity surveys in the early to mid-90s using spotlights, hair tubes and traps failed to detect them either in or near The Gurdies Reserve (Kutt and Yugovic 1996, Wilson 1990).

In view of the findings reported herewith, the authors feel that the common appellation recommended by Lindenmayer *et. al.* (2002), namely 'mountain' brushtail possum, is not an accurate description and should be dropped in favour of a name less misleading to the lay public. For the sake of simplicity, we urge that the northern group, 'Short Eared Possum' *T. caninus*, (Lindenmayer *et. al.* 2002), be re-designated as the 'Northern Bobuck' and those from south-west Gippsland be known by the name 'Southern Bobuck' *T. cunninghami.*

The outcome of this survey emphasises that relatively inexpensive yet technically versatile automatic camera-trap technology allows new data relating to the distribution of native animals to be collected with convenience and economy.

Acknowledgements

The Gippsland Bobuck Infrared Camera Survey was conducted under the terms of Research Permit Number 10003882, Department of Sustainability and Environment. The authors thank Parks Victoria for sanctioning this work. The authors thank Anne and Phil Westwood, Gary and Joan Wallis and Jan Hillyard who provided information about previous bobuck sightings in Gippsland and M Hoskins (Ranger, Parks Victoria) for information about bobucks at Wilsons Promontory. The authors thank Dr JK Martin of Melbourne University Zoology Department for generously providing advice about bobucks and for helpful criticism of this manuscript. The authors also thank Ian Hynes for preparation of images presented herewith.

References

Burchfield E, Agar NS and Hume ID (2005). Effects of terpenes and tannins on some physiological and biochemical parameters in two species of phalangerid possums (Mar-

supialia: Phalangeridae). *Australian Journal of Zoology* **53**, 395-402.
Claridge AW and Lindenmayer DB (1998) Consumption of hypogeous fungi by the mountain brushtail possum (*T. caninus*) in eastern Australia. *Mycological Research* **102**, 269-272.
Collins BB (2003) Phylogeography of brushtail possums (*T. vulpecula*). (Unpublished BSc Hons thesis, James Cook University, Townsville)
Hynes D and Cleeland M (2005) Presence of Bobucks *Trichosurus caninus* in The Gurdies on Westernport Bay, Victoria. *The Victorian Naturalist* **122**, 141-145.
Hynes D (2006) The Gurdies Bobucks: How Are they Faring? *The Victorian Naturalist* **123**, 117-118.
Hynes D (2007) Final Report: Gippsland Bobuck Infrared-Camera Survey, 2006-2007. Department of Sustainability and Environment, Melbourne.
Kavanagh RP (1984) Seasonal changes in habitat use by gliders and possums in southeastern New South Wales. In *Possums and Gliders*, pp. 527-543. Eds AP Smith and ID Hume. (Surrey Beatty & Sons: Chipping Norton, NSW)
Kerl A (2001) *Possums: the Brushtails, Ringtails and Greater Glider*. (UNSW Press: Sydney)
Kutt AS and Yugovic JW (1996) Fauna of the Grantville Gravel Reserve, with Reference to Vegetation and Conservation Significance. *The Victorian Naturalist* **113**, 58-57.
Lindenmayer DB, Cunningham RB, Tanton MT, Smith AP, and Nix HA (1990) Habitat requirements of the mountain brushtail possum and the greater glider in the montane ash-type eucalypt forests of the Central Highlands of Victoria. *Australian Wildlife Research* **17**, 467-478.
Lindenmayer DB, Dubach J, and Viggers KL (2002) Geographic dimorphism in the mountain brushtail possum *Trichosurus caninus*: the case for a new species. *Australian Journal of Zoology* **50**, 369-393.
Martin JK, Handasyde KA, Wright CJ, Ayer LT, McDonald-Madden E and Reside A (2004) Aspects of the ecology of the bobuck *Trichosurus caninus* in the Strathbogie Ranges, Victoria. In *The biology of Australian possums and gliders*, pp. 484-489. Eds RL Goldingay and SM Jackson. (Surrey Beatty & Sons: Chipping Norton, NSW)
Martin JK and Handasyde KA (2007) Comparison of bobuck demography in two habitat types in the Strathbogie Ranges. *Australian Journal of Zoology* **271**, 375-385.
Menkhorst P and Knight F (2001) *A Field Guide to the Mammals of Australia*. (Oxford University Press: Melbourne)
Seebeck JH, Warneke RM and Baxter BJ (1984) Diet of the bobuck, *Trichosurus caninus* (Ogilby) (Marsupialia: Phalangeridae) in a mountain forest in Victoria. In *Possums and Gliders*, pp. 145–154. Eds AP Smith and ID Hume. (Surrey Beatty & Sons: Chipping Norton, NSW)
Tyndale-Biscoe H (2005) *Life of marsupials*. (CSIRO Publishing: Melbourne)
Wilson CG (1990) Mammals of The Gurdies, a proposed Flora and Fauna Reserve. *The Victorian Naturalist* **107**, 52-57.

Web Site:
"Bobuck Underground" Biodiversity Survey
<http://www.thylacoleo.com/bobuck_underground/>

Media Coverage 2006:
The Current, Spring Issue 2006, pg 2. Tales of the Bobuck, Maureen Sherrin.
South Gippsland Sentinel Times, June 27, 2006, pg. 25. Discovery of an Unknown Possum.

Received 19 July 2007; accepted 9 July 2009

Velvet Thread-petal *Stenopetalum velutinum* rediscovery in Victoria

David Cheal

Arthur Rylah Institute for Environmental Research
123 Brown St, Heidelberg, Victoria 3084. Email: david.cheal@dse.vic.gov.au

Abstract
The Velvet Thread-petal *Stenopetalum velutinum* has been rediscovered in Victoria in the Big Desert – the first confirmed records since the nineteenth century. (*The Victorian Naturalist* **127** (1) 2010, 19-22)

Keywords Stenopetalum, velutinum, rediscovery, Big Desert

Introduction

2002 Wildfires and Report

The 2002 wildfires in the Big Desert burnt a substantial part of the west and north-west of the Big Desert (Fig. 1), including stands of 36 plant species listed as rare or threatened in Victoria. The post-fire status of some of these plants was assessed on field trips in 2003 (Carter and Cheal 2004). During one of these trips, we traversed an unusual patch of low mallee, whilst returning to the car one evening. We collected specimens of an unfamiliar tall herb. These specimens subsequently proved to be Velvet Thread-petal *Stenopetalum velutinum* F. Muell., as recognised by the distinct branching hairs, the lack of simple hairs, the largely linear leaves and near-glabrous upper stems.

Stenopetalum velutinum is a more or less annual native herb of the crucifer family (Brassicaceae). It grows to about 65 cm tall from a woody base. The basal leaves are about 7 cm long and entire or with a few teeth. The stem leaves are lanceolate to linear and up to 7 cm

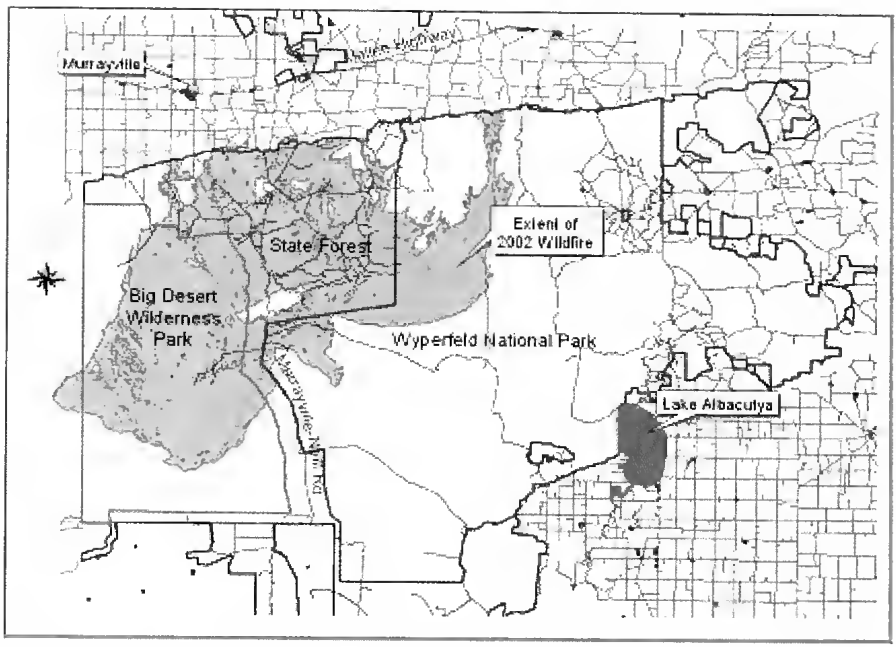


Fig. 1. Extent of the 2002 Wildfire in the Big Desert (fire boundary courtesy of DSE, Mildura; other data from the DSE corporate library).

long. The insignificant greenish-yellow flowers are followed by oblong or obovoid short fruits about 5 to 8 mm long. The main feature that distinguishes this herb from the species with which it is most likely to be confused (i.e. Narrow Thread-petal *S. lineare* R.Br. ex DC.) is the distinctively branched hairs scattered along the stems, cf. the short covering of mostly simple (unbranched) velvety hairs covering the foliage and stems of the closely-related and similar *S. lineare*. Furthermore, the basal leaves of S. velutinum are reliably linear (perhaps with a few insignificant marginal teeth) cf. the pinnately lobed basal leaves of *S. lineare*. *Stenopetalum lineare* is common and widespread in native vegetation of north-western Victoria, from raak shrublands near salt pans to mallee communities on loamier sands and broombush on laterised outcrops.

In spite of a 25-year familiarity with the flora of the north-west of Victoria, I had never seen *S. velutinum*, although the other two Victorian species of *Stenopetalum* (*S. lineare* and *S. sphaerocarpum*) had been commonly encountered.

Stenopetalum velutinum in Victoria

The Victorian Flora Information System (FIS), the database of plant occurrences maintained by the Department of Sustainability and Environment (DSE), has no site records for *S. velutinum*, suggesting that this species had not been recorded in the last century or so of surveys in Victoria.

The Flora of Victoria vol. 3 considered *S. velutinum* ' ... now apparently very rare in Victoria and reported recently from only Wyperfeld National Park and Red Cliffs area' (Walsh and Entwisle 1996). However, these recent reports are not supported by specimens lodged at the National Herbarium (MEL) nor by site records in the FIS.

Inspection of MEL collections, (Royal Botanic Gardens Board, Melbourne, MELISR database, 30 January 2009), revealed eight Victorian collections. All were from the Wimmera (mostly around Nhill to Dimboola) and dating from 1885 to 1899. There was scant ecological information provided, apart from the notes 'good soils' (MEL620107A) and 'pastures' (MEL 2232767A). The most recent collection was dated 1899. As is usually the case with historic records, these earlier collection sites cannot be precisely located in the field.

Clearly, *S. velutinum* is extremely rare in Victoria. It is listed as 'vulnerable in Victoria' in

DSE (2005). Carter and Cheal (2004) proposed that its status be redetermined as 'endangered in Victoria'. *Stenopetalum velutinum* is not listed under Victoria's Flora and Fauna Guarantee Act, nor the Federal Environment Protection and Biodiversity Conservation Act.

Recent Big Desert record

The specimen collected in the 2003 record came from a small mallee flat of approximately 400 m^2 and 50 to 100 m east of latitude 35° 30' 35.8" South and longitude 141° 18' 41.2" East. Twelve individual plants were seen, all apparently regenerated from seed after the 2002 wildfires. Dominant eucalypts were Dumosa Mallee *Eucalyptus dumosa*[1] s.l. and Narrow-leaf Mallee *E. leptophylla*. This small mallee patch was a marked contrast to the extensive (surrounding) heathland vegetation, dominated by Heathy Mallee (*sensu* White *et al.* 2003), which has an open canopy of Yellow Mallee *E. incrassata* and *E. leptophylla*, above an open shrub layer of typical heathland species, particularly Desert Banksia *Banksia ornata*, Common Heath-myrtle *Calytrix tetragona*, Western Sheoke *Casuarina* sp. (also known as *Allocasuarina muelleriana*)[2], Dwarf Sheoke *Casuarina pusilla*, Desert Hakea *Hakea mitchellii* and Silky Tea-tree *Leptospermum myrsinoides*.

Specimens of *S. velutinum* were collected and will be lodged with MEL.

Ecological speculation

Former Victorian occurrences of *S. velutinum* were from the relatively fertile loams of the Wimmera (Connor 1966; Morcom 2000). The Big Desert is dominated by aeolian Lowan sands that are remarkably free-draining and infertile (Lilley 1993; Cheal 1994). The infertile sands of the Big Desert support few grazing mammals, including very few kangaroos and rabbits (Cochrane and McDonald 1966; Sandell *et al.* 2002). It is suggested that *S. velutinum* is highly palatable and was early eliminated from most of its former Victorian range following the introduction of domestic stock and rabbits. Lack of contemporary seed sources and ongoing grazing by rabbits and kangaroos may be maintaining its rarity in parks and reserves. Its persistence in this small site towards the centre of the Big Desert can be attributed to (1) a lack of local grazing pressure (from rabbits, goats or kangaroos), as the surrounding habitats support very low densities of grazing mammals, and (2) a gap in the overlying Lowan sands, exposing more fertile loamy sands derived from the underlying Parilla Formation (White *et al.* 2003).

Although *S. velutinum* may have taken advantage of the opportunities presented for regeneration by the recent fire, it is unlikely to be a strict fire ephemeral (i.e. with an obligately fire-cued germination and not visible for extended periods between fires). The two other Victorian species in the genus, *S. lineare* and *S. sphaerocarpum*, are annuals and commonly seen in both burnt and long-unburnt habitats. Other native species of the family (Brassicaceae) in north-western Victoria are often disturbance responsive, but none is known to be a strict fire ephemeral.

There are recent records of *S. velutinum* from the arid centre of Australia (Fig. 2), where the species apparently remains (seasonally) common. However, there are few to no recent records from the agricultural areas of South Australia. In New South Wales, *S. velutinum* is gazetted 'Presumed Extinct', with only three (historic) records from the state (PlantNET, Royal Botanic Gardens Sydney).

It appears that *S. velutinum* has been (nearly) exterminated in south-eastern Australia by a combination of land clearance (including for cropping) and high grazing pressure from introduced mammals (notably rabbits and hares), and perhaps also from macropods (increased populations due to the forage increase resulting from tree clearance). There are very few Western Grey Kangaroos *Macropus fuliginosus* in the Big Desert, and no evidence of rabbits or goats in the vicinity of this stand of *S. velutinum*. Hence, none of the *S. velutinum* plants showed any evidence of having been browsed. The recent fire (one of a succession of large, landscape-scale fires in the Big Desert, e.g. 1959, 1982) may have provided some release from even this low grazing pressure, as native vegetation regenerating after being burnt is considered more palatable than older vegetation (Land Conservation Council 1974 and 1987; Tasker and Bradstock 2006), thus providing increased local forage for the very small populations of mammalian browsers found in the Big Desert.

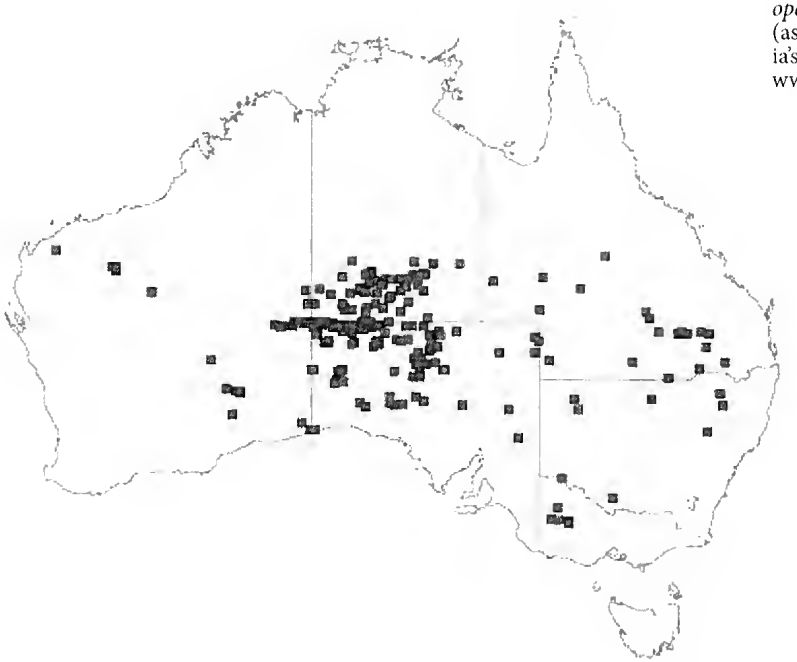


Fig. 2. Distribution of *Stenopetalum velutinum* records (as extracted from Australia's Virtual Herbarium: www.rbg.vic.gov.au/avh/)

Acknowledgments

Obe Carter assisted in collection of the field data. The survey was funded by DSE, Mildura. Alison Vaughan assisted in extraction of data from MEL records.

Notes

1. nomenclature follows Walsh and Entwisle (2003) unless indicated otherwise
2. after Hwang (1992)

References

Carter O and Cheal D (2004) *Recovery of Rare and Threatened Flora after the 2002 Wildfire and Vital Attributes to Assist Ecological Fire Management in the Big Desert, Western Victoria.* Arthur Rylah Institute Technical Paper Series.

Cheal DC (1994) Fire Succession in Heathlands and Implications for Vegetation Management. In *Fire and Biodiversity: The Effects and Effectiveness of Fire Management.* Biodiversity Unit, Department of Environment, Sport and Territories, Canberra, ACT

Cochrane GR and McDonald NHE (1966) A Regeneration Study in the Victorian Mallee. *The Victorian Naturalist* **83**, 220-226.

Connor DJ (1966) Vegetation studies in north-west Victoria II. The Horsham Area. *Proceedings of the Royal Society of Victoria* **79**, 637-647.

DSE (2005) *Advisory List.* Department of Sustainability and Environment (Victoria), East Melbourne, Victoria.

Hwang YH (1992) The Casuarinaceae: *Allocasuarina* is unsupported. *Australian Systematic Botany Society Newsletter* **70**, 16-19.

Land Conservation Council (1974) *Report on the Mallee Study Area.* Land Conservation Council of Victoria, Melbourne.

Land Conservation Council (1987) *Report on the Mallee Area Review.* Land Conservation Council of Victoria, Melbourne.

Lilley DM (1993) *Banksia ornata* decline in Wyperfeld National Park. Biology C31 Assignment.

Morcom L (2000) The Floristic Composition and Regeneration Characteristics of Buloke (*Allocasuarina luehmannii*) Woodland of the Wimmera, Victoria. In *Centre for Environmental Management.* Ballarat, Victoria.

Sandell P, Ballentine M and Horner G (2002) *Vegetation Recovery in the Victorian Mallee Parks 1991-1998.* Parks Victoria, Melbourne

Tasker EM and Bradstock RA (2006) Influence of cattle grazing practices on forest understorey structure in north-eastern New South Wales. *Austral Ecology* **31**, 490-502.

Walsh NG and Entwisle TJ (1996) *Flora of Victoria. Vol. 3 Dicotyledons Winteraceae to Myrtaceae.* (Inkata Press: Melbourne)

White M, Oates A, Brown J, Barlow T, McMahon A, Rosengren N, Cheal D, Sutter G, Sinclair S, Chesterfield E, Frood D and Pelikan M (2003) Vegetation Mapping North-West Victoria, Arthur Rylah Institute for Environmental Research, Department of Sustainability and Environment, East Melbourne, Victoria.

Received 2 July 2009; accepted 3 December 2009

Australian Natural History Medallion 2009: Richard Shine *AM*

The winner of the 2009 Australian Natural History Medallion is Dr Richard Shine, Professor in Biology, University of Sydney. In the past ten years Professor Shine has authored more than 400 scientific papers on herpetological subjects, and received a number of awards marking excellence in his field. The Australian Society of Herpetologists and the ACT Herpetological Society jointly nominated Professor Shine, to recognise his lifetime's work—devoted not only to discovering new information about the natural history of reptiles, but also to disseminating that knowledge widely to influence public attitudes and to assist in the conservation of Australian fauna.

Dr Shine has provided reliable information on basic life-history and ecological characteristics of a large proportion of the snake fauna of Australia. In addition, he has conducted or initiated intensive field studies to elucidate information necessary for the conservation of species and the ecosystems that they inhabit. In 1992 his popular book *Australian Snakes - a natural history* received the Whitley Award for the best Zoological Handbook. It has since been reprinted a number of times (1998, 1999, 2001 and 2004) and has influenced a whole generation of young Australians to see snakes in a more favourable light.

More recently, Rick has initiated a wide-ranging project on the biology, impact and control of cane toads. Perhaps the best example of his extracurricular effort is his website <www.canetoadsinoz.com>, which he and his wife have set up to provide the general public with quick and easy access to reliable information about this invasive pest.

Amongst Professor Shine's awards are the Clarke Medal of the Royal Society of New South Wales (1990); the Mueller Medal (ANZAAS – 2005); and the Eureka Prize for Biodiversity Research (2006). He was elected a Fellow of the Linnean Society of London in 2005 and, in the same year, was appointed as a Member of the Order of Australia. Overseas awards include the E.O. Wilson Naturalist Award, presented by the American Society of Naturalists, for contributions to the evolutionary biology and natural history of snakes (2000), and the Henry S. Fitch Award, presented by the American Society of Naturalists and Herpetologists, for outstanding contributions to herpetology (2003).

Much of Rick's efforts have focused on long-term projects, and address issues that occur on a timescale inaccessible to most scientific research. Many of the processes of critical importance to population viability—such as responses to changing climates or the invasion of feral organisms—play out over long periods. For example, 25 years ago Rick initiated intensive, highly detailed studies on the reptiles and amphibians of the coastal floodplains of the Northern Territory. He and his colleagues have been able to understand, and therefore predict, the ways in which year-to-year variation in weather conditions translates into shifts in prey densities, and thus into demographic features (recruitment, survival, growth, reproductive output) of predator populations. His empirically-validated models of the links between climate and population viability comprise a powerful tool for understanding, predicting and managing the impacts of future climate change.

Professor Shine has made detailed studies on the ecology of a highly endangered snake in eastern New South Wales (the Broad-headed Snake *Hoplocephalus bungaroides*) and on the biology and impact of cane toads in the Australian tropics. Currently, he has major collaborative projects with the NSW National Parks and Wildlife Service, Zoos Victoria and the Australian Reptile Park, not only to improve understanding of the processes that threaten the endangered broad-headed snakes, but also to remedy those problems by landscape-scale habitat improvement measures. That project has involved construction and deployment of artificial rocks to replace those stolen for garden ornamentation, and large-scale forest thinning to allow sun penetration to the snake's favoured rocky crevice habitats. Similarly, he is working with Federal Department of Environment and Heritage and the Western Australian Department of Conservation to mitigate impacts of

the invasive cane toad on the endemic fauna of the Kimberley region.

Just as important as Rick's direct contributions, has been his mentoring of more than 50 research students, and his encouragement of amateur reptile enthusiasts. By giving frequent talks at local community group meetings, he has provided inspiration and guidance to younger members of the reptile-enthusiast community. Many of his former students have attained responsible positions in Australian universities and museums, greatly expanding his influence on Australian herpetology.

Rick Shine has contributed prolifically to popular magazines and appeared, literally, hundreds of times on radio and television shows to promote an understanding of the natural history of the Australian reptile fauna. Stories and interviews about his research have appeared in every major Australian newspaper over the last few years, on most major television stations, and on many national and local radio stations.

Professor Shine's enthusiasm for communicating with the general public has contributed enormously to the rapprochement that is continuing to build between Australians and components of their native fauna that previously were feared, hated or neglected. He has been an extremely influential figure in studying and publicising the natural history of Australian reptiles.

Ian Endersby
56 Looker Road
Montmorency, Victoria 3094

Australian Natural History Medallion Trust Fund

Donations were gratefully received during 2009 from the following:

	$
Royal Society of Victoria	200.00
Mrs Eulalie Brewster	50.00
SEANA	500.00
Mid Murray Field Naturalists	20.00
Gary Presland	30.00
Mrs Felicity Teague	50.00
John Patykowski	5.00
Field Naturalists Club of Victoria	200.00
Victoria Hemming	10.00
Launceston Field Naturalists Club	50.00
Philip Rance	15.00
Victorian Ornithological Research Group	25.00

If you would like to contribute to this fund, which supports the Australian Natural History Medallion, donations should be sent to: The Treasurer, Field Naturalists Club of Victoria, Locked Bag 3, Blackburn, Vic. 3130. Cheques should be made payable to the 'Australian Natural History Medallion Trust Fund'.

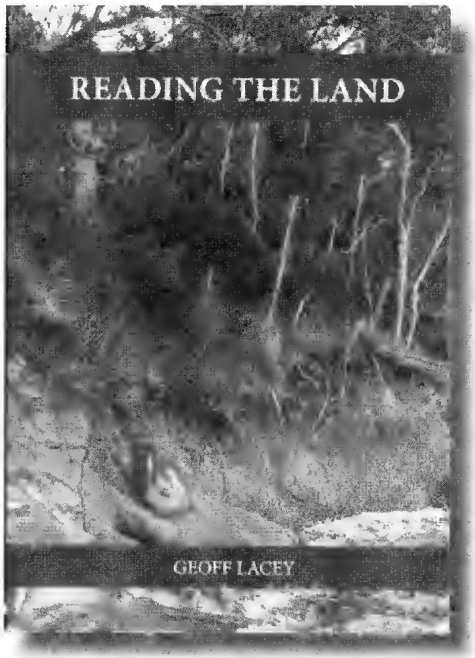
The medallion is awarded annually to a person who is considered to have made the most significant contribution to the understanding of Australian natural history in the last ten years.

Ian D Endersby
Secretary
ANHM Committee

Reading the Land

by Geoff Lacey

Publisher: *Australian Scholarly Publishing 2008. 292 pages, paperback;*
ISBN 9781740971553. RRP $39.95.



Understanding the landscape is integral to conservation efforts, and conserving the landscape is integral not only to survival of humanity but to all living things, a fact often taken for granted. Geoff Lacey takes us on a journey through the natural history of central Victoria (briefly) and French Island. The journey begins by evoking a feeling of continuity with the past, reminding us of our heritage and that the land is important for our spiritual as well as our physical well-being. To achieve this, Geoff uses quotes from many sources including a beautiful poem by Bill Neidjie, expressing the Aboriginal sense of intimacy with the land.

The key concepts relating to landscape patterns, how they have changed with time, the geology, the flora and fauna are described. The regular use of quotes from historians, naturalists and those who lived on the land or simply visited it, adds a further layer of interest and intrigue to these descriptions. The text is supported by easy-to-read maps, a small glossary, notes on sources, an index and a table listing the indigenous plant species at study sites. However, readers without some knowledge of plants and their communities would do well to have a picture book of Victorian plants close to hand for navigating through the many vegetation descriptions and lists of their characteristic species. Some photographs of plants and vegetation communities are provided, as well as reproductions of two beautiful artworks: *Snowy Bluff on the Wonnangatta River* by Eugene von Guerard (1864) and *Bush Track, Dromana* by Louis Buvelot (1875).

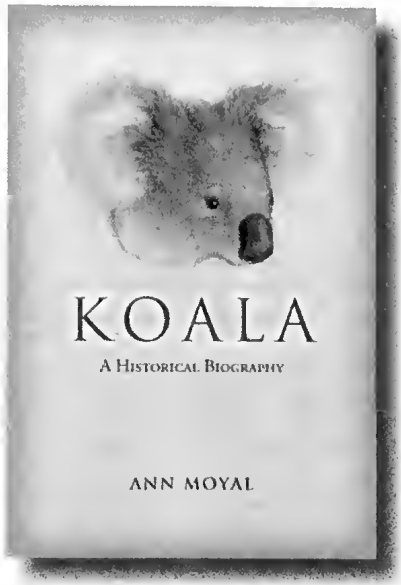
The book is a great resource for understanding the natural history of the land, not just central Victoria and French Island but elsewhere as well, since the key concepts and methodology of reading the land can be applied to other situations. For this reason alone, the book is well worth acquiring, but it also provides an interesting and thought-provoking read: food for both the mind and the soul.

Maria Gibson
Plant Ecology Research Unit
Life and Environmental Sciences
Deakin University
221 Burwood Highway, Burwood, Victoria 3125

Koala: A historical biography

by Ann Moyal

Publisher: *CSIRO Publishing, 2008, 256 pages, colour photographs. ISBN 9780643094017. RRP $39.95*



This book is a captivating narrative that documents the early history of the koala, the perceptions of early Australian settlers about this unique animal, and continues through to the current status of the koala. The book contains many interesting illustrations (mostly in black and white) with early paintings and sketches by naturalists and artists including John Lewin, Ferdinand Bauer, James Stuart, John Gould, Georges Cuvier and William Romaine Govett. There are even some of Norman Lindsay's depictions of the koala as 'Bunyip Bluegum' in *The Magic Pudding*.

The accounts of the early encounters of white man with koalas and aboriginal history are what make this book different from other books about the koala (another narrative-style book was published only one year earlier than this one). It is interesting to know, although probably not hard to believe if you have ever tried searching for a koala yourself, that koalas went undetected for many years following European settlement in Australia. The first encounter appears to be that by Frenchman Francis Barrallier in 1802. He noticed his aboriginal guides eating one and traded a tomahawk for the feet!

The first attempts by naturalists and taxonomists to describe the koala; and the study of the koala for medical applications are also well-detailed. The stories about how koalas were caught for study add humour to the book. There was one account of an aborigine climbing a tree with a noose made from bark attached to the end of a pole. He placed the noose around the koala's head and attempted to bring the koala to the ground, much the same as how koalas are caught today. The catchers soon discovered that the apparently 'gentle' koala had extremely sharp claws and even described it as attacking them out of 'spite'. Readers who have helped catch koalas could relate to stories like these.

The book also relates some of the aboriginal legends of koalas, and discusses the debate over whether aborigines may have contributed to the decline of the koala in Australia by burning habitat and hunting. The narrative continues with the shocking details of the extent of hunting of koalas by white men, and the mostly inadequate protection afforded to koalas by early legislation.

My only criticism of the book is its account of the more recent history of the koala. It provides a very superficial view of what has become a very complex (and often controversial) management issue. Furthermore, many details provided are contradictory to those in scientific publications, which made me wonder about the accuracy of sources used for this component of the book. For example, it was stated that male koalas on Kangaroo Island are being 'inoculated' to make them infertile, yet scientific publications state that the overabundance on the island is being addressed through a program based on the surgical sterilisation of koalas.

Despite this, the book is an enjoyable read and although focused on the koala, paints a colourful picture of the history of discovery of Australia's other wildlife and habitats.

Desley Whisson
Life and Environmental Sciences,
Deakin University
221 Burwood Hwy, Burwood, Victoria 3125

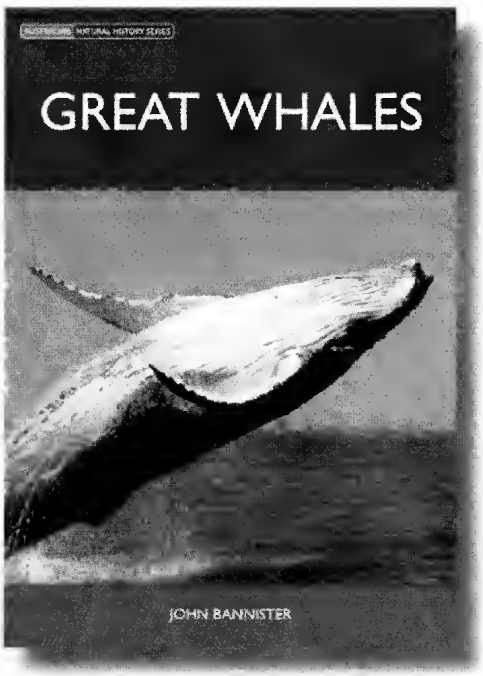
Great whales

by John Bannister

Publisher: *CSIRO Publishing, Collingwood, Victoria, 2008, 160 pages, paperback, colour photographs. ISBN 9780643093737. RRP* $39.95

The 'great whales' of this book's title is a term, first referred to in the book of Genesis, which has more recently referred to a grouping of cetacean species, including the filter-feeding baleen whales as well as the largest of the toothed whales, the sperm whale. The members of this group are linked because they have been the principal targets of the whaling industry over the past two centuries. In the Australian context for which the book is written, the relevant baleen whales include blue whales (one species but two sub-species), fin whales, sei whales, Bryde's whales, minke whales (two species), humpback whales and southern right whales. True to its title the book ignores the fascinating and little-known pygmy right whale, the smallest baleen whale, which occurs across southern Australia but which is not classified as a 'great whale'.

John Bannister is well placed to write this book. Former longtime Director of the West Australian Museum, he has been involved in great whale research since 1961, when he took up a position as Junior Whale Fishery Inspector at sub-antarctic South Georgia Island in the South Atlantic. Fortunately for science, the British Government employed biologists such as Bannister to gather what useful information could be obtained from the abundant supply of whale carcasses that the industry was busy creating, before population crashes brought about the conservation ethic that prevails today. Without this scientific legacy, the deaths of more than 2 000 000 whales in Antarctic and sub-Antarctic waters during the 20th century would have been an even more tragic waste than they were. As it was, a wealth of data was gathered by diligent scientists like Bannister, toiling away in the freezing blood and guts of whaling stations. Thanks to them we have irreplaceable data that taught us much about whale diet, migration, reproduction, growth and other essentials of cetacean biology.



Bannister's own career in cetology – the science of cetaceans – has traced historical changes in our attitude to whales, from commodities to be exploited for valuable oil and other products, to vital components of ecosystems to be studied and protected both for their own sake, and for future generations of humans to value. Bannister is also a longtime member—and past Chair—of the Scientific Committee of the International Whaling Commission.

In short concise chapters the book introduces whales and their defining characteristics: the evolving relationship between humans and whales from whaling to whale watching; the natural history of whales (including evolutionary origins, biology, behaviour, ecology, migra-

tion, predators and parasites); individual species accounts of the great whales; and finally, conservation and management, and the future. A glossary ranges from archaic whaling terms to modern technical terms.

The style is terse and to the point, illustrated with graphs and tables relating to salient points in the text, black and white historical images, and excellent colour photos of each species provided by experienced researchers. Much of the material reflects Bannister's membership of the close-knit Western Australian whale research community, and refers to much current research, with a large amount of information on humpback whales, Bannister's main research species. Not surprisingly, there is not so much detail about research conducted in other parts of Australia, where he does not work. Some species such as fin, sei and Bryde's whales are rarely sighted in Australian waters, while humpback, southern right, blue and sperm whales are perhaps the species about which most is known.

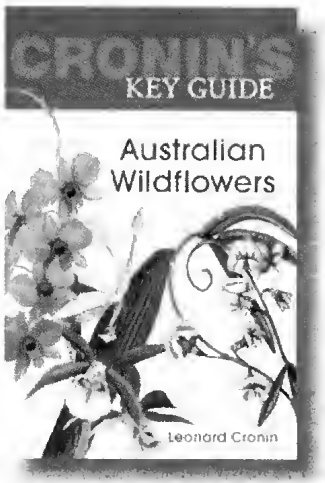
This easily readable book is a useful addition to the library of students and whale enthusiasts.

Dr Peter Gill
Blue Whale Study Inc.
C/- Post Office
Narrawong, Victoria 3285

Cronin's Key Guide to Australian Wildflowers

by Leonard Cronin

Publisher: *Allen & Unwin, 2008. 232 pages, paperback, colour illustrations. ISBN 9781741751116. RRP $35.00*



Australia has some of the most beautiful flowers in the world, a fact well illustrated in this fourth book of Cronin's Key Guides. Over 590 wildflowers from all over Australia are described. This constitutes less than 2% of Australia's flora but it introduces the reader to the major families of the Australian flowering plants, and highlights some of the more unique as well as some of the more common species. Scientific terms are kept at a minimum, thus plant descriptions can be easily understood by the novice as well as more experienced plant enthusiasts. The few botanical terms used are explained in a glossary at the back of the book. The habit or form of the plant, key leaf and flower characteristics, and flowering periods are succinctly described. Both scientific and common names are provided, and the accompanying distribution maps allow one to plan trysts with the seductive Bower of Beauty, Dusky Bush Pea or Horny Cone Bush.

The book has been designed as a straightforward and easy to follow field guide. Flowers with similar shapes are grouped together and a key to flower shapes is provided, with page numbers indicating where plants with such flowers can be found in the book. At the recommended retail price of $35.00, this book is an ideal travelling companion when touring Australia, or simply for familiarisation with Australia's unique and intriguing wildflowers.

Maria Gibson
Plant Ecology Research Unit
Life and Environmental Sciences
Deakin University
221 Burwood Highway, Burwood, Victoria 3125

Spectacular Snakes of Australia

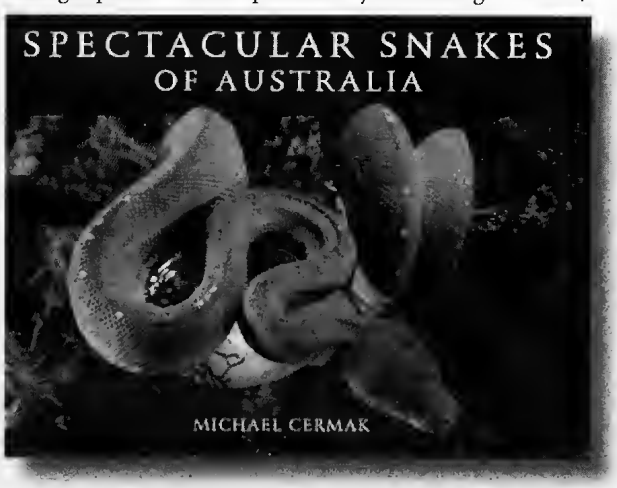
By Michael Cermak

Publisher: *CSIRO Publishing, Collingwood, Victoria 2008. 120 pages, paperback, colour plates. ISBN 9780643095946. RRP $40.00*

It is fair to say that, of Australia's vertebrate wildlife, snakes top the 'least popular' list. In fact, a recent study noted that of all the animals likely to be encountered in suburbia, snakes were the *least* desired around people's homes (Davies *et al.* 2004). Mentioning a fondness for snakes in polite company will often result in people smiling nervously, shuffling a few paces away, and quietly hoping that the malaise is not contagious.

I imagine that this is a situation that Michael Cermak has experienced more than once. In the preface to *Spectacular Snakes of Australia*, he relates his experiences over four decades, firstly as an amateur reptile keeper, and later as a lowly-paid professional (not much has changed in earning potential since then). Importantly, the preface also explains the aim and target audience of this book. This is *not* a field guide – there are a number of excellent national and regional field guides for Australian snakes; rather, in the words of the author, this book is intended to 'visually portray snakes, their habitats, predators and prey, alongside informative text, digestible not only by reptile enthusiasts but by anyone who appreciates wildlife and natural history' (p. vii).

The book follows a taxonomic format, showcasing representative or particularly interesting members of the families of Australian snakes, with a very brief overview of sea snakes and sea kraits. The accounts typically describe each snake's habits, habitat, predators, prey and reproduction, with numerous photographs of each of these subtopics. As in most modern books on reptiles, the photographs are very good. And as in several other books on Australian reptiles, the photogenic Green Python graces the front cover. A brief glossary is provided.



As well as imparting a great deal of factual information from recent decades of research by others, Cermak infuses the text with many anecdotes and facts from his own considerable experience (including observations from captive husbandry, and field experiences such as being bitten by a large Scrub Python!). The work is up-to-date, covering the recent discovery of a third species of Taipan and a second King Brown Snake.

The book has few faults – a couple of minor grammatical errors, and one photograph is out of place on page 81. I believe that any book that covers snakes should include a guide to snakebite first aid. I realise this is not within the explicit scope of the book, but it is a simple inclusion, and I like to see this information imparted at every opportunity, particularly when the likely readership will include young, passionate herpetologists who are known for their risk-taking.

Owing to the subject matter, I imagine that this book will not have a particularly wide readership, and most purchases will be by those already interested in snakes. This is a shame, because this is precisely the type of book and format that can engender an appreciation of these maligned animals.

Reference

Davies RG, Webber LM and Barnes GS (2004) Urban wildlife management – it's as much about people! In *Urban Wildlife: More Than Meets the Eye*. Eds Lunney D & Burgin S. (Sydney: Royal Zoological Society of New South Wales)

Nick Clemann
Arthur Rylah Institute
for Environmental Research
Dept of Sustainability and Environment
123 Brown Street Heidelberg,
Victoria 3084

Guidelines for Authors – *The Victorian Naturalist*

The Victorian Naturalist welcomes the submission of papers presenting original and significant research. When preparing a paper for publication, please follow the journal style as closely as possible.

Submission of a manuscript will be taken to mean that the material has not been published, nor is being considered for publication, elsewhere, and that all authors agree to its submission.

Authors may submit material in the form of Research Reports, Contributions, Naturalist Notes, Letters to the Editor and Book Reviews. All Research Reports and Contributions are peer reviewed by external referees. A ***Research Report*** is a succinct and original scientific paper written in a form that includes an abstract, introduction, methods, results and discussion. A ***Contribution*** may consist of reports, comments, observations, survey results, bibliographies or other material relating to natural history. The scope of a contribution is broad in order to encourage material on a wide range of topics and in a range of styles. This allows inclusion of material that makes a contribution to our knowledge of natural history but for which the traditional format of scientific papers is not appropriate. ***Naturalist Notes*** are generally short, personal accounts of observations made in the field by anyone with an interest in natural history. These notes also may include reports on excursions and talks, where appropriate, or comment on matters relating to natural history. ***Letters to the Editor*** must be no longer than 500 words. ***Book Reviews*** are usually commissioned, but the editors also welcome enquiries from potential reviewers.

Guidelines for presentation of papers

If submitting by post, three copies of the manuscript should be provided, each including all tables and copies of figures. If submitting by email, only a single copy is necessary. Original artwork and photos can be withheld by the author until acceptance of the manuscript. Manuscripts should be typed, double spaced with wide margins and pages numbered. Please indicate the telephone number (and email address if available) of the author who is to receive correspondence. Submission of manuscripts should be accompanied by a covering letter.

The ***title*** should be concise, interesting and informative and not stated as a question.

Research reports and contributions must be accompanied by an ***abstract*** of not more than 150 words. The abstract should state the scope of the work, give the principal findings and be sufficiently complete for use by abstracting services.

Keywords will be included folllowing the Abstract in Contributions and Research Reports. A maximum of five terms will be used.

References are cited chronologically in the text by author and date. All references in the text must be listed at the end of the paper in alphabetical order. Entries in this list must correspond to references in the text.

An electronic version and one hard copy of the manuscript are required upon resubmission after referees' comments have heen incorporated. Documents should be in Microsoft Word . **The bibliographic software 'EndNote' should NOT be used.**

Abbreviations

The following abbreviations should be used in the manuscript where appropriate (italicised as indicated): *et al.*; pers. obs.; unpubl. data; pers. comm. (followed by a date); 'subsp.' for subspecies.

Units

The International System of Units (SI units) should be used for exact measurement of physical quantities.

Figures and Tables

All illustrations (including photographs) are considered as figures and will be laid out to fit the width of a page (115 mm) or a column (55 mm) width. **It is important that the legend is clearly visible at these sizes.** Photographs sbould be of high quality/ high contrast which will reproduce clearly. They may be colour slides or colour or black-and-white prints, or digital images. Line drawings, maps and graphs may be computer generated or in black Indian Ink on stout white or tracing paper. The figure number and the paper's title should be written on the back of each figure in pencil. If a hand-drawn figure is scanned it must be done at **a minimum of 300 dpi resolution.**

Computer-generated figures should be submitted as high-quality TIFF, encapsulated postscript (EPS) or high quality JPG files scanned **at 300 dpi resolution** or more, separately on disc and not embedded into a MS Word document. Low-resolution JPG files will not be accepted.

Tables must fit into 55 mm or 115 mm. If using a table editor, such as that in MS Word, do not use carriage returns within cells. Use tabs and not spaces when setting up columns without a table editor.

All figures and tables should be referred to in the text and numbered consecutively. Their captions must be numbered consecutively (Fig. 1, Fig. 2, etc.) and put on a separate page at the end of the manuscript. Tables should be numbered consecutively (Table 1, Table 2, etc.) and have an explanatory caption at the top.

Please consult the editors if additional details are required regarding document formats and image specifications.

Permits

Papers reporting work that required permits should quote the apropriate permit type and numbers.

Sequence data
All nucleotide sequence data and alignments should be submitted to an appropriate public database, such as Genbank or EMBL. The accession numbers for all sequences must be cited in the article.

Journal style
A style guide for *The Victorian Naturalist* is available on our website. For further information on style, write to the editors, or consult the latest issue of *The Victorian Naturalist* or edition of *Style Manual for Authors, Editors and Printers* (John Wiley & Sons: Milton, Qld).

Authors are advised to note the layout of headings, tables and illustrations as given in recent issues of the Journal. A full stop is followed by a **single space**; **single quotation marks** are used throughout.

In all papers, first reference to a species should use both the common name and binomial. This journal uses capitalised common names for species, followed by the binomial in italics without brackets, e.g. Kangaroo Grass *Themeda triandra*. However, where many species are mentioned, a list (an appendix at the end), with both common and binomial names, may be preferred. Lists must be in taxonomic order using the order in which they appear in the references recommended below.

References
References in the text should cite author and year, e.g. Brown (1990), (Brown 1990), (Brown 1990; 1991), (Brown 1995 unpubl.), (Brown and Green 1990), (Brown and Green 1990; Blue 1990; Red 1990). If there are more than two authors for a paper use (Brown *et al.* 1990). All references mentioned in the text should be included, in alphabetic order, at the end of the text under **References** (see examples below). The use of unpublished data is accepted only if the data are available on request for viewing. Pers. obs. and pers. comm. should not be included in the list of references. **Journal titles should be given in full.**

Leigh J, Boden R and Briggs J (1984) *Extinct and Endangered Plants of Australia.* (Macmillan: South Melbourne)

Lunney D (1995) Bush Rat. In *The Mammals of Australia*, pp. 651-653. Ed R Strahan. (Australian Museum/Reed New Holland: Sydney)

Phillips A and Watson R (1991) *Xanthorrhoea*: consequences of 'horticultural fashion'. *The Victorian Naturalist* **108**, 130-133.

Smith AB (1995) Flowering plants in north-eastern Victoria. (Unpublished PhD thesis, The University of Melbourne)

Wolf L and Chippendale GM (1981) The natural distribution of *Eucalyptus* in Australia. Australian National Parks and Wildlife Service, Special Publications No 6, Canberra.

Other methods of referencing may be acceptable in manuscripts other than research reports, and the editors should be consulted.

Manuscript corrections
Page proofs are sent to the corresponding author for checking prior to publication. At this stage only minor alterations may be made.

Complimentary copies
Following publication of an article in the journal, five complimentary copies of that issue are sent to the author(s) for each paper. Authors of Naturalist Notes and Book Reviews will receive two complimentary copies of the journal. Please notify the editors before publication if more copies are required.

Taxonomic names
Cite references used for taxonomic names. **Checking species names is the responsibility of authors.** The books we use as references for articles in The Victorian Naturalist are listed below. **Authors should refer to the source used for species names in their manuscripts.** In every case, the latest edition of the book should be used.

Mammals – Menkhorst PW (ed) (1995) Mammals of Victoria: Distribution, Ecology and Conservation. (Oxford University Press: South Melbourne)

Reptiles and Amphibians – Cogger H (2000) *Reptiles and Amphibians of Australia*, 6 ed. (Reed Books: Chatswood, NSW)

Insects – ABRS: <http://www.environment.gov.au/biodiversity/abrs/online-resources/fauna/index.html>

Birds – Christidis L and Boles WE (2008) *Systematics and taxonomy of Australian birds.* (CSIRO: Collingwood, Victoria)

Plants – Ross JH (ed) (2000) *A Census of the Vascular Plants of Victoria*, 6 ed. (Royal Botanic Gardens of Victoria: Melbourne)

Please submit manuscripts and enquiries to:

The Editor
The Victorian Naturalist
Locked Bag 3, P.O.
Blackburn, Victoria 3130

Phone/Fax (03) 9877 9860.
Email vicnat@fncv.org.au
Web www.fncv.org.au

The Victorian Naturalist
is published six times per year by the

Field Naturalists Club of Victoria Inc

Patron: His Excellency, the Governor of Victoria

Registered Office: FNCV, 1 Gardenia Street, Blackburn, Victoria 3130, Australia.
Postal Address: FNCV, Locked Bag 3, Blackburn, Victoria 3130, Australia.
Phone/Fax (03) 9877 9860; International Phone/Fax 61 3 9877 9860.
email: admin@fncv.org.au
www.fncv.org.au

Address correspondence to:
The Editors, *The Victorian Naturalist*, Locked Bag 3, Blackburn, Victoria, Australia 3130.
Phone: (03) 9877 9860. Email: vicnat@fncv.org.au

Yearly Subscription Rates – The Field Naturalists Club of Victoria Inc

Membership category		*Institutional*	
Single	$65	Libraries and Institutions	
Concessional (pensioner/Senior)	$50	- within Australia	$120
Family (at same address)	$85	- overseas	AUD130
Junior	$18		
Additional junior (same family)	$6	Schools/Clubs	$65
Student	$25		

(These rates apply as of 1 October 2008)

All subscription enquiries should be sent to
FNCV, Locked Bag 3, Blackburn, Victoria, Australia 3130.
Phone/Fax 61 3 9877 9860. Email: admin@fncv.org.au