
The Australasian Bat Society Newsletter

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– Instructions for Contributors –

The *Australasian Bat Society Newsletter* will accept contributions under one of the following two sections: Research Papers, and all other articles or notes. There are two deadlines each year: **10th March** for the April issue, and **10th October** for the November issue. The Editor reserves the right to hold over contributions for subsequent issues of the *Newsletter*, and meeting the deadline is not a guarantee of immediate publication.

Opinions expressed in contributions to the Newsletter are the responsibility of the author, and do not necessarily reflect the views of the Australasian Bat Society, its Executive or members.

For consistency, the following guidelines should be followed:

- Emailed electronic copy of manuscripts or articles, sent as an attachment, is the preferred method of submission. Manuscripts can also be sent on CD, preferably in IBM format. **Please use the Microsoft Word template if you can (available from the editor).** Faxed and hard copy manuscripts will be accepted but reluctantly! Please send all submissions to the *Newsletter* Editor at the email or postal address below.
- Electronic copy should be in 11 point Arial font, left and right justified with 16 mm left and right margins. Please use Microsoft Word; any version is acceptable.
- Manuscripts should be submitted in clear, concise English and free from typographical and spelling errors. Please leave two spaces after each sentence.
- Research Papers should include: Title; Names and addresses of authors; Abstract (approx. 200 words); Introduction; Materials and methods; Results; Discussion; and References. References should conform to the Harvard System (author-date; see recent *Newsletter* issues for examples).
- Technical notes, News, Notes, Notices, Art etc should include a Title; Names and addresses of authors. References should conform to the Harvard System (author-date).
- All pages, figures and tables should be consecutively numbered and correct orientation must be used throughout. Metric units and SI units should be used wherever possible.
- Photographs can be reproduced in the *Newsletter* (consult the Editor for advice). Diagrams and figures should be submitted as 'Camera ready' copy, sized to fit on an A4 page, or electronically as TIFF, JPEG or BMP image files. Tables should be in a format suitable for reproduction on a single page.
- Research Papers and Notes will be refereed, and specialist opinion will be sought in some cases for other types of articles. Editorial amendments may be suggested, and articles will generally undergo some minor editing to conform to the *Newsletter*.
- Please contact the *Newsletter* Editor if you need help or advice.

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– Editorial –



G'day!

Looking back at my March 2009 editorial, I am reluctant to begin this one with 'it has been a scorcher of a summer', for fear of repetition! But I find it difficult to avoid, especially as Western Australia has seen its hottest, driest summer on record, period. The implications for our native fauna are not difficult to imagine. With the potential for increased fire events, decreased surface water availability and possibly (?) altered prey availability, it will be interesting to hear how bats, both 'mega' and 'micro' have fared this summer. Have you observed shifts in the timing, number or location of foraging fruit bats? Has your trapping success of forest bats exceeded your expectations, or have you noticed more deleterious affects of the hot weather? These anecdotal observations are the back-bone of this *Newsletter*, so please, don't be shy – send me your contributions today!

Apologies to the squeamish, but I couldn't resist sharing this photo with you. Last October I ventured to the Kimberley to help run a couple of feral pig baiting projects. We collected various tissue samples from carcasses, although I was not as happy as this picture makes out when I accidentally pierced this unlucky fellow's gut lining – stinky! But, you don't want to hear about pigs (unless they're the flying variety), so here's what's news with bats in this *mega* (66 pages!!) ABS *Newsletter* edition.

My attempt at blackmail has proved successful, with several up-and-coming students submitting updates on their projects to me in return for my 'Darwin-accommodation-booking-service' for the ABS Conference in July. Discover their great projects between pages 9 to 23.

Our Society (whose membership tipped 300 at the end of 2009!) is being asked to alert the powers-that-be to the great disservice being dealt to flying-foxes in NSW, both at the hands of fruit growers with guns *and* managers of the Royal Botanic Gardens in Sydney. The plight of our pteropid friends is detailed on pages 29 and 40 and you are asked to write to the relevant NSW Ministers whose details are provided on page 43.

On the research front, accurately counting bats was an issue confronted both by Marg Turton in Sydney and also Steven Bourne and colleagues in South Australia. Both teams have come up with very different solutions to their similar questions, find out how on pages 14 and 24. Ken Sanderson also reports on the detection of bats in vineyards, with the promise of some great relationships being fostered between grape-growers and bats in the Adelaide Hills, South Australia (page 7).

An early heads up to you all, but particularly to our budding students, the **American Society of Mammalogists** and the **Australian Mammal Society** are co-hosting a mammal conference in Portland, Oregon in June 2011. Stuart Parsons has submitted a proposal for a bat symposium to be included as part of this conference. I strongly urge students and others to consider presenting at this prestigious conference where exposure to the world's great mammalogists is guaranteed. For more details contact me or Stuart directly (s.parsons@auckland.ac.nz).

Word in the rumour mill has it that there could be a very exciting new bat publication from the Royal Zoological Society available in Darwin in July, something to look forward to!

Remember to register for the ABS Conference in Darwin by May 2010 (more details on page 46), and if you haven't already done so, book your accommodation soon before everything fills up.

Susan Campbell
Newsletter Editor

Cover: There were some great photos sent in to grace the cover of this edition. It was a tough choice between Terry Reardon's *Nyctimene cf robinsoni* (possibly new taxon), captured at Lickerbie Scrub, near the tip of Cape York (photo credit to Terry and Michael Pennay), and Simon Robson's wonderfully detailed male Creagh's Horshoe Bat *Rhinolophus creaghi*, full details on page 23.

– From the President –

Hi everyone and welcome to another entertaining and educational edition of the Australasian Bat Society *Newsletter*.

I have to say that whilst the front cover is indeed very beautiful, it does strike a little fear into me being 'camera operator' during the elaborate Reardon method of bat photography required to get shots like this one. A minimum of five positions are required to get a photo like this, including 'flash-holder', 'beer-holder', 'chucker' and 'bat removal/first aid assistant' (for when bat attaches to fingers of the 'chucker' and first aid to whomever required**). My view as camera operator was pretty much the same as what you see in the photo, except you have to focus on the teeth and imagine them progressing, at speed, closer and closer until they intersected with the (substantial) bridge of my nose.

Anyway, I digress. Thanks to everyone who has contributed, with your input this *Newsletter* is a very interesting read. I'd especially like to thank Susan for the great idea of blackmailing students to submit information about their work in exchange for accommodation in Darwin and the students who've subjected themselves to this blackmail! It's inspiring to read about the work you are doing and I look forward to hearing more stories from many of you soon in Darwin at the conference.

Earlier this year many of us had a 'scare' when Anna McConville circulated a photo of a bat with symptoms suspiciously like those emerging and rapidly spreading a bat pathogen known as white

nose syndrome which is causing mass bat mortality in North America (see page 30). The good news is that after testing by the Australian Registry of Wildlife Health at the Taronga Conservation Society, Anna's bat was found to be suffering from a mite infestation and not from the *Geomyces destructans* fungus associated with white nose syndrome. I was glad to hear this news, but equally glad to see that we had, in effect, a 'test run' of a worst case scenario and thing worked as they should have. I'd particularly like to thank Anna for being alert, recognising the potential seriousness and raising it, and also for taking the bat to Taronga Zoo, and Dr Karrie Rose from the Australian Registry of Wildlife Health for undertaking the testing as well as Tiggy Grillo and Rupert Woods for their assistance and advice.

Well, enough from me, just get in there and read it!

See you soon at the conference in Darwin.

Michael Pennay
ABS President

**nb: I can assure you no bats were harmed during photographic operations – the same cannot be said for the humans however!



Fuzzface-us taspennayensis? Falsisvespachalinob pennayii?
Or just our President after-hours?

– Australasian Bat Society Inc: Business and Reports –

*Ed: In January this year, the ABS wrote to the NSW Department of Environment Climate Change and Water about a proposal to demolish a maternity roost of the bat *Vespadelus troughtoni*, which is listed as a threatened species in NSW. The alert was raised by a local member who was concerned that the environmental impact assessment of the demolition did not properly consider the potential impact on the bat. The ABS asked Lisa Corbyn, Director General of DECCW to postpone the planned demolition until a proper impact assessment was undertaken which considered alternatives to demolition. Below is her response. Since receiving this response, the ABS has learnt that DECCW were intending to proceed with the demolition in early April 2010. The ABS contacted the Environmental Defenders Office and discussed the adequacy of the impact assessment and the EDO has supported the ABS view that the impact assessment was not legally adequate. The EDO has again written to DECCW on behalf of the ABS, again requesting that the demolition be postponed until a formal impact assessment is undertaken. Stop Press. We have just been informed by DECCW that they have decided not to go ahead with the demolition of the shed in Kwiambal National Park – great news!*

Ms Maree Kerr
Secretary
Australasian Bat Society Inc
PO Box 481
LINDFIELD NSW 2070

24 FEB 2010

Dear Ms Kerr

I am writing to you in relation to your letter dated 11 January 2010 regarding the Australasian Bat Society's concerns for the Eastern Cave Bat (*Vespadelus troughtoni*).

Managing national parks in NSW for conservation of nature is one of the most important aspects of park management. Kwiambal National Park was first gazetted in 2000 with an area of about 1,300 hectares. Since then, the park has had significant additions, with the total area now around 9,000 hectares. This increase in the area of reserved land for the park, as well as the expansion in the Nandewar bioregion since 2005, significantly contribute to the conservation of nature and provide even greater protection and conservation of habitat, especially for threatened species including the Eastern Cave Bat.

Acquisition of the land for Kwiambal National Park included a number of old farm structures and various derelict sheds, some lined with asbestos sheeting. Two sheds near several residences were used mainly for tobacco drying until the early 1980s. These two large sheds are adjacent to facilities for visitors and staff. The visitor facilities have been important in assisting local traditional owners, school groups and extended family and friends groups to access and enjoy the park.

As part of regular maintenance, the sheds were identified as a potential hazard. The sheds are constructed with cypress pine and asbestos sheeting; are in a poor state of repair, rapidly deteriorating and present a significant health and safety risk to members of the public and staff. The Department of Environment, Climate Change and Water (DECCW) takes its environmental responsibilities and its responsibility to protect people from hazards very seriously.

DECCW acknowledges that at times a colony of Eastern Cave Bats has been present in the sheds. In 2005, it was first identified that a maternity colony appeared to be established. This is the first evidence of the maternity colony being present at the site.

I would like to assure the Society that the Department is working to minimise impacts and, in particular, to not significantly impact on opportunities for the Eastern Cave Bat to establish maternity colonies in Kwiambal National Park. What DECCW is seeking to do is to retain one shed in sustainable condition which would have on-going access and use by the bats while also reducing health and safety risks to the public and staff in a manner that does not significantly impact on the Eastern Cave Bat.

The works proposed include removing one shed and stabilising and rehabilitating the other. The remaining structure will be made safe and also provide for ongoing use by the bats. It is also proposed to provide suitable education and interpretive material for visitors on various bats found in the park and the history of the tobacco growing industry in the Ashford area.

The proposed works were assessed under Part 5 of the *Environment Planning and Assessment Act 1979*. The assessment included a determination of the significance of possible impacts on the Eastern Cave Bat and a number of other environmental considerations including cultural heritage. The activity was determined to be not significant and therefore neither an Environmental Impact Statement nor a Species Impact Statement was required.

In the assessment and determination of possible environmental impact of removing one of the sheds, a number of significant matters were taken into account including:

1. A lengthy consideration of a range of options for the future of the sheds and for the management of the immediate precinct and the park as a whole.
2. A conservation assessment of the sheds and other infrastructure on the park, including oral history recording. The sheds were not considered significant, however, the smaller shed was recommended to be retained with interpretive material developed for visitors.
3. The retained shed will be stabilised, re-sheeted and decontaminated for ongoing access and use by the bats.
4. The area reserved for conservation purposes in Kwiambal National Park has increased from the original 1,300 to approximately 9,000 hectares in recent years. Conservation of this area provides significant protection and conservation of habitat especially for identified threatened species including the Eastern Cave Bat.
5. There are other known recordings of the Eastern Cave Bat in various reserves in the region for example in other parts of Kwiambal, Arakoola Nature Reserve and in Dthinna Dthinnawan Community Conservation Area.
6. The works will be carried out when bats are not using the sheds.

I would also like to assure you that a decision was made after a comprehensive consideration of options. In regards to the management of the asbestos, this was done in consultation with an environmental health safety expert in the field of asbestos management.

I have asked local staff to contact your organisation to discuss the approach we are using and to seek your assistance in the preparation of the interpretive material that will be displayed at the site.

I understand that the Regional Manager Northern Tablelands Region has provided a copy of the Part 5 assessment to a local member of your Society and that they are having discussions on the proposal. I think that this is constructive and have asked that the Regional Manager consider suggestions that would further mitigate any possible impact on the Eastern Cave Bat.

If you require further information in regard to your concerns, please contact Mr David Dutailis, Regional Manager Northern Tablelands on (02) 6776 0006.

Yours sincerely



LISA CORBYN
Director General

– Research Notes –

Bats in vineyards

Ken Sanderson

School of Biological Sciences, Flinders University,
South Australia

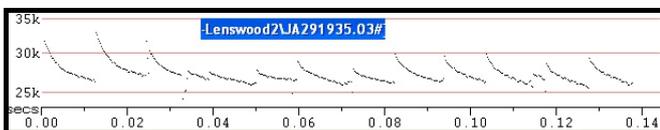
k.sanderson@flinders.edu.au

Starting mid-year 2009, Honours student Sarah Boyle from Flinders University has been studying the activity of bats in vineyards and neighbouring woodland in five vineyards located between Morialta and Woodside in the Adelaide Hills, and one at McLaren Flat, South Australia.



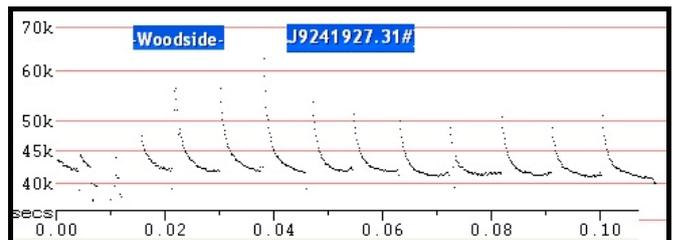
Sarah Boyle on-site at one of the vineyards where bats were regularly detected.

Initial bat recording in vineyards began in February 2009 at Sinclair's Gully near Norton Summit where Sue and Sean Delaney run an ecologically sensitive vineyard surrounded by Candlebark (*Eucalyptus rubida*) woodland. Lots of bat activity was recorded in just three nights of recording, with the detector placed in creek-bed woodland (CB) for two nights and in the vineyard (VY) for a single night (Fig. 1).



Greg and Jay Johnston with bat detector at Lenswood and a stationary bat detector in Woodside vineyard. There has been bat activity in all of the vineyards, sometimes detected better on night walks than by leaving the bat detectors overnight.

The February and March bat recordings at Sinclair Gully logged calls from forest bats (*Vespadelus regulus* and *V. darlingtoni*), wattled bats (*Chalinolobus gouldii* and *C. morio*), freetail bats (*Mormopterus* sp. 4 and *Tadarida australis*) and long-eared bats (*Nyctophilus geoffroyi*). Sarah started work in mid-year and Sue Delaney tapped into her many contacts to organise more vineyard owners keen to survey their bat fauna. Sarah and her helpers have walked around most of these vineyards at night with bat detectors, and units have also been left overnight.



Below left: *Mormopterus* sp. 4, Lenswood 29/10/09.
Above: *Vespadelus darlingtoni*, Woodside 24/09/09.

In addition to collection of bat activity data, Sarah has begun to survey insects at the different locations, and makes observations on vineyard practice, pests and weather conditions. Most of the vineyards like to have grasses between the rows to improve the soil and encourage beneficial insects. At Woodside, one of the owners showed us light brown apple moth caterpillars which get into some of the growing grapes. This owner preferred not to spray, and instead is setting up

bat boxes to encourage these natural insect predators.

An initial insect survey using two light traps for a single night at Sinclair's Gully revealed lots of moths, beetles, some flies and other insects.

Sarah's thesis is due in May 2010, with details of the bat activity in vineyards and neighbouring woodland. We thank the owners of these vineyards who have made possible this study and who all seem keen to improve the ecology of their vineyards as they grow grapes and make wine!

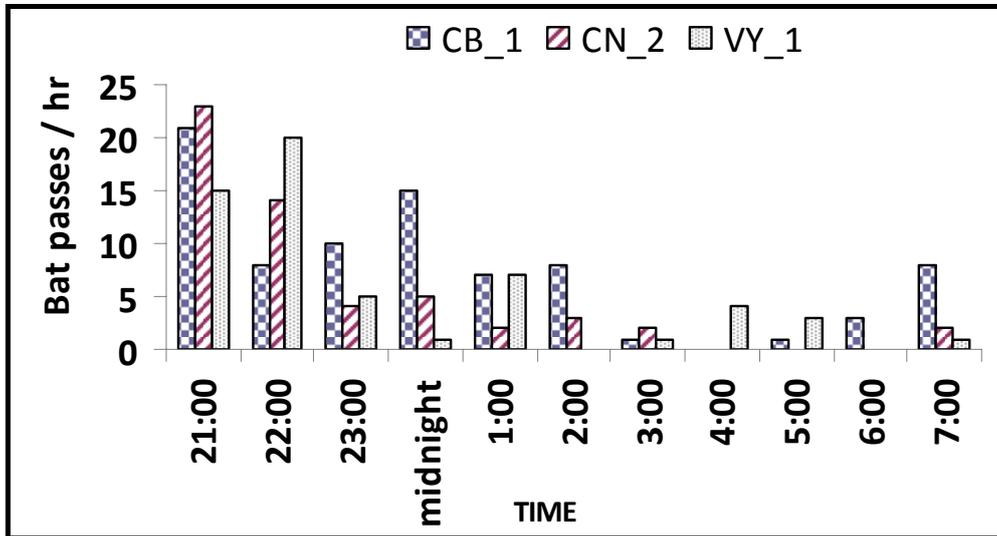


Figure 1: Number of bat passes per hour recorded by detectors placed in creek-bed woodland (CB) or vineyard (VY) habitats.



Apple moth larvae (above-left) are a pest in some vineyards. The addition of bat-boxes (above-centre) in woodland adjacent to crops may encourage bat activity and help reduce the abundance of unwanted insects (above-right).

'BATS – OUR NOCTURNAL INSECT EXTERMINATORS'. So reads the sign (right) on one of the vineyards, highlighting the interest these growers have in encouraging bats onto their properties.



Microbats in Sydney's urban landscape: possible mechanisms influencing regional persistence

Caragh Threlfall¹, Bradley Law², Peter Banks¹ and Trent Penman²

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Project update

Urbanisation affects indigenous fauna in many ways; some species persist and even increase in urban areas, whereas others are lost. The causative mechanisms for success or failure of wildlife in the urban setting remain especially elusive but these must be resolved if the impacts of expanding urbanisation are to be managed. Understanding the mechanisms that may influence the regional persistence of microbats in an urban landscape is the aim of my PhD thesis.

The last submission I made to this *Newsletter* detailed the first aim of my thesis where I examined patterns of microbat diversity and activity across the Sydney metropolitan region. Using Anabat detectors, we examined the patterns of species diversity, species activity and foraging activity along the entire urban to rural gradient present in the landscape. Controlling for the effects of the level of urbanisation (housing density), and the level of habitat loss (% vegetation remaining) in any given landscape unit (5 x 5 km square grid), we compared richness, activity and foraging activity in backyards, creeklines, bushland remnants and public open spaces (golf courses and council parks). In addition to comparing these landscape elements, we also compared the effects of geology and differing soil fertility in each landscape unit as it may effect prey density and thus bat activity.

Field work for this section of the project was completed between October and December 2008. Data analysis is complete and results are currently being compiled for submission in a series of papers relating to overall bat patterns at a landscape level and species-habitat

relationships. Relative prey density was also measured at each site an insect analysis is near completion. We predict that insect biomass and its association with landscape productivity will strongly influence bat species richness and activity, and that this pattern would be typical of many urban areas.

In my second field season, I aimed to examine urban maternity roost selection, roosting behaviour and foraging ecology of microbats in the urban bushland remnant; Cumberland State Forest, West Pennant Hills. Maternity roosts are trees typically identified for removal in urban areas due to their decayed and unsafe nature, and as such may be few and far between in urban bushland remnants. To date there have only been a few studies in Australia documenting such roost characteristics in an urban setting (Kirsten and Klomp 1998, Rhodes 2006). Roost trees in urban environments are a critical resource needed for microbat persistence, therefore research in this area is crucial to the conservation management of this diverse fauna group. Over two tracking periods (March 2009 and November-December 2009) we radiotracked 27 individuals from three species – Gould's Long-eared Bat *Nyctophilus gouldi*, Gould's Wattled Bat *Chalinolobus gouldii*, and the Eastern Broad-nosed Bat *Scotorepens orion*. Data from the first field season indicates these species are very different in their overall presence in the urban landscape. Radiotracking data will be used to gain an understanding of why some species may benefit over others and how roosting and foraging strategies differ between these species. Mating versus maternity roost selection of *N. gouldi* was a particular focus of this section of my project.

Observations of threats to microbats, specifically, threats at the roost site were made during both field seasons, and were noted in previous work (Basham 2005). As such, in the final section of my thesis I am taking an experimental approach to examine two poorly understood potential threats to bats in urban landscapes. I have experimentally examined predation at the roost site by an introduced olfactory predator that is extremely abundant in urban areas, the Black Rat *Rattus rattus*. I have also conducted an observational study in and around the bat roosts of hollow using birds such as parrots and lorikeets, which may be aggressively outcompeting bats for hollow resources in urban areas. This study is being followed up also by an experimental study, which is currently underway

and will be complete by the end of 2010. Just in time to submit my thesis in 2011.

This project has only been a success due to the patience and support of my supervisors. I would like to thank all the financial and in-kind support from the Ecological Society of Australia, MA Ingram Trust, Royal Zoological Society of NSW, Linnean Society of NSW, Australian Geographic, Ku-ring-gai Bat Conservation Society and Industry and Investment NSW. Thank you to the ABS for distributing my flyers requesting field work volunteers, as many of my most valued volunteers came from this Society! And an enormous thanks to the extensive troupe of volunteers who helped with radiotracking.

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Ed: Hungry for some results? Keep an eye out for Caragh at the Darwin conference and also on the current literature section of up-coming Newsletters!



Members of the radiotracking team. From left to right we have Jo Haddock, Chad White, Kristy Willet, Caragh Threlfall and Adam Birnbaum.



Mangroves a hotspot for microbats in the Hunter!

Anna McConville

Masters of Philosophy (Env Sc) Candidate

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Old stands of mangroves in the Hunter Estuary have recently been found to support a high abundance of microbats, including maternity colonies of *Mormopterus norfolkensis* (East Coast Freetail Bat) and *Scoteanax rueppellii* (Greater Broad-nosed Bat), both of which are notoriously difficult to capture and of which little is currently known. A total of eight other microbat species have also been recorded using these stands of mangroves to date.

The mangrove stands are at least 50 years old and contain numerous hollows which are heavily utilised by microbats. The relatively low canopy height (10 – 15 m) and high abundance of microbats makes stag-watching a pleasure and offers exciting social and behavioural research opportunities. The Hunter Estuary is also a great location to observe *Myotis macropus* (Large-footed Myotis) foraging over the Hunter River and mangrove creeks, particularly when silhouetted at dusk. Furthermore, with over 200 *M. norfolkensis* captured in one night, the mangroves are making a great study site for my Masters project on this species!

Radiotracking of *M. norfolkensis* as part of my Masters and of *S. rueppellii* by Dr Bradley Law from Industry and Investment NSW has revealed that whilst these species are roosting and occasionally foraging in the mangroves, they also regularly travel distances of up to 8 km to the western Newcastle LGA (local government area) to forage.

So next time you are thinking of mangroves, think bats!

Ed: Again, keep your eye out for Anna in Darwin.

Top: An example of delightful mangrove forest of the kind full of microbats it seems!

Centre and Bottom: Two roosts in mangrove forest being used by *Mormopterus norfolkensis*.



Radiotracking the Little Forest Bat

Leroy Gonsalves

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From February 12th – 24th, myself and a team of wonderful volunteers tracked ten Little Forest Bats (*Vespadelus vulturnus*) on the New South Wales Central Coast to identify which macrohabitats they were using at a time when the salt-marsh mosquito was in great abundance. Believe me – the mozzies were everywhere you looked!!

Concurrent with tracking the ten bats, we also surveyed the aerial insect fauna and mosquito populations.

While it is too early to provide any information about macrohabitat use, one interesting thing we found was that two individuals (one male and one female) that were trapped together, were also roosting together a great distance away from the trap site (~1.8 km as the crow flies), which happens to be on the other side of a water body. These two bats were also consistently roosting in telegraph poles – under the metal cap, and one of them would travel to the area surrounding the trap site on most nights.

I am extremely grateful to all of my fantastic volunteers who travelled great distances (sometimes from interstate) to lend a hand. This work is not possible without them!

It is now getting close to part two of radio-tracking, thankfully with fewer mozzies this time. Again, I am investigating macrohabitat use by the Little Forest Bat. For anyone interested in coming out and helping for a few nights, radiotracking will commence on Friday 19th March and continue up until Thursday 1st April – your assistance will be greatly appreciated. If interested, please contact me on the above e-mail.

Ed: Yes, there is a trend here. Leroy will also be at the Darwin conference, and yes, I may have blackmailed these students into sending in their Newsletter contributions in return for finding us accommodation in Darwin!



Top: Little Forest Bat *Vespadelus vulturnus*, photo: Lindy Lumsden.

Bottom: Little Forest Bat roost on Phillip Island, Victoria, photo: Susan Campbell.

Drinking ecology of Australian microchiroptera

Stephen Griffiths

PhD Candidate

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Project description and aims

Studies specifically examining drinking ecology of free ranging microbats are rare due to logistical difficulties associated with observing small, nocturnal, fast flying animals drinking on the wing (Adams and Simmons 2002, Tuttle *et al.* 2006). Consequently, behavioural mechanisms associated with drinking on the wing and the degree to which microbats require access to drinking water in temperate and arid environments remain under-investigated topics in conservation biology, behavioural ecology and ecophysiology (Adams and Hayes 2008, Griffiths *et al.* 2009).

During this project I intend to investigate a range of fundamental aspects of water balance and drinking ecology of microbats in Australia. This project will also address a significant knowledge gap highlighted by recent research into the risk tailings dams represent to wildlife. These studies generated extensive echolocation call data from gold mining operations across Australia and Africa clearly showing microbats commonly use the airspace above tailings dams and other mine site water bodies (Donato and Smith 2007, Smith *et al.* 2008, Adams *et al.* 2008). However, due to limitations associated with the field-based survey methods the researchers were unable to determine the degree to which microbats ingested potentially toxic solutions (Griffiths *et al.* 2009).

This project has four primary research objectives:

1. Document activity levels of microbats at gold mining water bodies in arid regions of Australia and investigate the importance these anthropogenic water sources represent for foraging and drinking.
2. Develop new equipment and methods to distinguish between microbat drinking and foraging behaviour above water, i.e. quantify drinking behaviour; thereby providing gold

mine operators monitoring tools capable of determining potential exposure of microbats to pollutants.

3. Deploy newly developed techniques in the field to investigate specific ecological factors associated with the consumption of surface water by microbats. Examples of specific questions include: 'How often do microbats come down to drink?', 'What is the influence of a range of environmental variables on drinking?', 'How does salinity tolerance influence drinking?'
4. Conduct a series of laboratory (respirometry) and field based (doubly labelled water) trials to investigate physiological requirements associated with water flux in microbats.

I commenced my PhD candidature in July 2009 and the summer of 2010/11 will be my first proper field season for data collection.

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Steve Griffiths, seen here above inspecting a microbat roost box and below a Lesser Long-eared Bat, began his PhD candidature in July 2009 on drinking ecology of microbats.



Monitoring a maternity colony of White-striped Free-tailed Bats (*Tadarida australis*) in a building

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Introduction

The White-striped Free-tailed Bat (*Tadarida australis*) is a large insectivorous molossid bat that occurs across southern Australia. While single *T. australis* have been recorded roosting within the ceilings of buildings, no maternity roosts have been previously documented in built structures. The maternity colony at Newington Armory, Sydney Olympic Park, is the only known maternity colony of White-striped Free-tailed Bats located within a building.

The maternity colony of *T. australis* was first detected by Glenn Hoyer in 2002 (Hoyer 2002). I began monitoring the colony in 2005 with the support of the Sydney Olympic Park Authority. The location provides excellent potential as a study site to gain further knowledge of this species.

Aged trees with roost hollows are a limiting resource for many bat species and the presence of mature trees with suitable hollows, although relatively abundant in Newington Nature Reserve at Sydney Olympic Park, are scarce elsewhere within the park and other surrounding urban areas. Competition for hollows is strong and the few hollows that are present are often occupied by parrots and lorikeets. The presence of the White-striped Free-tailed Bat colony within a building is likely to reflect the scarcity of hollows in the area, as this species is typically known to roost in tree hollows. Work by Rhodes (2006) showed that White-striped Free-tailed Bats prefer roost trees with high numbers of hollows in the trunk and branches, and that had large trunk cavities. Trees of this nature are uncommon in urban areas, and are commonly removed by councils and other authorities due to assumed public risk issues.

Buildings have been found in many countries to be commonly used by bats during maternity

periods, especially when they provide appropriate thermal conditions for rearing young. Darkness, shelter from wind and rain, proximity to feeding areas and reduced predation risks are important factors that govern the selection of these shelters (Kunz 1982).

Study phase 1

The building within the Newington Armory is a large empty warehouse that was originally used to store arms and explosives. The bats are located within the cavity of a double brick north-west facing wall. The exit is located just under the eaves approximately nine metres above the ground (Fig. 1).



Fig. 1. Arrow points to the location of the *T. australis* roost entrance to a maternity colony inside an empty warehouse located in the Sydney Olympic Park precinct.

Initially, monitoring entailed recording the bats exiting the building by using video recording simultaneously with an Anabat II bat detector and Compact Flash Zcaim (Titley Electronics). The video monitoring was carried out with a simple 'security type' video camera and monitor connected to two video recorders which were set up to turn on in sequence, thereby recording a full 10 hours. Illumination was provided by several infrared lights pointed at the entrance. Monitoring was carried out in December 2005 and February and March 2006. Exit counts were determined by watching subsequent play back of the video recordings.

During the peak months from December to February, the majority of bats within the roost exited within one and a half hours after sunset. Audible social calling (chittering) was heard in the late afternoon until the colony exited the roost.

During the night a high degree of flypast activity was noted where bats flew close to the entrance but did not enter. Some bats were also observed hovering at the roost entrance and then flying off again, while others re-entered the roost. One bat was recorded exiting the roost at the relatively late hour of 1am prior to any other bats re-entering. With the monitoring system used at that time, the interval of time away from the roost by individual bats remained unknown due to an inability to identify individual bats. It was considered probable that individual bats would leave the roost, feed, return to the roost to feed young and fly out later to continue hunting for food.

While this method of monitoring using video did show some interesting behaviours, the analysis involved watching an 8 hour video of a brick wall for every monitoring night undertaken! Such video watching was a challenge, and really required the presence of two people in case one blinked while the bat flew out! After the first few videos, my family and friends soon discovered a myriad of excuses not to accompany my screenings of the videos, so I was reduced to watching 10 minute 'grabs' when I could spare time during the day.

Study phase 2

The next phase of monitoring began in 2008, when the venerable Bruce Thomson donated some equipment and his valuable time to help me set up a more efficient system using Passive Integrated Transponder (PIT) tags. The site provided an excellent opportunity to assist in catching of the bats, as it is surrounded by tall earthen embankments that enabled us to gain the height required to catch the bats as they emerged from the building.

We trapped bats with a mist net on the top of the embankment approximately 50 m from the roost. Once we'd removed bats immediately after they were caught, we placed them in cloth bags and moved into the building to take their weight and forearm and record their sex and health condition. We then injected the bats with an ISO standard 134.2 kHz full duplex PIT tag (Allflex). After a short period of recovery time, we released the bats. To date, nine trapping sessions have seen 28 *T. australis* fitted with PIT tags.

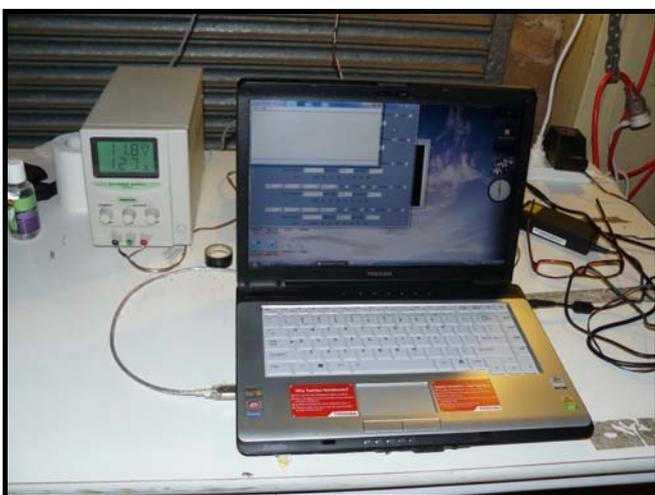
To monitor the comings and goings of individuals from the roost we placed a PIT tag antenna securely around the entry to the roost (Fig. 2). The antenna runs to a reader module that is

connected to a laptop computer within the building (Fig. 3). The PIT tagged bats are recorded as they move through the antenna at the roost entrance. The data collected is: Date, Time and PIT tag ID number. All data is automatically transferred to the laptop.



Fig. 2. (above) PIT antenna (under building eave) and reader positioned around the entrance to *T. australis* maternity roost.

Fig. 3. (below). Data on individual bats entry and exit from the roost is recorded on a laptop.



Disturbance to the bats is restricted to tagging events, and infrequent equipment maintenance. Regular checking of the computer to ensure it is running smoothly is required, especially after storm events that can cause fluctuations in electricity supply. Data is downloaded weekly during the maternity season and monthly during the rest of the year.

This system is producing large amounts of data that may well take the rest of my life to process! Data from the reader is voluminous, as many bats will 'sit' in the antennae reading zone for hours at a time. This makes analysing the data very time consuming, so much so that a computer-minded friend designed a small Java based program (that we called "Tadtime") to filter this data. Records from the same bat PIT tag number that occur within a 10th of a second of each other are deleted. This makes the data more manageable, while ensuring that no specific bat movements are lost.

Results so far

Monitoring with the PIT tags has now been carried out continuously since 2008. Over the 2008/09 maternity season there were several equipment outages and gear failures, however over the last maternity season the equipment has been working reliably.

Visual assessments of the colony have regularly been ≥ 50 individuals. Thirty-eight bats have now been tagged, representing $\sim 76\%$ of the estimated population of the roost. The composition of the colony is expected to be dynamic, with males from the previous year not returning, juvenile females returning and females from other colonies potentially moving into this one. It is possible that colony size is also regulated by the available space in the wall of the building.

There appears to be high roost fidelity for this site. Of the 23 bats tagged in the 2008 season, 13 returned to the maternity roost in the 08/09 season. Females caught and tagged continue to outnumber the males with only nine out of the 38 bats caught being male. Interestingly, one tagged male bat did return to the maternity roost and was the second last tagged bat to leave the roost in Autumn 2009. Why this male was present and stayed at the roost throughout the maternity season is unknown.

Associations between some of the bats are appearing, and with further analysis, more are expected to be revealed. For example, on the 1st

October 2008, two tagged males left the roost within one minute of each other, and returned six hours later within 17 seconds of each other. Other examples of these associations are being noted, for example two bats leaving the roost at the same time on the 9/3/09 and both returning within two minutes of each other on the 8/4/09 – after having been absent from the roost for over a month. The data will be analysed in the future using a statistical program that analyses social structure, hopefully clarifying these associations.

In late March, early April, the population of the maternity colony decreases as the juveniles become independent and both adults and juveniles disperse. At present there is no information as to where these bats are going once they leave the maternity roost. The only way to determine this is to use radio-tracking to find other sites where the bats may be roosting. This is the next stage of this monitoring program, five bats will be fitted with transmitters in an attempt to determine where they are going and if they are using any other buildings or roost trees in the area during the cooler months.

Tadarida australis (below) are commonly thought to be a nomadic species, with previous studies showing that they leave summer roosts during winter and move to warmer areas. The milder winters in Sydney may preclude this activity, as one tagged bat was recorded using the maternity

roost in July as well as throughout the maternity season.

Radio-racking during the evening when the bats are out feeding will also indicate where the bats are foraging and how far they may travel while foraging, the duration of foraging and if they have periods of 'rest' during the night at other roosts.

Thanks to the Environmental Management staff at Sydney Olympic Park Authority, Bruce Thomson, Monika Rhodes and all my helpers.

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Grey...with a touch of ivory!

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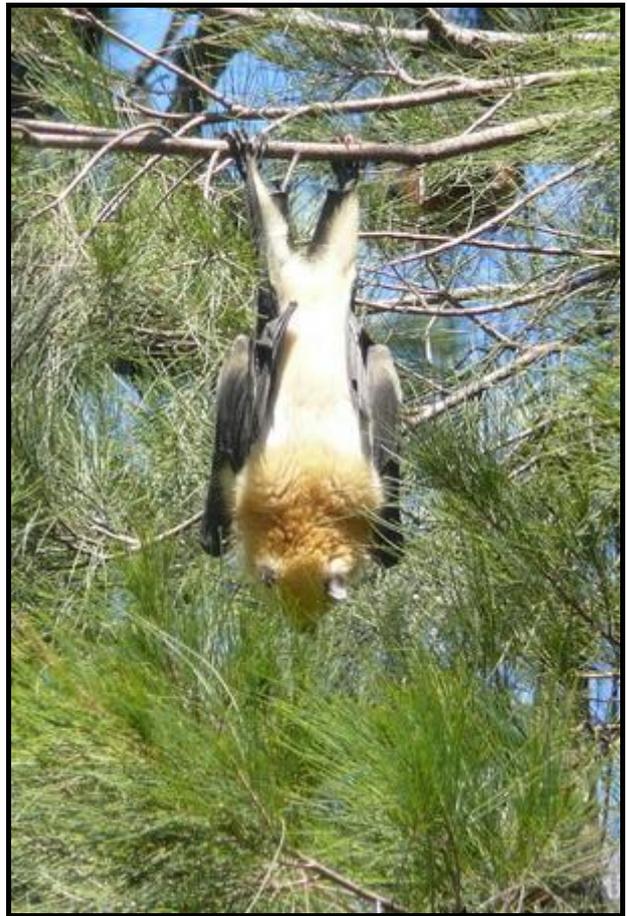
I am a wildlife carer with WIRES Blue Mountains branch and have had an interest in bats since I joined in 1988 and thanks to people like Helen Gorge, Julie Spence and Linda Collins who nurtured my interest in all Australian bats, which I still have today. I am only one of many carers who have provided an extra pair of hands in trapping both mega and micro bats for researchers and who also monitor local flying-fox camps every month. Being a wildlife carer is not just about fostering or rescuing animals, many of us are involved in habitat restoration, conservation and wildlife education.

Once a month I visit my local camp to count bats and record any problem which may affect the bats whilst they are visiting the area. The project is to monitor the amount of bats in the camps and pass the information on to Billie Roberts who is conducting her PhD on these colonies.

Sometimes the camp can swell from 3000 bats to such large numbers that you cannot see the leaves on the trees for the bats! Some will hang around until the nectar stops flowing, or it could be a short stop over to rest and re-fuel before taking off to continue the next leg of their journey.

If the Little Red Flying-foxes ('Reds') decide to visit the camp-site, they can outnumber the Grey-headed Flying-foxes ('Greys') 100 to 1! This puts a strain on the availability of food in the area for the Greys, not to mention the Reds' habit of clustering together which has caused trees to fall in the camp.

Over the last few years the local colony has played host to a few students working on individual research projects that may provide very important information to insure these animals survive into the future along with their habitat. It was on one of these monthly visits that my spritely 72 years young offsider noticed what she thought was a piece of paper amongst the foliage. It was not until I looked through the binoculars that I realised what it was and I hoped my camera would be able to capture the image as it was some distance away from us. These are the times you wish you had a big lens with plenty of scope sitting on a tripod!





Over the years I have come across a few animals affected by albinism such as ring-tail and brush-tail possums, red-belly black snake, birds, kangaroos, koala, microbats and now I can add the Grey-headed Flying-fox to the list. I have seen many "blonde" *Pteropus poliocephalus*, but not one whose whole body is cream!

The beautiful male in these images would be at least two years of age and I believe he was spotted at another camp two weeks before arriving at my camp. I also received an e-mail from a well known flying-fox photographer who thinks he was at her camp in Bellingen in March, however she was so gob-smacked at the sight of him that she failed to take a photo!

Whatever colour they choose to wear, they are and will always be a very special and unique flying mammal, I wish him a safe journey and hopefully some other bat counter may come across him in the future.



Community assemblage, altitudinal gradients, and ecophysiology of microbats in the Wet Tropics

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After an honours project working in the hot, sweaty, spear grass infested Eucalypt woodlands of Northern Australia, a PhD set in the lush and cool tropical rainforest is a very welcome change. With the importance of habitats like the Wet Tropics World Heritage Area being highlighted recently as climate change becomes the buzz word on everybody's lips, now is a perfect time to conduct studies combining the two.

The rainforests of the Wet Tropics are globally recognised for their high level of biodiversity, and bats contribute significantly to this diversity with over 30 species inhabiting the region. This makes bats the perfect study species for a project investigating the effects of climate change on species distribution and biodiversity. My project will investigate the ecology of microbat species inhabiting the Wet Tropics bioregion (and areas of PNG – see "Elevational surveys of microbats in Papua New Guinea", page 20), by providing an in-depth study into the altitudinal and regional community assemblage of the bats inhabiting the area. The physiological and ecological requirements of these bats will also be closely examined to determine what factors might influence the observed distributions and how they might change with the increasing temperatures predicted to occur as a consequence of climate change.

This study takes advantage of ongoing work being conducted in the Wet Tropics (funded primarily by the Centre for Tropical Biodiversity and Climate Change (CTBCC), School of Marine & Tropical Biology, James Cook University) that provides the infrastructure for long-term monitoring of flora, fauna, and environmental conditions at six locations throughout the Wet Tropics (covering an area of around 400 km and altitudinal gradients of over 1000 m). The first

stage of the project will involve determining the altitudinal distribution patterns of microbat communities at these locations. This will be done using a variety of passive (Anabat ultrasound detection) and active (mist netting and harp trapping) monitoring techniques. One of the major aims of my project is to create a call library of the bats of the Wet Tropics, collated with calls collected during this stage. A very exciting visit to the Australian Canopy Crane Research Station will also explore the detection abilities of Anabat in tropical rainforests by looking at changes in call detectability as sound source and detection sites vary within the canopy.

Relationships between community assemblage, altitudinal diversity, and ecophysiological requirements will be investigated in stage two by combining distribution data with environmental data (temperature, rainfall, etc) to produce predictive models depicting species distributions. Additional environmental data, specific to target species, will be obtained through the monitoring of climate variables in known roosts. Projections will be made, using predicted global warming scenarios, to investigate how known species' distributions may alter in response to a warming climate. These predictive models will form the basis of recommendations regarding the mitigation of biodiversity loss in the Wet Tropics World Heritage Area.

I hope that the knowledge gained during this study will lead to a greater understanding of the ecological requirements of microbats in this region, and will provide insight into the relationships between abundance, distribution and environmental factors. By increasing our ability to predict changes in community assemblage and regional distributions, specifically those caused by changes to the world's climate, we may be able protect microbat biodiversity for future generations of keen batto's!

For further information please visit the following websites, or contact me on the e-mail address above.

<http://www.jcu.edu.au/ctbcc/index.htm>

<http://www.jcu.edu.au/canopycrane/>

Ed: Yep, you guessed it, Tamara will also be in Darwin, so keep an eye out for more information on this great project.



Tamara releasing a rather sleepy *Nyctimene robinsoni* caught at Bowling Green National Park, just south of Townsville, Queensland.

Elevational surveys of microbats in Papua New Guinea

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Conservation International has awarded \$1.3 million to a team of James Cook University scientists as part of an ecological and socioeconomic monitoring program to be conducted in the YUS conservation area of Papua New Guinea. The conservation area,

spanning 76 000 hectares, gets its name from the three major rivers in the area; the Yopno, Uruwa and Som rivers.

As well as projects relating to community based reforestation, agroforestry and carbon sequestration to name but a few, this substantial grant also includes climate and biodiversity transects as part of its carbon and climate field science component. The transect, spanning altitudes from sea level to 4000 m, is designed to describe the changes in ecological communities and species distribution in the area, providing a basis for future climate change research. As well as monitoring tree kangaroo populations, and the areas bird fauna, the project will also investigate the microbat community assemblage. Monitoring will be conducted using a variety of passive (Anabat ultrasound detection) and active (mist netting and harp trapping) techniques, and will hopefully build on call libraries already created for the region.

As well as being incredibly important for the YUS conservation area, and PNG in general, the microbat surveys conducted as part of this grant will also benefit PhD studies currently underway at JCU. Microbat community assemblage and altitudinal distribution data collected whilst in PNG will allow comparisons between the species assemblage in the Australian Wet Tropics and a near tropical neighbour (see previous article).

We would be grateful for any information, suggestions, or witty anecdotes from those of you who have conducted similar work in PNG (not to mention continued lessons in Tok Pisin, as started by our knowledgeable president Michael!). Please contact either Simon Robson or Tamara Inkster on the address provided above, or visit the links below for more information.

"Planti lik lik blakbokis gut, planti bia nambawan!"

<http://www.zoo.org/conservation/PFW/tree-kangaroo>

http://www.conservation.org/sites/gcf/portfolio/asia_pacific/Pages/yus.aspx



Tracking bats in selectively logged jarrah forests, south-western Australia

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In Australia, old-growth forests are important bat roosting habitats as they contain old mature trees with hollows suitable for bat roosting. In south-western Australia, extensive timber harvesting of jarrah forest in the last century and the more recent introduction of selective methods of logging over the last two decades may have reduced the availability of suitable roost sites. With logging shifting from clear-felling to ecologically sustainable forest management in 1985, three forest treatments now remain after logging:

- 1) Gap release, involving the removal of ~95% of mature over-storey to provide opportunity for a regenerating tree cohort, with four habitat trees (i.e., those containing hollows suitable for fauna) and eight potential habitat trees retained per ha;
- 2) Shelterwoods, which involve the retention of 40 – 60% of basal area after logging to provide seed for regeneration;
- 3) Maintenance of buffers of old-growth forest between gaps and along riparian areas including streams and creeks.

However, before selective logging methods were introduced in 1985, parts of jarrah forest were lightly logged, with relatively few timber trees harvested. Therefore, relative to gaps and shelterwoods, these 'lightly logged' sites appear similar to unlogged forest and contain mature forest characteristics such as little or no undergrowth with large (DBHOB > 200 cm), mature (> 100 yrs) trees. These sites are referred to as old-growth forest.

The roosting requirements of bats in Western Australia have hitherto not been investigated. An understanding of roost requirements of common species is vital to bat conservation in this region and elsewhere. As part of my PhD and with the help of my supervisors (Stuart Bradley, Michael Craig, Bradley Law, Adrian Wayne and Kyle Armstrong), we investigated the sensitivity of two sympatric species of jarrah forest-dwelling

vespertilionid bats, the Southern Forest Bat *Vespadelus regulus* and Gould's Long-eared Bat *Nyctophilus gouldi* to the loss of roost sites from logging. Consequently, we could also investigate the effectiveness of current management practices for conserving appropriate microbat roost sites. Our study objectives were to;

- 1) Investigate roost and site selection by the bats in selectively logged forests by comparing roost trees (and the surrounding habitat) with potential roost trees and surrounding plots to identify important roost habitat characteristics;
- 2) Compare roost and site selection of *N. gouldi* with those of *V. regulus*;
- 3) Determine the relative importance of buffer zones and other unlogged zones as roosting habitat for bats in selectively logged jarrah forests, south-western Australia.



Paul setting up both mist nets and harp traps in the jarrah forests of south-western Western Australia.

We compared characteristics of roost trees and forest structure around roost trees ($n = 48$) with trees and forest structure on randomly located plots at a local roost tree level ($n = 90$) in February and March 2009. For landscape features, we compared roost trees with randomly selected trees with cavities or exfoliating bark in the broader landscape ($n = 204$). This work is under review for publication in a refereed journal, however below are a snapshot of key preliminary findings of the study and their implications.

- Both microbat species were highly selective in their choice of day roost, preferring old large trees (> 200 cm DBHOB) at intermediate or advanced stages of decay, crown senescence and deterioration with a lower percent bark cover.



A very alert *Nyctophilus gouldi* caught by Paul and team in south-western WA.

- Tree hollows were important roosting sites for both species, with *V. regulus* roosting exclusively in hollows. However, *N. gouldi* was also found to roost under decorticated bark and under the skirt of Balga grass trees.
- *V. regulus* preferred tall trees in the canopy with roost entrances higher above the ground with little surrounding vegetation while *N. gouldi* preferred roosting closer to the ground in dense clutter.
- No evidence was found of bats roosting in eucalypt regrowth, in neither shelterwoods nor gaps, although a few *N. gouldi* roosted in retained habitat trees in these forest types.
- Only unlogged buffers and old-growth forest appeared to provide sufficient alternate roosts, containing a higher density of trees with hollows required by bats for roosting. In contrast, the density of hollow bearing trees is much lower in gaps and shelterwoods, resulting in fewer actual and potential roosting sites.



A curious Chris Corben investigates the contents of Paul's harp trap.

The logging rotation in the jarrah forest is dependent on a 10-year Forest Management Plan (FMP), with the current FMP ending in 2014. At two forest blocks, Kingston and Warrup, where our study was undertaken, approximately 53% of the total forest area (11,750 ha) has been reserved from logging since 1990 as informal reserves (riparian buffers, diverse ecotype zones, road reserves), uneconomic areas, old-growth forest, native forest retained for research purposes, fauna habitat zones and buffers between the gaps. However, of these, only 39% representing the riparian buffers, diverse ecotype zones, uneconomic zones and old-growth forest may never be logged. The remaining classifications are available for logging during and after the current FMP (A. Wayne, DEC, pers. comm.).



The *Nyctophilus gouldi* roost located under the skirt of a balga grass tree.

Therefore, although our study demonstrated the importance of old-growth forest and buffers as mitigating measures on bat roost sties, it remains unclear whether the retained habitat is adequate as roost sites for bats in the future given the dynamics of logging regimes in the jarrah forests.



A gorgeous photo of a male Creagh's Horseshoe Bat *Rhinolophus creaghi*, captured at Danum Valley Field Station, Sabah Malaysia in December 2009. This fellow, with the bizarre patch of hair in the middle of his nose, was caught by Simon Robson (photo credit), Tamara Inkster, Chris Corben and the class of BZ3000 from James Cook University. Simon wishes to point out that the bat was caught in their "home-made you-beaut 5 (that's right, FIVE) bank portable harp trap, built from a modified Glenn Hoyer design". Apparently it worked a treat!

Bat Research at Naracoorte

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Introduction

The population decline of the Southern Bentwing Bat *Miniopterus schreibersii bassanii* at Bat Cave, Naracoorte, SA, has been well documented through various reports over the past decade (for a comprehensive list of references relating to work on this species, see Kerr and Bonifacio 2009). The research program has sought to identify factors that may have contributed to this decline, but to date, nothing conclusive has been determined. One of the greatest challenges has been trying to ascertain what the actual total population size is.

A fundamental problem with determining population size is a reliable method of accurately counting all of the bats at any given time. A possible causal factor for the decline is loss of habitat, but this is difficult to confirm when we do not even know their favoured feeding grounds. Although the majority of bats spend the summer months in Bat Cave, where they spend winter is less well known. A project was funded by the Wildlife Conservation Fund to survey for winter cave sites, and there are over 60 known caves that have been used. The Department for Environment and Heritage (DEH) also received funding from the South East Natural Resources Management (SE NRM) Board to support bat conservation work. This enabled a Project Officer, Ronald Bonifacio to be employed which enabled a great deal of work to be completed in a short period of time. The Friends of Naracoorte Caves received a grant to investigate foraging habitats by radio tracking from the World Wide Fund for Nature through the Threatened Species Network.

An outbreak of disease detected when the bats returned to Bat Cave in spring 2009 sparked an intense investigation. This paper describes work undertaken over the past six months in the quest to conserve this species.

Disease outbreak!

In early September, one of the Naracoorte Site Interpreters, Decima McTernan, reported seeing something that appeared to be an ulcer on an adult bat. I spent quite some time viewing footage through the permanent infra red cameras

installed in Bat Cave, but failed to see anything like Decima reported. A visit was made into the cave for a closer inspection to determine whether this was a single occurrence or something more sinister. The cave visit raised serious concerns as over 50% of the bats inspected had white raised ulcers 1-2 mm across, all on bare skin. I contacted people who had previously been involved with the December 2008 investigation into lesions found on pups and received an excellent response. Ten bats were caught and sent to Adelaide for emergency testing.



Celia Dickason (PIRSA) and David McLelland (Adelaide Zoo) operating on a Southern Bentwing Bat.

Investigations were undertaken by Dr David McLelland from the Adelaide Zoo. All bats were caught in a side chamber away from the main maternity area which may have biased the sample: I managed to catch 10 males! The initial analyses identified parasites were responsible for the majority of ulcers with one attributed to a pox virus. This is particularly significant as pox viruses, as far as we could determine, had not been previously found in bats. Samples were submitted to the Australian Animal Health Laboratory in Victoria, Gribbles Laboratory and to a parasitologist Dr Ian Beveridge at Melbourne University.

On 26 October, David and Dr Wayne Boardman from the Adelaide Zoo, Celia Dickason from Department of Primary Industries and Resources SA (PIRSA) and Terry Reardon from the South Australian Museum travelled to Naracoorte to undertake further investigations. Rather than euthanasia, operations were conducted under anaesthesia – a particularly delicate exercise! We trapped 125 bats and operated on 18. Interestingly, ulcers were more prevalent on male bats with females generally pregnant and healthy. Very pleasingly, the percentage of bats with

ulcers was much less and they were generally less severe that were observed a month earlier. Since this investigation, only occasional observations of ulcers have been made through the cameras and no fatalities that could be attributable to them found. A visiting expert to Adelaide offered a possible identification of the parasite, *Riouxgolvania beveridgei*, which was described in 1965 from specimens found in *Miniopterus* in North Queensland (Bain 1979). It was a great effort to track down the paper (in French) describing the parasite and to discover the holotype was held in the South Australian Museum!



Small, white raised ulcer (indicated by arrow) on a Southern Bentwing Bat from Naracoorte.

These investigations were generously supported by PIRSA who treated the outbreak as a biosecurity risk. The support from Adelaide Zoo vets, testing laboratories and universities was outstanding and an excellent network has been established should the need arise again.

In 2006, pup mortality was high with the dry season suggested as the cause (Bourne and Hamilton-Smith 2007). The 2008 season saw similar mortality but some pups had lesions as well as malnutrition. We had people in place should similar symptoms arise this season but 2009/10 has been a more successful season than the previous three years. The risk of mortality from disease appears to have abated for the time being.

Determining the population of Southern Bentwing Bats

Southern Bentwing Bats only breed at two sites, Bat Cave at Naracoorte and Starlight Cave at Warrnambool, Victoria. It was reported in 1965 (Dwyer and Hamilton-Smith 1965) that unlike other species of *Miniopterus*, males return to the maternity site over the summer months. This has

not been tested since and it has been assumed that if this is the case, a count of bats at Bat Cave during summer will include the entire South Australian population. It is now known however, that all bats do not return to Bat Cave, with up to several thousand bats found in what have traditionally been called "wintering sites" over summer (Chris Grant pers. comm.). This calls into question the validity of Bat Cave counts as an accurate population census. What we have really been counting each year is the number of bats in Bat Cave without checking where the entire population is!

Video counts have been completed annually by Chris Grant, a laborious but reasonably accurate process. The counts show a steady decline from 35,000 in 2000 to 21,000 in 2008, a reason for serious concern. There are two important factors to consider and this very low figure should be treated with caution.

- It is difficult to determine if all the bats have left the cave. The permanent cameras do not show all chambers and a physical check was not done.
- There was no check of other cave sites for bats. There could have been thousands elsewhere as has been observed previously.

When the counts were undertaken in 1965 by Dwyer and Hamilton-Smith, the district had been through a number of extremely good seasons, in fact 1964 was the wettest year on record (880 mm) for Naracoorte. Good wet seasons would produce an abundance of food and the entire population could be supported living in Bat Cave. The 2008 count followed a number of dry seasons with 2006 the driest year (234 mm) on record. It is speculative, but it is possible food resources are substantially lower in the dry periods and male and non-breeding females may use caves elsewhere to enable breeding females to utilise resources closer to Bat Cave. This will be discussed further under determining foraging habitat.

Although we cannot be sure of how much of the population we are counting when counts are undertaken at Bat Cave, accurate counts are nevertheless important. How many bats are using the cave and how successful is each breeding season? Terry Reardon has been working closely with Adelaide-based company Lastek to develop an automated counting system. This involved placing a thin sheet of light across the cave entrance and using light sensitive diodes to record each time the sheet of light was broken. This project was progressing slowly with

mixed results when the possibility of using thermal imaging technology became an option.

The Department for Environment and Heritage secured a grant through the SE NRM Board to undertake some bat work which included elements previously submitted unsuccessfully for Caring for our Country funding. This grant included wintering site survey and protection works, equipment to count the bats and data loggers to monitor in cave conditions.

Thermal Imaging

We learnt that Doug Mills had a thermal imaging camera in New South Wales and had software to count bats. We brought Doug to Naracoorte and conducted a trial. All were quickly convinced that this technology was what we were looking for, a system that could be easily set up and once calibrated, provide accurate counts that did not require days of laborious counting.

The technology we are using was developed by the US military for missile tracking. It was adapted for bat counting by Bruce Sabol and Eddie Menton of the US Army Engineer and Research Development Center and is called the Thermal Target Tracker (T3) System. Thermal infrared is a passive sensing technique that takes "heat pictures" by measuring heat radiated by objects. No illumination is required and the resolution of the camera is such that a bat's body heat is detectable against relatively cooler backgrounds. The continuous flight motion of the bat allows each individual bat to be tracked from frame to frame using the bat's instantaneous motion vector to predict and detect its position in the next frame (Sabol and Melton 2008).

Cool objects are dark and warmer objects lighter with more accurate counts gained with greater contrast between background and the objects being counted. To cool the background, hessian has been used and is soaked with water prior to the count. This gives an almost black background against which the bats appear quite white. Two Photon 320 NTSC cameras were purchased, a 19 mm wide angle and 35 mm lens. We purchased the highest resolution cameras that the US Military allow to be exported from the US and waited over five months for them to be delivered. The paperwork was substantial to say the least and I imagine that Terry and I have been the subjects of a thorough investigation!

The cameras record onto NTSC video cameras with mini DV tapes. Several counts have been completed at the time of writing and the counts

suggest approximately 30,000 bats in Bat Cave. The cameras have been used concurrently from different angles and giving consistent results. They are also directional in that both ingress and egress are recorded and a net result given. It is hoped to continue counts as pups begin to fly and we can hopefully give an insight into the recruitment for the 2009/10 breeding season.

There is still a margin of error with counting the population for a number of reasons:

- not all bats are in the cave over summer;
- not all bats leave the cave every night; and
- each count is limited to 90 minutes, the length of mini DV tape on long play, so late emergencies will not be recorded.

We now have the capacity to count bats easily and accurately and understand the limitations of the data. More comprehensive surveys of caves over summer to determine if all bats are in Bat Cave will improve the robustness of the data. Further improvements from a total species population census would be improved if the same technique could be implemented at Starlight Cave at Warrnambool, but given its location and accessibility this appears unlikely. Accessing Starlight involves climbing down a cliff, traversing a rocky shoreline accessible only at low tide and climbing back up the cliff into the cave. The Department of Sustainability and Environment is currently resolving safety issues in accessing the site. Until we can achieve accurate estimates at Starlight Cave, the best information we can achieve is to accurately count the Bat Cave population at various times of the year to determine levels of usage and recruitment each breeding season.

Winter surveys

A survey of wintering caves was undertaken by Kevin Mott, Fred Aslin and colleagues in 2000. They were only able to locate approximately 16,000 bats over their weekend survey and made several recommendations on how further surveys could be conducted (Mott and Aslin 2000). One recommendation was to survey all known sites over a single day, to reduce the chances of bats moving from one cave to another overnight, to either be missed completely or counted twice. We also tentatively explored the idea of surveying Victorian caves as they suggested, but lack of knowledge on sites and availability of people made this impossible.

Ronald Bonifacio coordinated the survey conducted on 6 June 2009. Members of the

Friends of Naracoorte Caves and Cave Exploration Group of South Australia (CEGSA) joined DEH staff with 30 people in six teams involved on the day. Surveyors were briefed prior to the count on minimising disturbance, safety, and provided maps and guidelines on how to estimate cluster sizes to ensure a degree of consistency. An estimate of 100 bats per square foot (30 x 30 cm) was used. Where large clusters are found, each team member was encouraged to independently estimate the cluster size and estimates were averaged.

The survey was also used to gather;

- Photographs of cave entrances.
- Evidence of feral animals. Cats in particular are predators of bats in caves. They leave tell tale evidence as they generally eat the entire bat except the wings.
- Evidence of people using caves such the remains of light sources, new graffiti or damage to the cave.
- Presence of absence of guano and whether this was fresh or old, determined by white fungus that grows on old guano.

This information was collated by Ronald and became the basis of classifying which caves are priority sites for on-ground protection and restoration activities. A number of caves have been worked on previously including Cave Park Cave, Joanna Bat Cave and Five Corners Cave cleaned by Friends of Naracoorte Caves and Green Corps. Robertson Cave had an artificial entrance closed in an attempt to restore what was thought to be a maternity site (Baudinette *et al.* 1994). Landholders were approached and were generally very supportive of protection works for caves on their property. Circumstances on the day of the count assisted this in the case of Monbulla Cave, west of Penola. Surveyors found an injured calf that had fallen into the cave. CEGSA members generously assisted the farmer the following day to remove the injured beast from the cave. Monbulla Cave now has a stock proof fence protecting all 30 or so entrances and mesh that covered deep entrances providing limited stock protection but restricted bat access has been removed.

Two small caves near Kongorong were identified for protection works. Melangine and Koongine Caves (also known as Noonan's Caves) are important Aboriginal art sites. Protective mesh was placed over the cave entrances in the 1980's to protect the art. On the day of the survey the gates to the caves were found open and stock

has accessed the cave, causing damage to the cave floors. The landowner supported installing fencing further back from the cave entrance to provide additional protection. Unfortunately, the fencing contractor removed the mesh making the sites accessible to people again. This has resulted in two letters to the Minister, some serious attention from heritage and Indigenous interests, and considerable discussion on how the art should be protected. Consultation is still ongoing with Indigenous and Heritage representatives to find a solution that achieves both of the sought objectives. The most challenging issue to date is finding agreement on what this solution might be!!

Unfortunately, the 2009 survey was no more successful at identifying where the bats overwinter, with only 13,700 bats located. Glencoe West Cave had over 5,000 with five other caves with 1,000 or more. Bats were seen in a further 13 caves of the 40 visited on the day. A number were not visited as landowners refused access and some others have been blocked in recent years. None of the sea caves could be accessed due to high seas so there is some potential more bats were in the region but not found. More likely is bats had moved across into Victorian caves. Preliminary planning is underway to conduct a survey of all known cave wintering sites for this sub-species in June 2010.

Determining foraging habitat

Tracking bats to their feeding grounds is difficult; they fly fast, at night and cover vast distances. In 2004, a small project was supported by DEH to gather some information on where Southern Bentwing Bats went to forage. The work formed part of PhD studies of Chris Grant who developed and coordinated the project (Grant 2004).

Data collected suggested that bats tended to follow the vegetation along the Caves Range with one bat tracked on consecutive nights to its feeding grounds over vineyards approximately 15 km from Bat Cave. I submitted a grant application on behalf of the Friends of Naracoorte Caves which was successful, receiving \$16,500 from the World Wide Fund for Nature through the Threatened Species Network. As usual, Terry Reardon from the South Australian Museum has offered huge support and greatly assisted with the implementation of the project, which aims to build on the data gathered in 2004. Ultimately, we hope to identify and conserve habitat required by bats for foraging.

Two sessions of radio tracking were planned; the first was completed in December 2009. Transmitters were attached to five lactating females and one adult male. The next session in February 2010 will track some of this season's pups aiming to determine any differences in foraging habitat between adults and juveniles. We used Holohil LB-2N transmitters, imported from Canada. The transmitters used are necessarily tiny, weighing just 0.43 g. An adult bat is 15-16 g so it equates to less than 3% of the bat's body weight. Transmitters were attached by trimming the fur and using glue. Each transmitter has a slightly different frequency signal to enable identification of each bat. They operate for up to 21 days but drop off before that. It is not a cheap exercise as they are \$200 each and we are yet to retrieve one after it has been used!



Terry Reardon radiotracking Southern Bentwing Bats inside Bat Cave at Naracoorte.

The tracking sounds simple but in reality is not. The plan is that as a bat with a transmitter emerges from Bat Cave, it will be detected by a receiver at the cave entrance. A crew in a plane flying above is notified, who then determine which direction the bat has travelled. Once located, the plane crew provide directions to a ground crew and they follow the bat. The plane crew then tries to locate another bat and repeats the process with another ground crew. A number of issues were encountered;

- Bats don't follow roads making the task of following in a vehicle difficult.
- Transmitters have a limited range (although 15 km from the air is suggested by the supplier)
- Once a bat is lost by the ground crew the plane has to relocate and provide new directions.

The first two nights of tracking we assigned one ground crew to a bat. The third night we assigned two ground crews to each bat, meaning we could only track two bats from the ground. From tests we conducted prior to tracking, we found we had a range of approximately 5-6 km from the plane. While bats are close to Bat Cave, they are reasonably easily located. As they venture further the distance the plane has to cover greatly increases and the chance of locating them diminishes.

We used Ozi Explorer software on laptops in the plane to maintain current location of the plane, direct ground crews and record waypoints when we passed over a bat. This collected data on the direction each bat travelled and was coupled with data from ground crews.

The five female bats all travelled south each night and two were tracked consistently to the same area. We managed to track them for over two hours but always lost contact by 11 pm. By this time the bats were over 25 km south of Bat Cave in the Glenroy and Coonawarra area. Bats were located in a variety of habitats including thick vegetation, over cleared land and in a vineyard. The one male we attached a transmitter to travelled north east from the cave on successive nights, opposite to the females. We managed to find it over the border in Victoria east of Mullinger Swamp; over 35 km in a direct route! We tried one last night's tracking after Terry had left with the intention of just following one bat in the plane for as long as we could but had a different receiver and could not detect any bats. I was a little surprised as to the distance travelled from Bat Cave, especially by lactating females. Is this an indicator that food is short close to the cave? Is there a huge energy requirement to travel this distance that could affect breeding success? This project seems typical of research into this species; the more we do and learn, the more questions we come up with!

The radio tracking work is being undertaken under DEH permit G 2597 with approval from the Wildlife Ethics Committee 55/2009. Population census work is under DEH permit Q25264 and

investigations into lesions under DEH permit Y25796.

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Miniopterus schreibersii bassanii



“Relocation” of flying-foxes from the Royal Botanic Gardens, Sydney

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The proposal to relocate the flying-fox camp from the Royal Botanic Gardens (RBG) is currently being assessed by the Federal Department of Environment, Water, Heritage and the Arts. Many environment and wildlife care groups remain very concerned that, if approved, disturbance using noise and dispersal of flying-foxes from the RBG will be detrimental to the species.

The proposed relocation is an exercise in cost shifting: shifting the impacts of flying-foxes to other land managers / residents. The question is, where will they go? Will it be to Hyde Park, Centennial Park, Trumper Park, Cooper Park, or any group of tall trees? The RBG Trust has committed to short term assistance to land managers to move flying-foxes on from what are considered ‘inappropriate’ sites (assuming that this can be verified). Does this mean that they will be chased all over Sydney? Is this the way to treat a threatened species?

A dispersal from the Botanic Gardens, would very likely result in flying-foxes joining and causing conflict at other camp sites in Sydney. Ku-ring-gai residents living close to the camp at Gordon have indicated that they do not want to have more flying-foxes in this Reserve. Similarly, increased numbers of flying-foxes at Kareela in Sutherland Shire is likely to become a problem for two schools and other homes nearby. Interestingly, the Kareela camp formed after flying-foxes vacated the camp site at Kurnell during construction of the desalination plant. Ironically, Sydney Water had agreed the flying-fox camp was welcome at Kurnell, so this is an unfortunate result of the noise during the construction of the plant.

The ‘relocation’ of flying-foxes from the Botanic Gardens in Melbourne to Yarra Bend in Kew was facilitated by a green corridor. Sydney is a very different place with only patches of vegetation amongst vast areas of houses, roads, factories and shops. The Sydney RBG Trust hopes that the flying-foxes will go to a National Park, however, if nearby National Parks represented

suitable habitat that the bats would likely use, why haven't they done so already?

Shooting flying-foxes for crop protection in NSW

The Flying-fox Review Panel, composed of a social scientist, ecologist, orchardist and RSPCA Inspector concluded in 2009 that:

- The animal welfare issues that result from shooting as a method for mitigating crop damage caused by flying-foxes are unacceptable ethically and legally.
- It is highly probable that the Grey-headed Flying-fox population is in decline and that any additional mortality can only increase the rate of decline. No matter what the causes, all mortalities are additive. Therefore, any orchard shooting will hasten decline of the flying-fox population, albeit by only a relatively small amount.
- Shooting is ineffective when larger numbers of flying-foxes visit orchards. Full exclusion netting provides the most effective protection against damage from flying-foxes.
- The industry could rely solely on exclusion netting as the means of Grey-headed Flying-fox crop damage mitigation. It is considered unlikely that netting would be erected to any large extent, in the Sydney area, without adequate government grants.

Despite these findings, the NSW Government continues to issue licences for the shooting of flying-foxes for crop protection. In an attempt to resolve the animal welfare issues of shooting flying-foxes, the NSW Department of Environment, Climate Change and Water, with assistance from the Department of Industry and Investment, developed a Standard Operating

Procedure (SOP) with which fruit growers must comply. However, the SOP fails to prevent the cruel suffering for many hours and sometimes days, of numerous flying-foxes that are not killed outright from shooting. No SOP can avoid the inhumane deaths of dependent young left in camps while females are killed when out feeding.

The ABS was part of a coalition of more than 60 conservation, wildlife rescue and animal welfare organisations asking the NSW Government to stop issuing shooting licences to fruit growers. The 'Why NSW should ban the shooting of flying-foxes' report can be found at:

<http://www.hsi.org.au/index.php?catID=263>

In March, coalition representatives from the Nature Conservation Council of NSW, Humane Society International, WWF, Bat Advocacy (see briefing on page 39) and WIRES met with the advisors to the NSW Minister for Environment and Climate Change, the Hon Frank Sartor. We understand that a funding proposal will be presented to NSW Cabinet soon.

Please let the NSW Premier know that you support an end to the killing of flying-foxes and native birds in orchards and that you support funding assistance for the provision of exclusion netting to affected growers.

[Ed. Contact details for relevant Ministers are provided on page 43]

Photo below courtesy of Nick Edards
<http://etech.smugmug.com>



– Reports and Viewpoints –



Reminder to keep an eye out!

The *Mormopterus* sp. above was caught and photographed by Anna McConville during her work on Ash Island in the Hunter Estuary. The under-weight, non-lactating adult female presented with small white spots on the wing membrane and also on the ears. These spots couldn't be prised off and were 'fluffy' on top. Although the white spots were predominantly on the forearm, faint discolorations over the entire wing were evident when viewed against light. The final report on the identification of the white spots has yet to be released, however the spots were confirmed as egg clusters from mites, along with other currently unidentified fungus and bacteria.

Similar observations of white spots on the unfurred parts of both mega and microbats have been made by Trish Wimberley at the Australian Bat Clinic and Wildlife Trauma Centre. Trish reports that if left untreated, the white spots found on the genitals, ears and wing membranes of infected bats developed into pustules. As above, the bats presenting to Trish with these symptoms are generally not in very good body condition. Trish reports that bat colleagues from Bat World in Texas are having some success treating

similar cases with both oral and topical applications of apple cider vinegar.

Neither of the cases mentioned here represent confirmed cases of White Nose Syndrome (WNS), however both highlight the importance of keeping an eye out for unusual, suspect instances of disease or infection on bats that we come into contact with. The WNS fungus *Geomyces destructans* continues to decimate North American bat populations and has also recently been discovered in France. In the wise words of our President, it is important that people coming into contact with, or even just viewing bats, need to know what to do and who to contact if you find a bat that you suspect may have WNS, or presents with other unusual, suspect symptoms.

Recently, Dr. Emma Teeling from University College in Dublin and Dr. Gudrum Wibbelt from the Leibniz Institute for Zoological and Wildlife Research compiled a protocol to try and standardise the recording and sampling of the WNS fungus from infected bats. Observations on WNS fungus or similar have been noted sporadically in Europe for over 20 years and a recent meeting in Berlin on Bats and Disease highlighted the need for a standardised protocol.

[Ed: The following, slightly modified, protocol was designed for European bat workers, whilst the data to be collected applies internationally, your first point of call is a phone call to your relevant wildlife coordinator, details provided below. Thank you to several wildlife coordinators who provided their input into the content and format of this protocol.]

Dear Bat-Conservationists,

As most of you might have heard already, within the last few years there have been dramatic population declines in bat hibernacula in the north-eastern USA. A large number of animals had lost weight, but others remained in good body condition. The most important feature is white fungal growth around the muzzle, often the wing membranes are also affected (image below). Because of the “white nose” this phenomenon is called “White Nose Syndrome” (WNS).



from: Blehert et al., Science, 2009

Since last winter season we know that similar fungal growth does appear on European bat species – apparently in some countries noted for over 20 years. A few people were able to retrieve samples from these bats and examination of the fungus was performed in Dublin/Ireland and Berlin/Germany. During the last Bat conference in Berlin, it was agreed that more information is needed on the true distribution of the fungus. Therefore, we would like to ask you for your help to extend the current knowledge. If possible please try also to pay particular attention on the climate condition within the hibernacula – there are no data of temperature and humidity. If possible, please, try to measure these parameters in close proximity to the animal suspicious for carrying the fungus.

Attached you will find a protocol sheet and sampling methods. If you should encounter such an animal, please, print out the protocol sheet and fill in the necessary details and send it to one of the addresses below.

**Protocol sheet for Investigations of Bats in Hibernacula
With Suspect of "White Nose-Syndrome"-like Lesions**

Bat species: _____

Identification (banding-No. etc): _____

Age: juvenile / adult **Sex:** male / female **Body weight:** _____ g

Body condition: very good / good / moderate / bad / emaciated

Date: _____ **Outdoor Temperature:** _____

Location: _____

GPS-Position: _____

Cave: ___ - Entrance area ___; rear area ___; height of animal's position: _____

Box: ___ - height position of box: _____

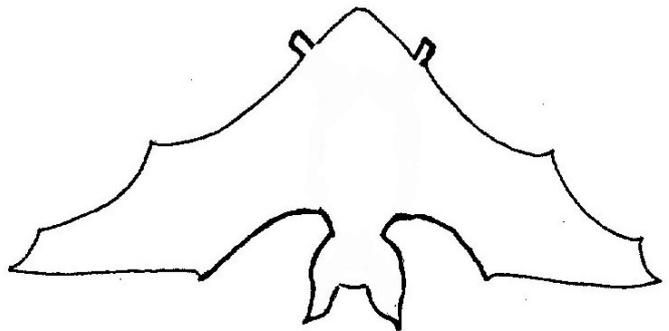
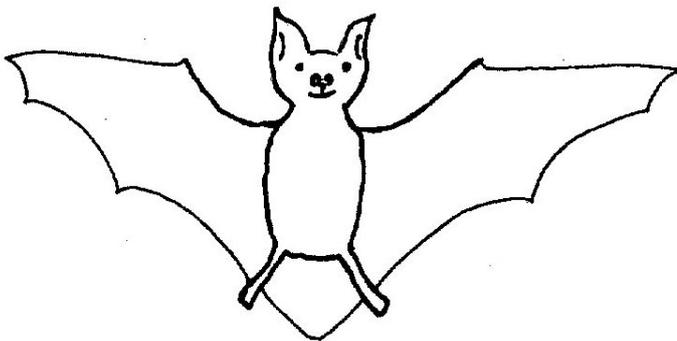
Tree: ___ - height position of hibernacula: _____

Temperature near animals position: _____ °C **Humidity** near animals position: _____

No. of individuals in hibernaculum: _____

No. of individuals with fungal growth: _____

Description of animals' lesions:



Localisation of fungal infection(s) (please mark in the sketch):

Appearance of lesion:

Colour: white: ___; yellow: ___; green-blue: ___; dark grey: ___; other: _____

Number of fungal patches: one ___; two ___; three ___; other _____

Size of the lesions: smallest: ___ cm; largest: ___ cm

Photograph taken: yes ___; no ___

Caution: Do not handle bats or samples without wearing disposable latex gloves.
Wash/disinfect hands thoroughly after sample collection.

Sampling equipment

Single-use latex gloves

Adhesive tape (clear + transparent!)

Glass slides (for microscopes)

Caution: Please use one pair of disposable gloves per animal to avoid cross contamination of fungal spores! Before entering caves it is recommended to wear rubber boots and overalls, which can be washed or exchanged between different sites to avoid passive transport of fungal spores with shoe soles or clothing.

Collecting a spore sample:

(1) If possible – **before** sampling **take a photo** of the lesions and the bat.

(2) Adhesive tape:

- Make a loop with a strip of tape with the adhesive side on the outside
- Carefully approach the bat and fungal lesion
- Gently roll tape over lesion allowing 1 or 2 superficial fungal structures to adhere
- Place adhesive tape (spore sample down) onto a labelled glass slide

(3) Please send glass slide (shatter-proof!) + filled in protocol sheet via mail to one of the addresses below.

Australian contacts

Dr. Tiggy Grillo, the Projects Coordinator for the Australian Wildlife Health Network (AWHN) has very kindly provided the contact details for all the Australian Wildlife Coordinators. AWHN wildlife coordinators are part of Australia's National Animal Health Information System. The names listed in the contact table below are the best points of contact in each state and territory to initially contact if you discover a suspect case of WNS. They will also be able to provide additional details on how suspect cases can be further investigated if it is needed. Dr. Grillo would also like to remind us that if you see *any* signs of disease that are unusual or clusters of wildlife deaths then you should contact your local AWHN Wildlife Coordinator or call the Emergency Animal Disease Watch Hotline: 1800 675 888

<http://www.daff.gov.au/animal-plant-health/pests-diseases-weeds/animal/spotted>

[Ed – it's worth checking out this link if just for the photo of the unusual piglet!]

Further to the details included on the WNS protocol, Karrie Rose from the Australian Registry of Wildlife Health at the Taronga Conservation Society also wishes to remind us all of some basic OHS principals surrounding bat work:

- Anyone handling bats must have an up-to-date vaccination against Lyssavirus.

- People entering caves and handling bats are recommended to wear a filtration mask.
- To reduce the risk of disease transmission, disinfect equipment and gear between animals and between populations.

Specific to sampling suspect fungal infections, Karrie also had the following tips:

- Please make contact with relevant state coordinator to discuss arrangement before sampling. A fully completed protocol form should accompany any samples.
- Sticky tape preparations can cause confusion as the glue from the tape can form lots of shapes that look just like fungal hyphae. Furthermore, specimens prepared on a slide with sticky tape cannot be cultured or run on PCR to identify any fungal elements that may be present.
- Scraping of white plaques with a scalpel blade and collecting the material in a sterile screw top container and also bagging the scalpel blade itself may allow for better analyses and identification of fungi *provided* the samples are sent immediately to the relevant contact.

[Ed – as we were going to press, news emerges that WNS has spread to Canada:

<http://www.ottawacitizen.com/technology/First+case+white+nose+fungus+found+Ontario+colony/2707582/story.html>

Contact details for Wildlife Coordinators

State or Territory	Co-ordinators	Notes	Address	Contact details
AAT (Australian Antarctic Territory)	Primary contact LESLIE FROST	Government rep	Australian Antarctic Division Channel Highway Kingston TAS 7050	Leslie.frost@aad.gov.au W: 03 6232 3414 F: 03 6232 3328 M: 0438 624 871
	Assistant Martin Riddle	Government rep AAD/ Human health	Program Leader Human Impacts Research Program Australian Antarctic Division Channel Highway Kingston TAS 7050	Martin.riddle@aad.gov.au W: 03 6232 3573 F: 03 6232 3351
ACT	Primary contact WILL ANDREW	Government vet	ACT Veterinary Services Parks Conservation & Lands (Athlon) PO Box 158 Canberra ACT 2601	Will.andrew@act.gov.au W: 62072357 M: 0419 239 073 F: 62072093
NSW	Primary contact DIANE RYAN	Government rep Appointed by CVO NSW	Regional Veterinary Officer (Menangle) Industry & Investment NSW EMAI PMB 8 Camden NSW 2570	diane.ryan@industry.nsw.gov.au W: 02 4640 6333 F: 02 4640 6300 M: 0402 070914
	Manager Karrie Rose	Australian Registry of Wildlife Health	Taronga Zoo Veterinary and Quarantine Centre PO Box 20 Mosman NSW 2088	krose@zoo.nsw.gov.au W: 02 9978 4749 F: 02 9978 4516
	Alternate Barbara Moloney		Industry & Investment NSW Technical Specialist (Disease Surveillance & Risk Management) Locked Bag 21 ORANGE NSW 2800	barbara.moloney@dpi.nsw.gov.au W: 02 6391 3687 F: 02 6361 9976 M: 0427 114 598
NT	Primary contact CATHY SHILTON	Government rep Appointed by CVO NT	Dept of Business, Industry and Resource Development Berrimah Vet Laboratories GPO Box 3000 Darwin, NT 0801	Cathy.shilton@nt.gov.au W: 08 8999 2122
	Carol Palmer	Dept of Natural Resources, Environment, Art and Sport	Biodiversity Conservation Dept of Natural Resources, Environment, Art and Sport P.O. Box 496 Palmerston NT 0831	carol.palmer@nt.gov.au W: 08 8995 5011 M: 0400 707 273
QLD	Primary contact ANITA GORDON	Government rep Appointed by CVO QLD	QLD Dept Primary Industries Animal Research Institute 665 Fairfield Road Yeerongpilly, QLD 4105	anita.gordon@dpi.qld.gov.au W: 07 3362 9419 F: 07 3362 9440
	Assistant Michael Pyne	Currumbin Sanctuary	Senior Veterinarian Veterinary Department Currumbin Wildlife Sanctuary 28 Tomewin Street Currumbin QLD 4223	mpyne@cws.org.au W: 07 5534 0833 F: 07 5525 0197 M: 0413 967 073
SA	Primary contact CELIA DICKASON	Government rep Appointed by CVO SA	Senior Veterinary Officer, Disease Surveillance PIRSA PO Box 1571 Flaxley SA 5153	Celia.dickason@sa.gov.au W: 08 8391 7125 F: 08 8388 8455 M: 0423 780 607
	Environment contact Scott Jennings (Secondary Contact)	Government rep/ Ecologist	Ecologist, Wildlife Management Department for Environment and Heritage PO Box 1047 Adelaide SA 5001	Scott.jennings@sa.gov.au W: 08 8124 4735 F: 08 8463 4818
	Zoos contact Wayne Boardman	Zoos SA	Head of Veterinary Conservation Adelaide Zoological Gardens Frome Rd Adelaide, SA 5000	wboardman@zoossa.com.au W: 008 8230 1253 F: 08 8267 4289

TAS	Primary contact ROBYN SHARPE	Government rep Appointed by CVO TAS Veterinary Officer	Department of Primary Industries, Parks, Water and Environment Animal Health and Welfare Branch PO Box 46 Kings Meadows TAS 7249	Robyn.Sharpe@dipwe.tas.gov.au W: 03 6336 5303 F: 03 6336 5374
	Alternate Stephen Pyecroft	Government rep Appointed by CVO TAS Veterinary Pathologist	Principal Veterinary Pathologist Animal Health Laboratories Diagnostic Services Branch Department of Primary Industries, Parks, Water and Environment PO Box 46 Kings Meadows TAS 7249	Stephen.Pyecroft@dipwe.tas.gov.au W: 03 6336 5275 F: 03 6336 5374
	Assistant Patsy Davies	Government wildlife co- ordinator Tasmania	Department of Primary Industries, Parks, Water and Environment Nature Conservation Branch GPO Box 44 Hobart, TAS 7001	Patsy.davies@dipwe.tas.gov.au W: 03 6233 6556
VIC	Primary contact MARK HAWES	Government rep Appointed by CVO VIC Veterinary Pathologist	Department of Primary Industries Primary Industries Research Victoria 475-485 Mickleham Rd, Attwood 3049	Mark.hawes@dpi.vic.gov.au W: 03 9217 4386 F: 03 9217 4399 (attn: Mark Hawes)
	Assistant Cameron Bell	Principal Veterinary Officer - Disease Surveillance	Department of Primary Industries Animal Standards Branch PO Box 2500 Bendigo Delivery Centre, VIC, 3554	Cameron.Bell@dpi.vic.gov.au W: 03 5430 4545 M: 0429 182 965 F: 03 5430 4520
WA	Primary contact TOM HOLLINGSWORTH	Government rep Appointed by CVO WA Pathologist	District Veterinary Officer Department of Agriculture and Food Bunbury WA	tom.hollingsworth@agric.wa.gov.au W: 08 9780 6280 F: 08 9780 6136
	Alternate Simone Vitali	Perth Zoo	Senior Veterinarian c/o Perth Zoo 20 Labouchere Rd South Perth, WA 6151	simone.vitali@perthzoo.wa.gov.au W: 02 9474 0326 F: 02 9474 0391
	Conservation contact Tamra Chapman	Department of Environment and Conservation WA	Senior Zoologist Species and Communities Branch Locked Bag 104 Bentley Delivery Centre WA 6983	tamra.chapman@dec.wa.gov.au W: 08 9334 0455 F: 08 9334 0278
OTHERS				
DAFF Australian Department of Agriculture, Fisheries and Forestry	LYNDEL POST	Wildlife Health and Environment	Wildlife Health and Environment Surveillance, EAD Coordination & Response, Animal Health Programs Department of Agriculture, Fisheries & Forestry Australia GPO Box 858 Canberra ACT 2601	Lyndel.post@daff.gov.au W 02 6272 4879 F: 02 6272 3150
AAHL CSIRO Australian Animal Health Laboratory	JOHN BINGHAM	Appointed by Director of AAHL	Private Bag 24 5 Portarlington Road Geelong, VIC 3220	John.Bingham@csiro.au W: 03 5227 5008 F: 03 5227 5555
ARWH Australian Registry of Wildlife Health	KARRIE ROSE	Australian Registry of Wildlife Health	Taronga Zoo Veterinary and Quarantine Centre PO Box 20 Mosman NSW 2088	krose@zoo.nsw.gov.au W: 02 9978 4749 F: 02 9978 4516
Head Office	CHAIR RUPERT WOODS	Manager	AWHN PO Box 20 Mosman NSW 2088	rwoods@zoo.nsw.gov.au W: 02 9978 4579 M: 0438 755 078 F: 02 9932 4376

	Tiggy Grillo Wildlife Coordinator's Contact	Projects Coordinator	AWHN PO Box 20 Mosman NSW 2088	tgrillo@zoo.nsw.gov.au W: 02 9978 4788 M: 0406 383 582 F: 02 9932 4376
	Karen Magee	Administrative Assistant	AWHN PO Box 20 Mosman NSW 2088	kmagee@zoo.nsw.gov.au W: 02 9932 4368 F: 02 9932 4376

Reporting of wildlife health issues and events

The AWHN is interested in receiving test results and any reports of disease testing or events in the following categories: mass or unexpected mortalities/ morbidities of unknown causes; significant clusters of deaths; suspect livestock associated notifiable diseases; undiagnosed syndromes; suspected human/ zoonotic connection; diseases likely to spread and be difficult to eradicate if they become established; suspected exotic and OIE list diseases; diseases with overseas events or international drivers and; diseases listed as key threatening processes by the Department of the Environment, Water, Heritage and the Arts. **Current, specific disease reporting priorities are for: avian influenza viruses, Australian bat lyssavirus, Salmonella, mass mortality events and any cases associated with non-suppurative encephalitis (especially avian).** Please alert your appropriate local Wildlife Coordinator. The AWH network also has a fact sheet on WNS and Australia:

[http://www.wildlifehealth.org.au/AWHN_Admin/ManageWebsite/FactSheets/UploadedFiles/119/White-nose%20Syndrome%20in%20Australian%20Bats%205%20Sept%202009%20\(1.1\).pdf](http://www.wildlifehealth.org.au/AWHN_Admin/ManageWebsite/FactSheets/UploadedFiles/119/White-nose%20Syndrome%20in%20Australian%20Bats%205%20Sept%202009%20(1.1).pdf)



On the topic of diseases...

An article by Petrina Berry published in TheWest.com.au on 1st February this year outlined Canadian research that showed the Hendra virus can potentially be spread by pigs. The research raises the prospect that pigs could act as intermediate hosts, passing the virus on to humans in the same way horses have done in Queensland. The findings are specifically relevant to Australia as there is a good chance that burgeoning populations of feral pigs will encounter bat camps, providing an opportunity for Hendra transmission. Similarly, piggeries that might have trees close by overhanging with fruit may also create an environment favourable for cross-species disease transmission.

A possible solution?

As reported in Queensland Country Life (2/11/09) by Melissa Martin, researchers from CSIRO and the United States have reportedly shown that administering human monoclonal antibodies after exposure to Nipah virus conferred protection to animals against Hendra. These findings pave the way for an effective treatment for Hendra virus infection in humans given the strong cross-reactive activity the Nipah antibody has against Hendra virus. The research represents the first stage of CSIRO's approach to dealing with Hendra, which includes developing a treatment and focussing on human health, developing a

rapid pen-side or stable-side test to confirm Hendra infection and finally further research into a vaccine for horses.

Bats are not the bad guys

Finally, the Australian Biosecurity Cooperative Research Centre (ABCRC) for Emerging Infectious Diseases has spoken out in defence of flying-foxes, stating that some of the outcomes blamed on bats are of our own making. The Wingham Chronicle (8/12/09) reports in an interview with Dr Stephen Prowse, the chief executive officer of the ABCRC, that the recent appearance of Hendra virus in bats may reflect the increased susceptibility of flying-foxes to infection as their populations are placed under increasing pressure from habitat destruction and persecution from humans. There are no known cases of humans catching Hendra directly from flying-foxes, only from horses to humans. The ABCRC emphasised that flying-foxes are important key pollinators and seed dispersers in Australian forests and many tourist operators regard them as a key ecotourism species. More research is required to develop a better understanding of how the virus persists in bats and spreads to horses. Finally, www.theage.com.au (18/1/2010) reported that vets, horse owners and wildlife handlers must all take a lead role in preventing further outbreaks of Hendra, particularly by minimising the risk of contact between flying-foxes and horses.

More troubles for flying-foxes

Lawrence Pope

President VAFA
North Carlton, Victoria 3054

lpope@vtown.com.au

In a plea to members to help fight against an ineffective and barbaric method of 'controlling' flying-foxes, Laurence Pope has provided the contact details for Queensland's MP Rob Messenger to help prevent a reintroduction of shooting of flying-foxes in Queensland.

Very few flying foxes are killed outright by shooting. Many, up to 90%, take hours or days to die slowly of shock, dehydration and blood loss. Shot females may have dependent young that consequently die slowly on their mothers or starve waiting in the colony for their return.

Member for Burnett, Rob Messenger has called on the QLD Premier to personally intervene and issue Damage Mitigation Permits or licences to shoot flying-foxes in light of failed experiments by some farmers with flying-fox scaring units as a method of crop protection. Stating that flying-foxes are in plague numbers and not threatened, the Member for Burnett has accused the 'loony left, extreme green and animal rights activists' of calling the shots within the Labor Party and coming up with the 'excuse' that limited shooting of flying-fox scouts is 'inhumane'.

Laurence Pope requests ABS members to help fight for the bats by contacting Rob Messenger and letting him know the facts on flying-foxes:

E-mail: burnett@parliament.qld.gov.au

Phone: Burnett electorate office: 07 4159 1988

Fax: 07 4159 2696

Post: Rob Messenger, PO Box 8371, Bargara, QLD, 4670



Volunteer available

Laura Bergner labergner@gmail.com is currently travelling on a Watson Fellowship studying bat ecology and conservation in various countries around the world. She is interested in cultural perceptions of bats and how they vary between countries. So far, Laura has visited Costa Rica, Panama and Fiji. Laura plans to travel in south-east Asia from April to June 2010, and would like to make plans to volunteer with bat projects throughout this region. Her Fellowship covers travel and basic living costs and she does not require a salary. Please contact Laura directly if you or someone you know could use her help.



Funding opportunity

The Wildlife Preservation Society of Australia Limited – University Research Grants are scholarships offered to honours or postgraduate students at Australian universities. Each year, ten grants of \$1,000 are awarded for research projects of direct relevance to the conservation of Australian wildlife; plant or animal. Grants may be used for the purchase of equipment, consumables, travel expenses related to field research, or attendance at conferences at which you are presenting your work.

Applications must be received by the 31st May.

For more information on how to apply, go to:

http://www.wpsa.org.au/grt_uni.html

An interesting summary of previous grants recipients and their projects can be found at:

<http://www.wpsa.org.au/pdf/grant/grantUni2K9Article.pdf>

Feral Herald

The October 2009 edition of the Feral Herald published by the Invasive Species Council of Australia (www.invasives.org.au) ran with a detailed front page feature on 'Disaster Island', summarising the Christmas Island Pipistrelle's path to extinction.

Only in Tasmania!

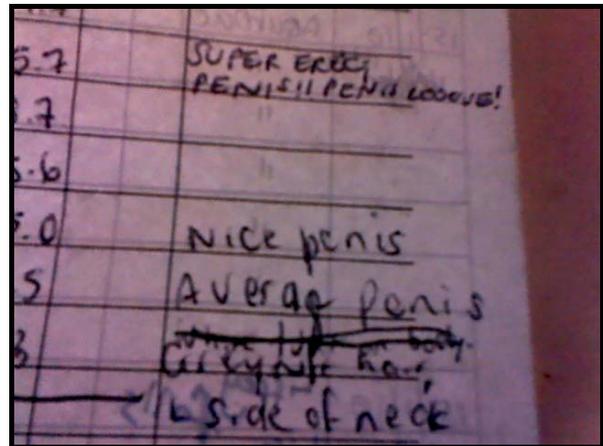
Lisa Cawthen

lcawthen@gmail.com

It isn't everyday that you get three bat biologists together in Tasmania. It's no wonder then that a Large Forest Bat *Vespadelus darlingtoni* decided to give the royal salute to myself (the PhD student), Chris Corben (needs no introduction) and Markus Utesch (a German bat biologist, now infamous Tasmanian bat-penis-photographer!). Volunteers were aghast as my fellow bat colleagues urged me to "keep it going" while Markus focused the camera for these shots. I was pretty impressed by Markus' penis photography, but it is my volunteer's notes that make me laugh every time!



Above right: Lisa's 'royal salute' courtesy of a Large Forest Bat in Tasmania (photo Markus Utesch), and at right, her volunteers astute observations on the, err, 'packages' of other bats trapped that day!



Below: A serious photo for you all to admire. Taken by Cathy Dorling, on the left is an adult and on the right a sub-adult Tasmanian Long-eared Bat *Nyctophilus sherinni*, now a recognised species, but one currently without pictures in Churchill's field guide.



[Ed: The following is a briefing prepared by Bat Advocacy, sent via Nick Edards nick.edards@fastmail.com.au to encourage ABS members to contact the relevant Ministers and help bring an end to shooting of flying-foxes]

Bat Advocacy

An overview of flying-fox issues in NSW – Orchards and urban camps

Of all native species, none seem to cause as much public and political controversy as flying-foxes. The future of flying-foxes depends very much on addressing these conflicts and upholding existing state and federal laws and policies.

As long-range pollinators and seed dispersers for native trees, flying-foxes are keystone species and their conservation is vital for the health of diverse ecosystems. They disperse pollen and seeds of diet plants during their foraging which extends across vast areas; in this way they participate in the reproductive and evolutionary processes of forest communities. With climate change, flying-foxes will become increasingly important in maintaining gene flow within plant species to facilitate adaptation to different climate patterns.

About Bat Advocacy

Bat Advocacy monitors all actions, positive and otherwise, that impact bats in Australia. Where appropriate, we engage with government and stakeholder groups with the aim of achieving optimal outcomes for populations of bats that are likely to be affected by those actions.

The grey-headed flying-fox

The focus of this article is the grey-headed flying-fox (*Pteropus poliocephalus*). The total population of grey-headed flying-foxes is estimated to be around 400,000 individuals, the majority of which, at any given time, will be within the borders of NSW.

As a consequence of a sharp decline in population numbers that was established in the late 1990's, the species is listed as vulnerable to extinction under the NSW Threatened Species Act 1995 (TSC Act) and the Commonwealth Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act).

Smaller populations of this nomadic species are found in Victoria, where it is also listed as threatened, and Queensland where, despite a scientific committee recommendation, it is not.

In NSW, the key issues relating to flying-foxes are:

- The use of lethal control (shooting) against flying-foxes for the purpose of crop protection.
- Camp management and the application of the NSW Department of Environment, Climate Change and Water (DECCW) Flying-fox Camp Management Policy (FFCMP) in relation to applications to disperse flying-fox colonies.

Licensed shooting of flying-foxes for crop protection

- There is no evidence supporting the view that shooting flying-foxes is an effective way to protect commercial orchard crops.
- The recovery of a species that has suffered a dramatic decline in population is compromised by the active support of government for a licensed annual cull.

- The independent report of autopsies carried out on flying foxes collected from an orchard in Sydney¹ provided indisputable evidence that many animals are maimed and suffer protracted deaths through starvation, dehydration and predation and that flying-fox pups, orphaned by the incapacitation of their mother, will inevitably die of starvation.
- The report also noted that the number of flying-foxes collected from the orchard was significantly more than the orchardist had been licensed to shoot. It is widely accepted that the number of bats reported to DECCW as having been shot is much less than the number actually shot.
- NSW is the only state that continues to issue licenses for shooting. Queensland banned the practice in 2009 because the government accepted the determination made by the Queensland Animal Welfare Committee that it was inhumane.
- In NSW an independent panel was formed by DECCW in response to a commitment by Verity Firth, the Environment Minister at that time, to review the practice of shooting.
- In the resulting report² the panel described the practice as “unacceptable legally and ethically”³.
- In response to the report, DECCW have implemented interim measures that wholly fail to address core welfare issues including the starvation of orphaned young, which was one of the outcomes from shooting that the review panel found to be unacceptable.
- DECCW have conceded that the interim measures cannot address the issue of orphan starvation. Despite this acknowledgement, DECCW have allowed shooting to continue and have yet to make a commitment for a moratorium on the practice despite the review panel’s recommendation that shooting should end.
- Welfare and conservation groups have raised concerns that the revised license conditions introduced before the 2009/2010 season will do nothing to improve welfare within the orchards, that DECCW’s compliance and monitoring program is inadequate and that there is no way to measure whether the revised protocols have resulted in the improvements that DECCW claim.
- The official NSW Farmers Association position is also for shooting to be brought to an end⁴.
- Regardless of this official position from NSW Farmers Association, there will inevitably be pressure applied by some orchardists to lobby government to both relax the licensing conditions and to increase the quota of flying-foxes that are allowed to be shot. Should these concessions be granted by the NSW Minister for Environment, it is inevitable that animal welfare and the recovery of the species will be further compromised.
- DECCW has recently compiled an internal assessment of the legal, welfare and economic aspects of the matter which will be presented to NSW Cabinet. It is expected a decision will be made within the next few months as to whether shooting should be allowed to continue and, if not, how it will be brought to an end. It seems that the funding of a compensation package for farmers will be a key issue within these discussions.
- It is clear that, if the practice is not brought to an end, the coalition of welfare, community and conservation groups that have come together to bring about change, the issue will continue to press for change with the assistance of the Greens and Liberals, to make it a focus environment issue in the lead up to the next election.

Camp Management

- Any application to disperse a colony of grey-headed flying-foxes in NSW must be approved by both state and federal agencies that test the application against the controlling legislation that they administer. At state level, the application is tested against TSC Act by DECCW. For the Commonwealth, the application (known as a referral) is tested by the Department of Environment, Water, Heritage and the Arts (DEWHA) against EPBC Act.
- The state legislation provides much less protection than is afforded by the federal legislation and the recent experience is that it is easier for a proponent to gain state approval than it is for them to gain federal approval.

¹ http://www.hsi.org.au/editor/assets/Actions/Report_for_orc_%20shoot_2007.pdf

² <http://www.environment.nsw.gov.au/threatenedspecies/Flyingfoxlicrev.htm>

³ NSW Flying-fox review panel report, page 2

⁴ http://www.nswfarmers.org.au/_data/assets/pdf_file/0014/11750/Association_Update_Report_210210.pdf

- In December 2007, DECCW formally adopted the Flying-fox camp management policy (FFCMP)⁵.
- The policy provisions state that:
 - “DECC will encourage the conservation of flying-fox camps.... and manage flying-fox camps on lands administered by DECC”*
 - “DECC will not generally support disturbing a flying-fox camp [because] such exercises have rarely resulted in desirable outcomes for all stakeholders [and] have uncertain outcomes”⁶*
- The policy itself notes that, should a proponent consider dispersal justified, the process defined for dispersal planning in FFCMP represents “best practice”⁷.
- Since the adoption of this policy, which was developed through expert consultation over a period of some years, there have been applications under Section 91 of the NSW Threatened Species Conservation Act 1995 to three disperse colonies in NSW. Those colonies are located at Burdekin Park Singleton, Maclean Rainforest Reserve and the Royal Botanic Gardens Sydney (RBGS).
- In every case, DECCW has compromised the provisions of its own policy and allowed the proponent to diverge from the “best practice” process defined by FFCMP.
- Bat Advocacy has sought, and continues to seek, clarification from DECCW as to why these divergences from policy are justified.
- It should also be noted that the Draft National Recovery Plan for the grey-headed flying-fox which, endorsed by NSW DECCW and in the final stages of formal adoption by the Commonwealth, classifies the Maclean, Singleton and RBGS camps as roosting habitat that is critical for the survival of the species.
- Of the three dispersal applications noted above, the RBGS proposal could be considered the most significant as Botanic Gardens Trust (BGT), the extant camp managers, are also part of DECCW.
- The proposal by BGT is flawed and continues to place heavy reliance on anecdotal, unscientific material that is inconsistent with a significant body of scientific research, much of which has been readily available to BGT during the 2+ years it has so far taken to develop the proposal:
 - BGT have continued to cite the experience of the Royal Botanic Gardens Melbourne (RBGM) in 2003 as a valid precedent whilst failing to acknowledge the problems with the RBGM dispersal including the fragmentation of the colony into camps across suburban Melbourne for a number of months before the new colony was allowed to settle at Yarra Bend.
 - BGT has failed to acknowledge the failure of dispersal attempts in other camps in the middle of the species foraging/roosting range, including those at Singleton and Maclean.
- We acknowledge that DECCW North Coast have recently made significant efforts to work with all stakeholders in the community to determine how the Maclean Rainforest Reserve camp might be managed in-situ although it now appears that political pressure has resulted in new applications being submitted for the dispersal of the colony despite DECCW’s efforts.

The Bigger Picture

Issues relating to flying-fox management are undoubtedly complex, and interlinked. Attempting to resolve each issue in isolation will inevitably result in ongoing conflict and the continued decline of the species.

Consider the following: The failure by Department of Education and Training to heed expert advice regarding the location of school buildings on the Maclean High School campus in the mid 1990s⁸, and the decision to construct an extension adjacent to the extant flying-fox colony must be seen as a major contributory factor to the ongoing conflict around that camp

⁵ <http://www.environment.nsw.gov.au/policiesandguidelines/flyingfoxcampol.htm>

⁶ DECCW Flying-fox camp management policy, page 6

⁷ DECCW Flying-fox camp management policy, page 19

⁸ Roberts, B., (2006), Management of Urban flying-fox camps, page 34

- BGT have proposed that some of the bats dispersed from RBGS will form a colony in the northern extent of Ku-ring-gai National Park. BGT have not considered that this will not only deprive the animals of their preferred food sources in the Eastern suburbs of metropolitan Sydney, but will also place them closer to the orchards in the Hawkesbury region which are a source of ongoing conflict because of incursions into commercial orchards and, consequently, licensed shooting
- The development of the Sydney Water desalination plant had the unexpected consequence of relocating the Kurnell flying-fox colony (that Sydney Water had sought to protect) to Kareela. The new camp, which is between two schools and homes, has now become a source of ongoing and escalating conflict with residents
- BGT have conceded that it is likely that some of the flying-foxes dispersed from RBGS will join the Kareela camp, a result that will inevitably exacerbate the conflict between the flying-foxes and the local residents
- BGT have proposed that some of the bats dispersed from RBGS will relocate to camp sites south of the city but have failed to acknowledge that this will bring the flying-foxes into an area where there is a higher likelihood of collision with aircraft using Sydney Airport. The Flying Fox Consultative Committee was established as a consequence of the grey-headed flying-fox being listed as vulnerable by the Commonwealth in 2001. This body has representatives from many of the stakeholder groups that can genuinely contribute to an over-arching plan for the management of the species in NSW. Both state and federal authorities must consult directly with this committee and to not rely on the limited knowledge base within government departments.

What can you do?

- **If you live in NSW**, please write to your local state (not federal) Member of Parliament. If you don't know who your local state MP is, you might find this link helpful:
<http://www.parliament.nsw.gov.au/prod/parliament/members.nsf/V3ListCurrentLAMembers?open&vwCurr=CurrLAByElectorate>
- If your local state MP represents a party other than the Labor party, copying your correspondence to the NSW Cabinet Ministers for Environment and Primary Industries will guarantee that your message gets through.
 - The Hon Frank Sartor MP, Minister for Climate Change and the Environment, Level 35 Governor Macquarie Tower, 1 Farrer Place, SYDNEY, NSW 2000
e-mail: office@sartor.minister.nsw.gov.au
 - Mr Steve Whan MP, Minister for Primary Industries, Level 35 Governor Macquarie Tower, 1 Farrer Place, SYDNEY NSW 2000
e-mail: office@whan.minister.nsw.gov.au
- Tell your MP and/or the Ministers that:
 - the shooting of flying foxes as a method of crop protection is ineffective, inhumane and must be ended.
 - you expect DECCW to enforce Flying-fox camp management policy when evaluating applications to disperse colonies of grey-headed flying-foxes.
 - you expect NSW government and departments to look at the overarching issue of flying-fox management in NSW and develop integrated strategies rather than treating each issue as distinct and separate. Looking at issues in isolation will inevitably simply move the problems around without creating genuine resolutions.
 - the stance of their party on these issues will be a factor in how you vote in the March 2011 state elections.
- **If you live outside of NSW**, writing directly to Ministers Sartor and Whan will demonstrate that concern about shooting and dispersals isn't limited to NSW.

– Gadgets, Techniques and Photos –

Using ANABATs to simultaneously look at harmonics.

Terry Reardon

Terry.reardon@samuseum.sa.gov.au

While going through 89,000 microbat calls from Cape York I was very frustrated at having to make best judgement identifications on emballonurid versus molossid calls.

The younger members of the team could easily hear the first harmonic (H1) of *Saccolaimus* spp. calls (9-12 kHz) but of course the ANABAT detectors only recorded the second harmonic (H2), which in many cases are similar in characteristics to the H1 of some molossid calls. Clearly, being able to see two harmonics simultaneously is a huge advantage during the identification process.

The H1 and H2 are quite visible using full spectrum recorders and having seen the Binary Acoustics (BA) detector in action, I was becoming convinced to buy one, even discard the ANABATs and change over! The BA detector is competitively priced, uses the same microphone and has recording capacity.

However there are great advantages to using the ANABAT detector and many Australian bat workers use them. Ideally, it would be great to retain use of the ANABATs whilst recording low frequencies simultaneously, at least for northern Australia where *Saccolaimus*, *Taphozous*, *Mormopterus beccarii* and *Chaerephon* all co-occur.

My solution is to record calls as per normal (passive recording) to a CF card, but also use the High Frequency (HF) output to record to a digital voice recorder at the same time. The digital voice recorder and the detector need to have their time clocks synchronised, and the voice recorder set to voice activation. Theoretically, all bat calls recorded will be recorded on both systems.

The signal of HF output is controlled by the volume knob, so has to be set around 7-8. The digital voice recorder can record at 48 kHz, so that calls up to 24 kHz can be recorded without issues with the higher harmonics. 24 kHz is enough to record the full spectrum to cover the *Saccolaimus* H1 and H2. Voice recorders are becoming cheaper, for example the Panasonic DM-520 from the U.S. is about AU\$200.

So when ploughing through your standard ANABAT calls and you come across a call that could be a molossid or emballonurid, you can go to that call on the digital voice recorder (because you have the time of the call), and view it to any sound recorder that shows frequency versus time outputs. This way you should be able to see if the call has a lower frequency or not.

I have tested this system by generating the appropriate frequency tones using the free software called Audacity (beta version).

This seems to be a simple and cheap solution to changing over to unfamiliar full spectrum recorders, or buying an expensive high speed sampling card for the ANABAT HF output. Of course, it will be useless for calls greater than 24 kHz, unless you buy a more expensive digital recorder. Chris Corben is thinking through this topic as well and concedes that it might be feasible to use the ANABAT detector's firmware to tap into the HF and feedback to the output in ANALOOK, but development might take a little while!



Witty photo caption competition



You may recall from the previous edition that Billie Roberts had dug up this lovely antiquated photo (☺) of the attendees of the 1st National Flying Fox symposium. Unfortunately none of you tried your hand at naming the dashing attendees, so I thought I'd have a crack at it myself. I came up with the following, almost complete list, I'm a bit sketchy on a few last names, but overall, I think I've done a stellar job of identifying the 52 or so bat enthusiasts (with absolutely no help from the scanned list of names that Billie found accompanying the photo!).

In no particular order (so you can still try and find yourself, or your friends if you like!), gathering that sunny day were: Helen Luckhoff, Dianne Vavrym, Greg Richards, Jeff Simmons, Glen Fisher, Brett Jordan, Len Martin, Peter Felming, Warren Kennedy, John Kennedy, Chris Tidemann, Mike Crawford, Val Richardson, Vince Teulster (?), Ross Loebel, Bill Phillips, Tracey Avery, Bambang Hariono, Mal Grayston (?), Adrian Borsboom, Kerryn Parry-Jones, Paul P Rocklv (?), Richard Gates, Andrew Hafferden (?), Ken McAnally, John Winter, Leon Hughes, S. Tully (?), Michael McGuckin, Bob Ploddington (?), ?? (DPI Nambour), Sussan F. (?), Ross McKinney, F.R. Allison, Lorraine Little, Rowan Swindeer (?), Craig Pow, Kay Martin, Les Hall, David Adrian, Janeen Samuel, Helen George, Sandy Cooper, Bill Linchton (?), Phil Towers, Jason Richardson, Tim Limbert, Lin Martin, Ian Slatter, Carol Slatter, John Nelson, Hugh Spencer!

Ed: any e-mails sent to me correcting the spelling of last and/or first names will be duly ignored in light of the fact that no-one else attempted the task! PS: Congratulations to Billie and family on the arrival of their new bub!



Thank you to Nick Edards for this wonderful image. Nick's title for this image "Bat High Rise" is catchy, but can you do better? Email suggestions to editor@ausbats.org.au

– News and Announcements –

14th ABS Conference

Darwin: 12 – 14 July 2010

Registration for the 14th ABS Conference is open!

Early bird registration: *Before* 1 May 2010

Normal registration: 1 May – 1 June 2010

(Day registration accepted up til and including the day of attendance)

Abstracts due: 1 May 2010

Full details: <http://conference.ausbats.org.au/>

Tolga Bat Hospital news

Jenny Maclean and team continue the hard work up in Tolga and would like to share their efforts with you via their first e-newsletter. You can view the e-newsletter at:

http://www.tolgabathospital.org/about_newsletter.htm



Assistant still needed in Israel

One field assistant is required to work closely with Talya Hackett from the University of Bristol on the foraging activity and density of insectivorous bats and insects in the Negev desert in Israel. Work involves mist-netting for bats, radio-telemetry, acoustic monitoring and possibly some insect trapping. Accommodation in the form of a shared apartment in a nearby town will be provided as well as a small stipend for food.

Think you've got what it takes? E-mail your CV, contact details, two references to:

Talya Hackett
School of Biological Sciences
Woodland Road, Bristol BS81UG
Te: +44 (0) 117 331 7994
Talya.Hackett@bristol.ac.uk

Eastern Bent-wing Bats?

Tim Scrace (timsgrace@hotmail.com) is a trustee on the Moore Creek Caves Reserve, an 80 ha Crown Reserve near Tamworth in New South Wales. Tim is after some information on the Eastern Bent-wing Bat, which apparently have a maternity cave amongst the small cave system within the Reserve. There is a gate over the entrance to the maternity cave, but Tim isn't sure if it's helping or hindering the bats. If you can provide Tim with details on the bat, the best time for prohibiting access to the cave or any other information that might be of help, please contact him on the e-mail above.



Canberra inundated!

Late summer and early autumn this year has seen some unusual movements of Grey-headed Flying-foxes. In March, Michael Pennay circulated a message on the ABS list-server about a large influx to the camp in Canberra which has only been occupied in summer/autumn for the last 4 – 5 years. The numbers had risen rapidly from about 30 in early February to several thousand by the end of the month. The most seen before then in the Canberra camp would have been a few hundred. ABS members responded with similar influxes reported in Maitland (approx 20,000 bats) and Bateman's Bay. Camps were also reported in areas not usually occupied including Naracoorte and Kingston in South Australia (20 – 30 bats), and camps of about 3000 at Bendigo and in the Otways in Victoria. There was speculation about what may have driven the movements and if it was a result of heavy rain further north or eucalypt flowering patterns. Interestingly, the influx in Canberra corresponded with a similar sized decrease in population at the camp at Bega on the NSW far south coast. Unfortunately many bats have been caught in fruit tree netting and quite a few people bitten trying to remove them because people are unaccustomed to flying-foxes in regions where they aren't commonly seen. Anyone after a bit more information can get in touch with Michael: president@ausbats.org.au





University of
BRISTOL



The Jacob Blaustein Institutes for Desert Research
Mitrani Department of Desert Ecology
University of Bristol (UK) - School of Biological Sciences
Humboldt University Berlin

**Registration for the 8th international workshop on
The Biology of Desert-dwelling Bats
1 - 13 August 2010**

To be held at the Jacob Blaustein Institutes for Desert Research on the Sede Boqer Campus of BGU at Midreshet Ben-Gurion and focusing on:

- **Predator-prey interactions -- emphasizing ecological aspects of echolocation**
- **Physiology -- emphasizing water and energy balances.**

The workshop will include lectures by the course instructors*, and guest lecturers; laboratory exercises in acoustics and physiology, and field and laboratory research projects.

- The workshop is open to undergraduates who have recently completed their degrees in biology, and to M.Sc. students in biology.
- The number of participants is limited, and acceptance will be based on academic criteria.
- **Deadline** for registration: 1 May 2010
- The workshop will be in English.
- For further information about the workshop curriculum and fees, and to obtain registration forms, please contact Dr. Carmi Korine (ckorine@bgu.ac.il).



Amram Zabari©

***Course Instructors**

Drs. Carmi Korine, Berry Pinshow and Agus Muñoz Garcia (BGU); Dr. Marc Holderied (UoB); Dr. Christian C. Voigt (Leibniz Institute for Zoo and Wildlife Research, Berlin).



VOLUNTEERS NEEDED TO RADIO-TRACK BATS

When: February 12 - 26 & March 19 - April 2

Where: Cockle Bay Nature Reserve, Empire Bay, NSW Central Coast.

Activities: You will help set up and check harp traps, locate roost sites, observe bats as they leave their roosts, follow bats on foot or by vehicle for periods between dusk and dawn (7pm – 6am).

Purpose

of work: Bats will be tracked to investigate whether they forage in nearby saltmarsh habitat. Two sessions of radio-tracking will be conducted to investigate whether foraging habitat or time spent by bats in a particular foraging habitat changes with predicted variation in mosquito populations.

N.B. Fieldwork will be physically demanding. Limited accommodation can be arranged if required.

If interested, please contact Leroy Gonsalves:
0404 095 330; leroy_gonsalves@hotmail.com
Please let me know which dates you are available to help on and whether you are available to help during night/day or both



Dates and times for flying-fox counts in Melbourne in 2010

Rodney van der Ree

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Here are the count dates and meeting times (all times are corrected for daylight savings) for 2010 flying-fox counts in Yarra Bend, Victoria. New counters, and of course regulars, are, as always, very welcome and very appreciated.

Meeting place is the car park for the Yarra Bend Park Golf Course (Melways map 2D G7).

Count date	Meeting time
27/01/2010	20:15
24/02/2010	19:45
31/03/2010	19:00
28/04/2010	17:30
26/05/2010	17:00
23/06/2010	17:00
21/07/2010	17:15
18/08/2010	17:30
22/09/2010	17:45
20/10/2010	19:30
17/11/2010	19:30
15/12/2010	20:00



– Book reviews –

**Ecological and Behavioral
Methods for the Study of Bats
2nd Edition (2009)**

T. H. Kunz and S. Parsons (Eds)

Johns Hopkins University Press

**Reviewed by Susan Campbell¹, Lisa Godinho
(nee Evans)², Chris Grant³, Steven Griffiths⁴
and Kyle Armstrong⁵**

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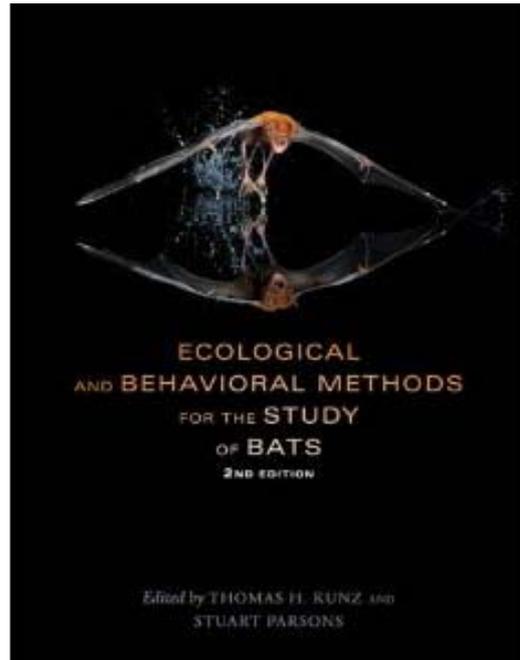
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This colossal, 901 page, 43 chapter, 11 part undertaking represents the 2nd edition of the renowned 'Kunz 1988' reference (rrp \$157). Such a mammoth undertaking by 84 contributors (52 from the U.S.) and edited by Tom Kunz and Stuart Parsons, warranted review by more than one person. Consequently, I commissioned the help of four other ABS members much more knowledgeable than I to provide their thoughts on specific chapters, hopefully providing you with an indication of the quality and resourcefulness of the book as a whole.

Of the 43 chapters, 14 are new to this 2nd edition. The topic areas covered are:

- Monitoring and tracking
- Populations and assemblages
- Reproduction and development
- Behaviour of bats in captivity and in the field
- Activity and movement
- Functional morphology
- Substance analysis
- Diet and nutrition
- Thermoregulation, energetics and water balance
- Genetics and evolution
- Parasites and disease
- Conservation



Methods of capturing and handling bats

T.H. Kunz, R. Hodgkison & C.D. Weise

'A [bat] in the hand is worth two in the bush'. So begins the first chapter to this physically larger edition of Ecological and Behavioural Methods for the Study of Bats.

This opening chapter provides a wealth of detail on traditional and contemporary trapping and handling techniques. Good illustrations accompany most topics ranging from the intricacies of specific knots to secure your mist nets, to trap configurations in a wide variety of field settings. The chapter is full of helpful text and diagrams to ensure 'best practise' methods for those biologists still refining their field 'know-how'. As such, I would recommend it as compulsory reading for budding bat enthusiasts. For the more experienced field operator, there is also new detail on less conventional trapping methods, including a specific section devoted to trapping at roosts.

A curve-backed harp trap not dissimilar to equipment trialled on Christmas Island is described, along with bucket traps, methods of hand capture at roosts, hoop nets and noose designs for pteropids. The authors also suggest protocols that should be followed, for mist netting, trapping at roosts and handling bats. Whilst the authors point out that consideration to the timing (early or late in the evening) and to the season (breeding or non-breeding) should be given to ensure the best welfare for bats trapped at

roosts, I think a much more cautionary approach is warranted, particularly when trapping bats at active maternity roosts. It would have been good to see a discussion of less invasive, alternative methods for obtaining data on reproductive and developing bats. New to the 2nd edition is also a paragraph dedicated to warning bat biologists about all the ill events they may encounter whilst working with bats, including bites, scratches, infections etc. Whilst necessary, I think this kicks the chapter off to a bit of a negative start and I believe it to be a theme revisited throughout the compilation, with a chapter dedicated to the topic of 'public health concerns and bat workers'.
Reviewed by Susan.

Methods and devices for marking bats

T.H. Kunz & C.D. Weise

Being known as a unique individual is perhaps something humans take for granted every day. Amongst bat researchers however, the ability to identify individual bats is important for a plethora of reasons, including estimating population size and viability, quantifying post-natal growth, estimating home ranges, characterising roost fidelity and social relationships...the list goes on! Marking individuals also means you can discover amazing statistics on bats, like the *Myotis brandtii* individual that was 41 years old!

This chapter provides information on the history of bat banding and after the moratorium on using aluminium bird bands in the 70s, the chapter goes on to describe more contemporary techniques of marking bats. Using forearm or thumb (pteropids) bat bands is still advocated as an acceptable method for marking individual bats, *provided* adequate care and precautions are taken. Fortunately, I do not think that the practical, step-by-step advice on fitting bat-bands is sufficiently detailed in this chapter to lead novice researchers to believe they can perform this practice on their own. There should be no replacement for the training and expertise provided by an expert when it comes to fitting bands to bats. Having said that, the section detailing Passive Integrated-Transponder (PIT) tags does contain sufficient detail, outlining best-practice methods for inserting tags. It is a pity that more emphasis isn't given to replacing traditional banding techniques with PIT tags in situations where marked bats and aerials / scanners can regularly come into contact (e.g., when bats are trapped, or as they exit / enter roost sites). Except for coloured bands that can be identified from a distance, the numbers on most bat bands require that the bat is in the hand

to be read, making PIT tagging a viable, less risky alternative.

The value in this chapter lies in alerting researchers to the benefits of individual identification and also in the final section that addresses the need for consistency and accuracy of record keeping. The authors propose a suite of conventions pertaining to the consistent marking of bats and collation of data world-wide, highlighting a real need for central 'band' return data-bases. *Reviewed by Susan.*

Food habits analysis of insectivorous bats

J.O. Whitaker Jr, G.F. McCracken & B.M. Siemers

The goals of this chapter are to examine and compare methods of analysing prey consumed by insectivorous bats and to describe the sensory basis by which bats detect and capture prey. There is very little (almost no) difference in the opening sections of the 2nd edition to those presented back in 1988, suggesting that little has changed in the way the world looks down a microscope at bat poo. However, by far the most emergent technique in this field is the use of genetic technology to amplify and sequence prey fragments present in scats, allowing more precise identification of prey.

Gary McCracken shares his team's methods for isolating and amplifying the fragmented DNA from scats in sufficient detail that the reader could readily apply the techniques. Using molecular techniques, Gary's team have identified the consumption of agricultural pest moths by Brazilian Free-tail Bats, exemplifying the benefits of such a fine scale analyses.

The 2nd half of this chapter looks at sensory detection and presents results from Björn Siemer's lab where they have assessed the role that sensory perception and morphology play in the 'choice' (passive or active) of prey by insectivorous bats. Overall, it appears that studies of insectivorous bat diet have moved from the field into the lab, resulting in finer scale identification of bat food habits. Ultimately this leads to a greater understanding and importantly, justification, of the ecosystem services provided by insectivorous bats. Finally, the chapter concludes with a brilliant key to assist with the identification of prey fragments (similar to, but modified from the 1st edition) and also presents what could prove an invaluable step-by-step (literally!) guide for students to the statistical analyses of food habitats data in SPSS.
Reviewed by Susan.



Rhinolophus megaphyllus. Photo credit Terry Reardon and Michael Pennay.

Parentage and kinship

S.J. Rossiter

Phylogenetic tools for examining character and clade evolution in bats

K.E. Jones & E.C. Teeling

Detecting, recording and analysing the vocalisations of bats

S. Parsons & J.M. Szewczak

Survey and monitoring

J. Hayes, H. Ober & R. Sherwin

Phylogeographic analysis of bats

M. Ruedi & G.F. McCracken

Karyotyping and studying chromosomes of bats

M. Volleth, R.A. Van Den Bussche & R.J. Baker

I read each of these chapters with interest and here are my random thoughts. The chapters are written by leaders in each field, and are a great resource for two reasons. Firstly, they are a good summary of techniques that are spread throughout many relatively recent papers; and secondly, the general topics are specifically applied to bats. Such summaries are convenient because you do not have to piece the methods together from many bat- and non-bat related papers. The book format has allowed the inclusion of the detail of manufacturers for some

specialist items, protocols for optimised laboratory procedures and explanation of field procedures and equipment. Whether you have been involved in some of these research areas or are just starting out, the reviews will provide something new. The small details, tips and warning of pitfalls will be very handy for student progress.

The only comment in the negative is that some chapters contain information that is already dated. However, this is a reflection of how fast technology is improving in some fields rather than a criticism of the author's work. Some chapters such as those on microsatellites by Rossiter and acoustics by Parsons and Szewczak are based on electronics or other rapidly developing technologies, which have progressed in the year or two since the authors have put pen to paper. For example, the development of microsatellites is now more convenient and cost effective using second generation sequencing (e.g. on a Roche GS-FLX platform), though this is at least mentioned at the end of the Rossiter chapter as a future prospect. Also, some of the methods in the Parsons and Szewczak chapter are essentially outdated, such as the use of analogue tapes, MiniDisc and DAT. While some people might still use these, there are now at least four

models of bat detector that use some kind of flash memory card to save data (ZCA, full spectrum) from whole night recordings, and the falling cost and increasing capacity of flash memory is only going to pull us further away from outdated storage media. Some parts of this chapter will therefore be essentially an historical record. Also, the phylogeographic chapter by Ruedi and McCracken might have benefited from the inclusion of the view of Omland *et al.* (2006 *Mol. Ecol.* 15:795), which presented a nice conceptual framework and terminology for thinking about the stages of 'intermediate polyphyly' and would have complemented the Avise categories.

The separate chapters on phylogenetics and phylogeography highlight how different these fields are, but I noticed that the Jones and Teeling chapter mentions how comparative studies can be undertaken both above and below the level of species. Thus, those interested in taxonomic work will benefit from both of these chapters. Jones and Teeling take us step by step through the comparative method, with brief details of an excellent electronic data management system. Digital means of summarising and managing data, be it a PDF library, DNA sequence database, laboratory information management system or taxonomic database, are making it easier for scientists to streamline their work, increase productivity and save time. Mention of database applications in this chapter highlighted to me the importance of organising data.

Lastly, I thought the inclusion of the chapter on karyotyping was valuable. Most taxonomic studies these days rely on morphology and molecular systematic relationships, but chromosomal patterns are still relevant, especially in complex groups. However, I wanted more explanation of the importance of karyotyping. *Reviewed by Kyle.*

Spatial methods for the macroecological study of bats

M.R. Willig, S.K. Lyons & R.D. Stevens

This chapter is nothing if not comprehensive in its exploration of methods for studying spatial ecology in bats. The authors are all U.S.-based macro-ecology research specialists. The chapter discusses major areas of research in relation to an animal's or community's spatial distribution, beginning with geographic range size, then body size, and lastly biodiversity. Each is, at minimum, discussed in terms of latitudinal gradients, with

the later including elevational gradients. Finally, they draw together these methods into two main applications, 1) landscape approaches, and 2) conservation approaches. There is a clear summary of the chapter which nicely condenses much of the content into concise 'take home' messages. These indicate research directions and advice about areas of bias to avoid in the different research methods – providing a really nice reference to come back to when planning new research. Throughout the chapter, the authors also provide good examples for the presentation of spatial modelling data, occasionally using the data of several studies to demonstrate the modelling of spatial patterns on larger scales. They also review indices that are useful for measuring biodiversity and body size in the field and give the related statistical advice.

The authors note, however, that more time has been devoted to the newer developing methods for examining spatial distributions in relation to body size, range size and abundance, than the well used approaches such as spatial distribution across latitudinal gradients. This suggested to me that the 'beginner' in this field is not the target audience. I believe this chapter is an excellent tool for professionals, but for the novice, or those just interested in the field, the language is not easy to follow as there was an assumption of prior understanding of, or exposure to, modelling spatial patterns in ecology. It reads more as a literature review than a technical guide, but nonetheless is an excellent summary of the methods available, their benefits and pitfalls. *Reviewed by Lisa.*

Collecting and preserving bat ectoparasites for ecological study

J.O. Whitaker Jr, C.M. Ritzi & C.W. Dick

As a bat parasitologist of sorts during my PhD, this chapter would have proved an excellent resource. Laid out in a clear and logical format, the authors guide their reader through a description of parasitism and the biology of ectoparasites before discussing collection techniques and the identification of parasites. The aim is to introduce parasitology to a mammalogist audience. Bat lovers may be put out at first to read that the use of sacrificial bats for the study of parasites is preferred (from the parasitologist's standpoint the bat is merely the host!). This is necessary when complete parasite communities, the microscopic or hard to remove parasites are of interest. But the authors do recognise that killing bats to get hold of their parasites is not always practical (particularly if the

bat species is endangered), and discuss the methods (and the biases) for collecting parasites from bats when you wish to release them unharmed.

There are detailed descriptions of how to store bats (if you have chosen the first option) to avoid losing parasites as they tend to abandon dead hosts. They also include methods of searching for parasites (including where best to look on the body), their removal, storage – including accurate labelling – and subsequent study. For the analysis of data there are clear equations for common variables used in parasitology, including prevalence, abundance and intensity. Throughout the chapter the authors give their advice on which methods they believe work best, which is excellent for the novice and perhaps a chance to rethink for those more experienced. A detailed and accessible guide to studying the eoparasites of bats. *Reviewed by Lisa.*

**Environmental contaminants and bats:
investigating exposure and effects**

T.J. O'Shea & J.J. Johnston

This chapter could almost be considered an homage to research conducted during the 1970's and 80's by Donald Clark Jr and colleagues at the U.S. Fish and Wildlife Service's Patuxent Wildlife Research Centre. The authors acknowledge the immense contribution made by Clark stating that he "established much of the existing knowledge and many of the fundamental approaches to the study of contaminants in bats".

Readers familiar with investigations into ecotoxicology of wild animals will be aware that such research is often extremely complex, involving multiple factors acting in unison and requires an understanding of a range of scientific disciplines (animal physiology and behavioural ecology, organic and inorganic chemistry, biological field survey techniques and laboratory based methods for examining toxicological processes, to name a few!). It is therefore no great surprise that a huge amount of information and pertinent literature is presented in this chapter. The result is a comprehensive and constructive review of the types of environmental contaminants known to affect bats, plus a thorough discussion of the range of methods employed to investigate modes of exposure and subsequent toxicological processes.

Sections of this chapter are certainly not for the faint hearted. There are descriptive accounts of the myriad ways in which bats may, and indeed

have been, negatively impacted via exposure to anthropogenic contaminants such as insecticides, fungicides and industrial waste products. While the primary interest of many ABS subscribers may lie in sections of *Ecological and Behavioral Methods for the Study of Bats* focused on biology, ecology and conservation (a little presumptuous of me perhaps?), this chapter provides an objective and systematic summary of what is potentially a very emotive topic (or range of topics).

For those amongst us with an interest in environmental risk and impact assessment, and more importantly ensuring bats are included in these processes, it always pays to be armed with the most up to date information. In this context *Environmental Contaminants and Bats: Investigating Exposure and Effects* represents a valuable resource and is well worth a read. *Reviewed by Steve.*

Methods for investigating water balance in bats

J.E. Basset, B. Pinshow & C. Korine

Considering the broader topic of my PhD project (water balance and drinking ecology of Australian microbats) I was rather excited to receive this chapter from Susan for review. One down side that became immediately apparent: I can pretty much forget about publishing my literature review on this very topic! However, on the upside the chapter provides a succinct review of the work done thus far on water balance in bats.

Methods for Investigating Water Balance in Bats is essentially an updated version of the chapter written by John Bassett and Eugene Studier for the first edition of *Behavioural and Ecological Methods for the Study of Bats*. As such, it mirrors the format of the original chapter, firstly presenting information on the primary components contributing to water economy in small mammals, followed by a summary of field and laboratory based techniques that have been employed to investigate water balance and turnover in bats. The information provided is succinct rather than expansive; the references cited provide a wealth of literature for anyone interested in pursuing techniques to investigate energetics and water turnover in bats. There is a rather strong emphasis on research conducted in the northern hemisphere, however this is entirely appropriate considering the majority of work on this topic has been conducted by a handful of incredibly enthusiastic and productive northern hemisphere based researchers, including the

authors themselves! I was pleased to see that several key papers by Australian researchers were cited (e.g. Baudinette *et al.* 2000; Geiser and Coburn 1999; Hosken and Withers 1997).

The only notable omission (in my humble opinion!) is reference to the field-based research conducted by Rick Adams (at the University of Northern Colorado) and colleagues into behavioural ecology associated with microbats drinking from sources of surface water.

I'll finish with a slightly paraphrased quote from the chapter, which I offer partly as a challenge to my fellow Australasian bat researchers: "Quantification of free water consumption (by bats) in the field remains problematic. Other than direct laboratory measurements, there appear to be no published methods to quantify daily water intake by drinking alone".

If anyone has any field based 'silver bullet' methods that address this issue, PLEASE let me know, preferably ASAP!! *Reviewed by Steve.*

Methods to promote bat conservation, outreach, and education through science- and research-based activities

A.L. Walsh & P.A. Morton

This chapter addresses the value of community education in bat conservation, and reminds us that scientific research alone does not necessarily yield conservation outcomes. It takes the reader through a range of ways to incorporate education into research activities and delves into education theory which I personally found pretty interesting. If we are to relay important conservation messages to the community it is worth reflecting on how to do this effectively. This chapter introduces us to some of the principles involved in successfully imparting information, and looks at practical ways to do this with bats. The use of real bats for education is given a big thumbs-up, be it the use of captive bats, viewing bat fly-outs, bat walks or bat-trapping.

The use of volunteer networks for bat related science projects is shown to have many benefits for science and conservation, as can collaboration with existing governmental organisations to utilise their communication networks and resources. The chapter finishes with what seems to be a pretty comprehensive list of bat organisations and networks as well as listing some web resources, which are unfortunately North American centric, and actual

web addresses are not provided for some reason. None-the-less, this chapter is worth a read. How best to achieve conservation through education is something we all touch on in one way or another, and there are plenty of worthwhile ideas here. *Reviewed by Chris.*

Acknowledgements

A copy of 'Ecological and Behavioral Methods for the Study of Bats' was made available to the ABS by 'Foot Print Books' (02 9997 3973), the Australasian distributor for John Hopkins Publishers. This book is available for purchase in Australia from Foot Print Books, or any good book store. The actual (slightly pawed through but otherwise in good nick!) review copy sent to the ABS will be made available as a student prize at the upcoming Darwin conference.

A Wild Australia Guide, Bats

Les Hall

Steve Parish Publishing

Reviewed by Michael Pennay

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Over the last year or two in Australia we have been blessed with the arrival of a number of books about bats. The publishing of a major revision of bat species accounts in the 3rd edition of the reference book, *Mammals of Australia*, in late 2008, and the 2nd edition of Sue Churchill's *Australian Bats* in early 2009 have gone a long way to bringing reference books about Australian bats up to date, both reflecting current levels of knowledge and understanding about bats.

In this context, it is interesting to see another new book about Australian bats, this one a joint effort from the Australian wildlife photography giant Steve Parish, and well known and long standing Australian bat expert Dr Les Hall. This book is part of the Wild Australia Guide series which includes another 22 titles on birds, snakes, parrots, frogs, spiders and other subjects. Steve Parish Publishing has also produced two children's books about bats at the same time.

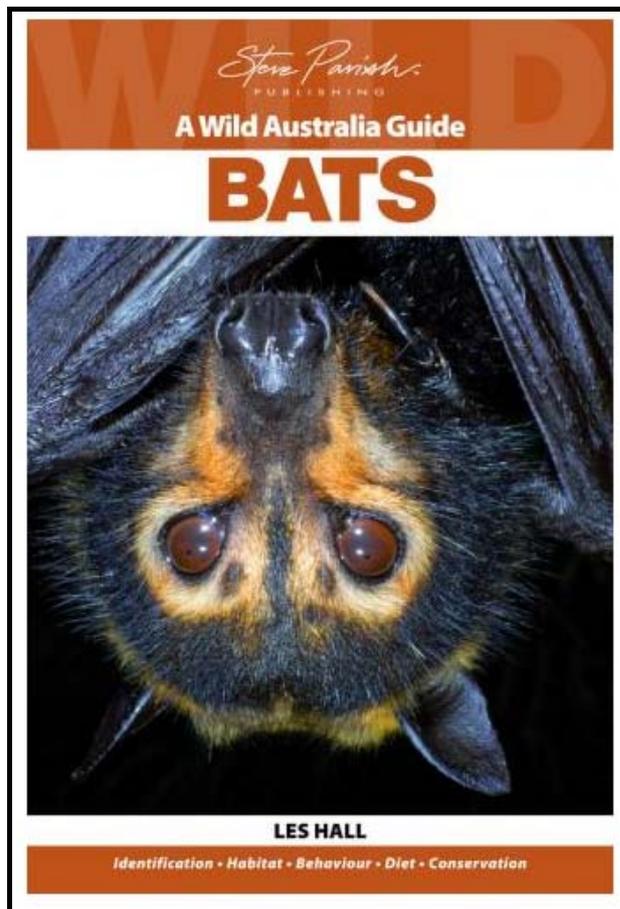
In some ways this book is an 'appetiser' for the main serve, as Steve, Les and Dr Greg Richards have been working on a book entitled 'A Natural History of Australian Bats' over the past three

years, which is now in the final layout stage before publishing. In their own words they 'wanted to get out to the lay public the wonderful things that Australian bats get up to, the sort of things that you can chat about when around a campfire, things that make us passionate about bats but that can get lost in a general text'. They also told me that when it comes out next year 'two old farts can sit back and say, well, we've put down on paper everything that we have learnt and loved, let's hope that we change some attitudes out there!'. I'm not sure about referring to them as 'old farts', but I'm certainly looking forward to seeing the combined knowledge and experience of these long time bat workers and acclaimed photographer documented.

It's great to have seen new books about bats (surely there is no such thing as too many?), however I have to admit I was a little worried when I first received *A Wild Australia Guide, Bats* in the mail as the general size and front cover are reminiscent of Sue Churchill's book. I was worried that we were entering a period where like Australian bird field guides, we have multiple books all competing for the same niche market.

The good news is that *A Wild Australia Guide, Bats* has managed to find its own niche in amongst these books, it doesn't try to be a reference book like *Mammals of Australia* and whilst it sits closer to Sue's book in content, it is not really a field guide. The book intentionally doesn't have a key or many of the detailed descriptive features required to identify bats to species level in the field. What it does well is introduce the reader to Australian bats, it has photos and a brief description of all species, as well as some choice words on misconceptions about bats, bat ecology and biology, bats and human health, the benefits of bats and conservation issues.

The format I think is excellent for keen students or adults with a casual interest in bats. This book is a great entry level book. It takes the reader beyond some of the negative stereotypes and opens the door to people's understanding that bats are quite an amazing group of animals and also how there are so many different types of bats in Australia. The book is ridiculously cheap for a colour production (rrp \$12.95), light (96 pages), accessible and easy to read. Those who really get into bats will ultimately feel the need to move to something more substantial, but for many people this book will have enough information in it to satisfy their curiosity.



I did pick up a few niggly problems in the book, but really these are only of concern to fastidious 'bat experts'. Whilst it would have been better to be accurate I also think that, in general, these glitches are irrelevant to the audience and value of this book. I also felt a little let down by some of the photos in the book, especially for a book associated with such a prolific photographer. I'm not sure if it's the printing or the photos, but some images seem a little flat and overexposed and some bats seem a little blinded by strong flashes (like the poor old spectacled flying fox on the front cover). It's sad to see such drab photos for two of Australia's most beautiful bat species, *Hipposideros diadema* and *Chalinolobus picatus*. Having said that, there are some truly beautiful photos in the book, the *Macroglossus* on the first page, and the photos of the bent-wing bats at Drum Cave on page 59 are spectacular.

The only big disappointment I have (and this is not necessarily the fault of this book, although it does contribute to it) is that with three books out in the last two years it would have been nice to see some consistency with the taxonomic treatment of bats. Instead each book has used its own taxonomy and we now find ourselves in a position where there are multiple published names for the same bat, or names that are accepted by some but not others. Between the

three books there are multiple names for *Rhinolophus robertsi* / *R. intermediate* / *R. phillippinensis*; *Phoniscus* / *Kerivoula papuensis*; *Austronomus* / *Tadarida australis*; *Pteropus natalis* / *melanotis*; *Pteropus banakrisi* (or not); *P. macrotis* (or not); *Nyctophilus daedalus*; *N. sherrini*; *N. major*; un-named *Nyctophilus* species; *Miniopterus schreibersii* (and sub-species) / *M. oriana* (and sub-species); *Hipposideros diadema* / *H. inornata*; *Scotorepens* species (or not); *Mormopterus planiceps* / *loriae* / *ridei* / *cobourgiana* etc.

Partly this is because the formal taxonomy hasn't been resolved for many of these species. But it would also have been good if the adoption and use of 'informal' or 'interim' taxonomy had been more consistent or minimised. This is a big problem, especially to newcomers or those not so up-to-date with the latest reviews. The inclusion of the contested species *Pteropus banakrisi* (see Helgen 2004 for details) without any acknowledgement of its disputed status also seems to lack impartiality and doesn't afford the reader the opportunity to investigate and make their own decisions.

Conclusion

I think this is a great book for introducing a whole new group of interested people into the world of Australian bats, the size, the price and the content are all well put together. I can just imagine myself finding this book when I was nine or ten and loving it, perhaps a future President of the ABS will discover his or her interest in bats through reading this book.

For the curious amongst you, I've included a brief list of the errors I did pick up, although as I said, I don't think these really impact on the book much at all.

The photo of the bat on page 4 isn't *Mormopterus norfolkensis* (the picture on page 82 also looks suspicious); page 10 - humans can't hear 0 kHz, the minimum is around 12-20 Hz; "bat species have unique calls making it possible to identify different species by call alone" (I wish!); page 15 - *Rhinolophidae* (sic); page 16 - "Megabats are not able to echolocate" (except *Rousettus*...); the bat on page 53 is *Chalinolobus dwyeri* not *C. picatus*; page 82 - the forearm size for *Mormopterus norfolkensis* is given as 31-35 mm however the latest review of the species (Reardon *et al.* 2008) shows it to be 35-39 mm; the extinct *Pteropus brunneus* is included but *Nyctophilus howensis* is missing; and *Vespadelus regulus* does not appear to occur in south-western Western Australia - in fact there appear to be no *Vespadelus* in SW WA which might come as a surprise to Paul Webala.

Attention to these minor errors in future editions will enhance the accuracy and help make this a great little book.

Acknowledgements

Thanks to Steve Parish Publishing for providing the copy of the book for review, Greg Richards and Les Hall for comments on their plans and Terry Reardon for comments and assistance with this review.

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The last laugh!
Mormopterus sp. 2
photographed by
Marg Turton during
the ABS Financial
AGM at Yanga
National Park, New
South Wales, 2009.



– Recent Literature –

Compiled by Susan Campbell from Web of Science (late September 2009 – mid March 2010).

[Ed: "The 0.05 rule for bats"; but not of the statistical variety! Check out my pick (in bold) of the current literature]

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[Ed: there are a few references in here that aren't specifically about wind energy, however I think that bat migration paths and the placement of turbines are two topics that should be considered together]

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