The Australasian Bat Society Newsletter

Number 38 'April' 2012

ABS Website: http://abs.ausbats.org.au
ABS Discussion list - email: discussion@list.ausbats.org.au
ISSN 1448-5877

Wind and Wildlife

Conference on wind energy and wildlife impacts

Melbourne, October 9th, 2012.

Call for speakers

The purpose of this conference is to increase our understanding of the actual effects of wind farms on wildlife in Australia. There have been numerous investigations into the impacts of wind farms on wildlife overseas, with many of these quantifying impacts on particular species at individual facilities. In Australia, however, there are usually intensive investigations during the pre-approval stage, but relatively few thorough investigations of the actual impacts of operational facilities on wildlife or an examination of the effectiveness of prescribed management actions currently being used.

Publications on this topic from Australian sites are scarce resulting in limited sharing of findings. Further, currently few learnings from sites are being incorporated into an adaptive management framework to improve the investigation, understanding and management of wind farms and wildlife in Australia. This conference aims to provide a unique opportunity for information sharing and networking, and to foster consistencies and improvements in research, management and processes.

Specifically the conference will endeavour to:

- Improve our understanding of the effect of wind farms on wildlife populations;
- Improve survey designs;
- Examine how learnings can be used to improve the assessment process;
- Facilitate incorporation of lessons learnt from current wind facilities to new proposals to ensure appropriate investigations are conducted and effective management of impacts incorporated.

We are seeking submissions from speakers to present their research and/or findings on the effects of commercial-scale wind farms on wildlife, and the effectiveness of current management strategies.
As the conference is a one day event, there is a strict limit on the number of talks that will be presented.

Papers that present scientific data focussing on one or more of the following will have priority:

- Issues around the design and implementation of pre-approval and post-construction studies on the effects of commercial-scale wind farms on wildlife;
- Methods aimed at improving data collection and understanding of the effects of wind farms on wildlife;
- Results of investigations on the effects of wind farms on wildlife. Note that priority will be given to studies that include and/or compare multiple sites and methods (i.e. involve learnings that are broadly applicable - rather than those focussed on a single case history);
- Evidence on the success or otherwise of current management actions used at commercial-scale wind farms.

The current session topics are listed below, although these may change depending on the abstracts received:

1. Assessments for new commercial-scale wind farms:
a. Species of interest versus species at risk
b. Survey design
c. Risk assessment processes
d. Mortality impact estimations
e. Cumulative impacts

2. Monitoring at operating commercial scale wind farms:
a. Survey design
b. Impacts on species
c. Compliance versus science

3. Mitigation and offsets
a. What has been used
b. The effectiveness of each

Submissions of abstracts of no longer than 300 words can be made before June 10th via www.windandwildlife.com.au or email info@windandwildlife.com.au for an application form. The scientific panel will select those abstract that best meets the above criteria. Speakers will be notified of the acceptance or otherwise of their abstracts by July 31st.

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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. 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 affiliation of authors and an email address for corresponding author; 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 affiliation of author(s) and an email address for the corresponding author. 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.
- Some 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.
- Editorial amendments may be suggested and all articles will generally undergo some minor editing to conform to the *Newsletter*.
- Please contact the *Newsletter* Editor if you need help or advice.
- **Advertising:** please contact the editor for current advertising (half and full page) rates.

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– Editorial –

I certainly missed catching up with you all at what I hear was an absolutely fantastic conference in Melbourne. Congratulations and thanks to the conference organisers! Abstracts from the 15th ABS conference are reprinted in this *Newsletter* (pages 21 to 41). Our conferences bring everyone together and facilitate the sharing of up-to-date chiropteran science and care. In addition, the Melbourne conference provided a public forum to convey to the broader community the wonder and importance of chiropterans. Never has this been a more important undertaking in light of increasing clashes between humanity, bats and other wildlife.

The new ABS Discussion list (discussion@list.ausbats.org.au) is proving to be a wonderful avenue for fruitful conversations. Usually I would keep track of this dialogue and provide a wrap up in the *Newsletter*. But the success of the email discussion list has meant that I've not been able to keep up! Please continue to use the email list, it provides access to a wealth of knowledge. At the same time, I look forward to receiving your interesting articles and photos on all your bat related work.

Susan Campbell

***Newsletter* Editor**

Cover: Logo from the 15th Australasian Bat Society Conference, Melbourne.

Photo below – how true! Thanks to Moni Rhodes for this simple slide that says it all from Lindy Lumsden's talk at the 'Managing our Nocturnal Neighbours Public Forum' as part of the 15th Australasian Bat Society Conference, Melbourne.

– From the out-going President –

Thank you to Michael Pennay, our out-going president, who has performed above and beyond the call of duty to successfully fill the president's role for four years! Nudging his way aside, Michael makes room for Kyle Armstrong to take the reins. Photo thanks to Luke Hogan.

This is just a quick note to express my sincere thanks for the opportunity to lead the Australasian Bat Society over the past four years. Over these years I've been lucky to have had an opportunity to meet many of you and I just wanted to thank you for the generous support, patience and advice you've given me and for the enthusiasm you have shown for the Society. Thanks! At the AGM in Melbourne Kyle Armstrong was voted as the new President so without delay I'll hand over to the President now!

Regards

Michael Pennay
Out-going ABS President

– From the in-coming President –

Well, after four years of introducing the Newsletter on page 1, a few more years of 'going dark', I now find myself on the President's page. I would like to thank the executive and other members for their vote of confidence in this new position, especially Michael Pennay who has filled me in on many things since I have taken over his role. It is of course a tremendous honour to be thought capable of fulfilling such a position, and I am fast learning that it is also a very busy one. Michael, and of course the other executives and the 'extended executive family', have put a lot of energy into the society, and I would like to thank all outgoing executive (and re-elected!) for their dedication in the past two years. I enjoy being a part of the ABS, we have such a diverse spread of talents, interests and backgrounds represented in the society, and it is also such a friendly one. I especially admire the sharing of knowledge that happens through our Discussion List and on a smaller scale between members and friends.

This year has been special because we had yet another wonderfully successful and interesting conference. Thanks so much to everyone

involved in its organisation, especially the organising committee Rodney van der Ree, Lindy Lumsden, Belinda Appleton, Grant Baverstock, Fiona Caryl, Lisa Godinho, Craig Grabham, Rob Gration, Steve Griffiths, Tanja Straka and Caroline Wilson; and the many other people that helped in many ways: Julia Stammers, Toni Lumsden, Chris Evans, Micaela Jemison, Alana Phillips and everyone else. Thanks also to The University of Melbourne for providing the excellent venue, the many sponsors for their valuable contributions, the talented caterers, and the many other people who donated their time and resources. The public forum was well attended – including an impressive attendance from 33 representatives from local governments around Melbourne. And the field trip to Kinglake Ranges Wilderness Camp was very enjoyable, and we were looked after well by the staff. To anyone I have missed, your contribution was just as much appreciated. And finally thanks to all presenters and attendees for contributing to the wonderful spirit.

From recent discussions in the executive meetings it is clear we have some challenges before us ... as per usual. I look forward to working with members and representing the society in our pursuits. And I especially look forward to several grubby and hot weeks capturing bats and spending time with bat friends old and new on the Cape York trip in a few months.

Kyle Armstrong

ABS President

2011 Australasian Bat Conservation Fund recipients

The Australasian Bat Conservation Fund was launched in 2011 and we congratulate the first three recipients of this award: Julie, Cory and Jenny.

For further details on the Bat Conservation Fund, please visit the ABS website:

http://ausbats.org.au/#/grants/4553586124

Projects supported in 2011:

Julie Broken-Brow – The abundance, species diversity and habitat usage of microbats in coastal mangroves of South-East Queensland.

Cory Toth – The breeding ecology of the Lesser Short-tailed Bat (*Mystacina tuberculata*)

Jenny Maclean – Tolga Bat Hospital: Assistance with Spectacled Flying-fox rescue and care during 2011-12 tick season.

Closing date for the first round of the 2012 Australasian Bat Conservation Fund is 30 June 2012. Check the ABS website for further details.

– Australasian Bat Society Inc: Business and Reports –

AUSTRALASIAN BAT SOCIETY, INC.

ABN: 75 120 155 626

Minutes of the ABS Annual General Meeting 2012

held on Thursday 12 April 2012
at the 15th ABS Conference; University of Melbourne

1. Open, attendance and apologies

The meeting opened at 4.00 pm.

Apologies were received from Chris Grant, Susan Campbell, Rob Gration, Susan Lamb and Craig Grabham.

Present: Terry Reardon, Stephen Griffiths, David Wilks, Maree Kerr, Lisa Godhino, Micaela Jemison, Katie Whiting, Tamara Inkster, Marg Turton, Nancy Pallin, Marjorie Beck, Adam Birnbaum, Kristen Lear, Ray Williams, Narawen Williams, Ian Kitchen, Cathy Dorling, Leroy Gonsalves, Anna Lloyd, Tanya Loos, Pam Whitley, Greg Richards, Francesca Amoresi, Ian Temby, David Gee, Piers Higgs, Lisa Cawthen, Dennis Matthews, Norm McKenzie, Caragh Threlfall, Pia Letino, Ian Gill, Yvonne Ingeme, Tony Mitchell, Grant Baverstock, Damian Milne, Trish Wimberley, Terry Wimberley, Robert Bender, Mark Mackinnon, Greg Ford, Anja Divijan, Kerryn Parry-Jones, Deb Melville, Michael Pennay, Kyle Armstrong, Brad Law, Lindy Lumsden, Peggy Eby.

2. Ratification of Minutes of FAGM, 25 June 2011 at "Narrowleaf", Australian Bat Clinic, Advancetown, Qld.

The minutes of FAGM 2011 were endorsed as a true record.
Moved: Greg Ford Seconded: Lindy Lumsden Carried.

3. Business arising from FAGM 2011 minutes

The following actions from the meeting were noted as completed:

- A high interest account was now set up.
- The amendment to Clause 47.3 of the ABS Rules, to allow electronic banking, had been lodged with the Department of Fair Trading.
- $1500 had been allocated to three projects under the ABS Conservation Fund in 2011.
- The new ABS website was launched and is now operating.

4. Reports from executive officers

President's Report – Michael Pennay

Michael Pennay reported on ABS events over the last year. He reported on the unprecedented Hendra outbreak during the year, and that ABS had been invited to join the Bat Health Focus Group of Wildlife Health Network, allowing ABS to work more closely with authorities and other wildlife health organisations.

Michael described how the ABS worked, and that besides the elected executive committee there was a group of members, including previous office holders and other interested members, who assisted the executive with advice and tasks. The ABS had broadened this Extended Executive in response to feedback from the FAGM and now our representation covered all Australian states as well as NZ, Fiji and PNG, across a very broad range of bat experience and age groups. He welcomed new members to the Extended Executive.

Other ABS activities over the past year included the launch of the new website, the inaugural Australasian Bat Night during March this year, and a proposal for a Cape York Bat Blitz in spring 2012. Reports on these would be given later in the meeting.

Michael informed the membership that he was not standing for re-election, and this meeting was his last official duty as President. He thanked the membership for the opportunity and privilege of being President and he had thoroughly enjoyed the last four years. He thanked the out-going committee for their support and wished the incoming executive well.

1st Vice President's Report – Chris Grant

Chris Grant rendered his apologies for the AGM due to his work commitments in Jordan. The President presented the report:

"I have little to report, other than to say Jordan is a great country, I'm having a great time, and come and visit! Good luck to the new Executive. The ABS seems to be going from strength to strength, and the Executive team have to take credit for this. Especial thanks to Michael Pennay for providing leadership and with the support of the hard working exec has positioned the ABS as an influential lobby group for bat conservation. I've enjoyed working with everyone; as always a great bunch of people. All the best!"

2nd Vice President's Report – Lindy Lumsden

Lindy Lumsden reported on her activities as 2nd Vice President. A major part of her role involves making sure the biennial conference happens. Lindy thanked Rodney van der Ree and the conference organising committee for the Melbourne conference – it was a fantastic team effort with a great result! Lindy asked for volunteers to host the 2014 conference.

Lindy also helps the *Newsletter* Editor, Susan Campbell, with the final stage of newsletter production, printing and posting, and assists the Treasurer, Craig Grabham, with financial activities.

Lindy thanked Susan for her great work as Editor, and Damian Milne and Craig Grabham for all their tireless work as Membership Secretary and Treasurer respectively. Finally, she thanked Michael Pennay for his excellent leadership over the last four years.

Secretary's Report – Maree Kerr

Maree Kerr described her activities over the year. She advised that the process for setting up the ABS Gift Fund were nearly complete, and that apart from normal secretarial duties (agendas and minutes), she has been representing the ABS on the Australian Environment Network which is a coalition of peak environmental groups including TWS, ACF, The Humane Society, Birdlife Australia, Greenpeace Australia, Total Environment Centre, Queensland Conservation Council, Environment Defenders Office Victoria and a number of others. The major concern of AEN has been the EPBC Act reform.

Another activity Maree has run, has been the coordination of the inaugural Australasian Bat Night. Australasian Bat night is based on the European Bat Night, which has been running for 15 years, and is designed to raise awareness of bats and educate the community about bats throughout Australasia. In the first year of the European Bat Night, two countries participated and a handful of activities were held. In 2011, 30 countries, including countries in Africa and South America, participated and over 200 activities were held with numbers attending reaching over 2000. Some events attracted 500

participants. Australasian Bat Night differs from European Bat Night in that it is held over a month rather than one week with a focus on one weekend.

Maree contacted a large number of organisations and individuals throughout Australia and New Zealand, and received quite a bit of interest particularly from local government. Not all interested parties were able to hold events this year. A total of 14 events were planned during March 2012, and 10 actually took place. (Four were cancelled or postponed to later in the year due to an extreme weather event). Activities ranged from a bat survey as part of a field trip component in a Masters of Wildlife Management course to a Batty Boat Cruise on the Brisbane River. Tolga Bat Hospital held an open weekend, but the most common activity was a bat talk and walk. Some of these involved watching flyouts and most detecting microbats, and some included activities for children. While some well attended events actually were "bat free" one of the most successful was organised by Marg Turton with over 100 attending and bats were detected!

Maree advised that she was not standing for Secretary again, in order to concentrate on this new role as Bat Night and events coordinator.

Maree thanked Michael for his leadership and especially thanked Lindy Lumsden, who is always hard working and without whom conferences would never happen.

Treasurer's Report – Craig Grabham

Craig Grabham was an apology for the AGM. The apology was accepted. Lindy Lumsden tabled the Treasurer's report.

Lindy spoke to the report and noted that:

- Merchant (Credit card) fees were still a substantial expense, and that ABS encouraged members to use electronic funds transfer for membership renewals and conference payments.
- Major expenses included $5000 to RZS for the ABS's contribution to the printing costs of the publication of the RZS/ABS Bat Symposium Biology and Conservation of Australasian Bats, held in Sydney in 2007. The printing and posting of the ABS *Newsletter* was also a major expense.
- The ABS financial year is the calendar year. At the end of 2011, the ABS held $56,370. This figure included the grant from the ACT government for Bat Watch, the one off payment to RZS and early deposits for functions at the 2012 conference.
- $15,000 has been transferred to a high Interest bank account, receiving 5% interest. After the conference transactions are finalised, further funds will be transferred.

Lindy Lumsden moved that the Treasurers' report was received.

Seconded: Maree Kerr Carried.

Notes TREASURERS REPORT FOR THE YEAR ENDING 31 DECEMBER 2011

		$	%
	Income		(of income)
1	ABS Conference 2010	$2,614.00	10.6%
2	ABS Conference 2012	$465.00	1.9%
3	Membership subscription	$10,379.00	42.0%
4	Cash Management	$106.10	0.4%
4	Interest (Bus Transaction Account (BTA)	$0.00	0.0%
4	Interest (Gift Account)	$0.12	0.0%
5	Grants received	$11,126.50	45.1%
	Donations	$0.00	0.0%
7	TOTAL INCOME	$24,690.72	100.0%
	Expenditure		
8	ABS Conference 2012	$3,392.00	-13.7%
9	Membership Management (renewals postage, etc)	$747.83	-3.0%
10	Newsletter (production & postage)	$2,751.19	-11.1%
11	Insurance (public liability)	$453.75	-1.8%
12	ABS conservation fund	$400.00	-1.6%
13	Facilities - BTA)	$582.93	-2.4%
13	Bank fees (BTA)	$120.00	-0.5%
13	Bank fees (Cash Management)	$0.00	0.0%
13	Bank fees (Gift)	$0.00	0.0%
14	Other (RZS contribution for printing book)	$5,000.00	-20.3%
15	TOTAL EXPENDITURE	$13,447.70	-54.5%
16	SURPLUS	$11,243.02	45.5%
17	GST Refunded from ATO	$477.00	
	GST Paid to ATO	$676.00	

	ASSETS AT 31 DECEMBER	*2010*	*2011*	*Difference*
18	ABS Cash Management Trust	$8,115.68	$0.00	$8,115.68
18	ABS Business Transaction Account	$35,773.41	$55,203.46	$19,430.05
18	ABS Gift Fund	$1,166.43	$1,166.55	$0.12
19	TOTAL ASSETS	$45,055.52	$56,370.01	$11,314.49

Conferences	
Income	$3,079.00
Costs	$3,392.00
Net result	$313.00

Membership	
Income - subscriptions	$10,379.00
Costs	$747.83
Net result	$9,631.17

Bank accounts	
Cash inflow	$106.22
Cash outflow	$702.93
Deficit	$596.71

Summary		
Membership	$9,631.17	85.7%
ABS grants	$11,126.50	99.0%
Donations	$0.00	0.0%
Newsletter	$2,751.19	-24.5%
Insurance	$453.75	-4.0%
Bank accounts	$596.71	-5.3%
ABS conservation fund	$400.00	-3.6%
Conferences	$313.00	-2.8%
Other (RZS contribution)	$5,000.00	-44.5%
Net result	$11,243.02	100.0%

NOTES explanation for Treasurer's Report

1 Recovery of 2010 conference income during 2011.

2 2012 conference income during 2011.

3 Includes memberships processed during 2011, consequently may underestimate overall number of memberships received during 2011.

4 Interested accumulated by each account during 2011.

5 New category - grant from the ACT Bat Watch Grant to ABS (M. Pennay).

7 Total of all forms of income during 2011.

8 2012 conference expenditure during 2011.

9 Costs attributed to membership management 2011.

10 Costs attributed to newsletter management 2011.

11 Costs attributed to insurance 2011.

12 Costs attributed to ABS conservation fund 2011 (1 grant of $400 for Julie Broken-Brow for 2011).

13 Bank fees for various accounts for 2011.

14 Contribution to RZS publication of findings for joint RZS/ABS 2007 symposium.

15 Total of all forms of expenditure during 2011.

16 Total income after expenditure for 2011. Note, this figure differs to total assests. NOTE Surplus after grant (Income of $24,690.72 - Grant $11,126.50 - Expenditure $13,447.70) = $116.52

17 Due to submission of final quarter BAS for 2011 in 2012 - ATO GST payments for and refunds not recovered until 2012.

18 Balanace of account at 31/12/2011.

19 Total assets (cash) all accounts combined at 31/12/2011.

Cash Management Account - redistribution of money from cash management account to business transaction account ($8299.60, 12/8/2011) Included in final amount for business transaction account.

NOTES – Summary (red) box explanations

Conference box - summary of the conference income and costs and net result regardless of year.

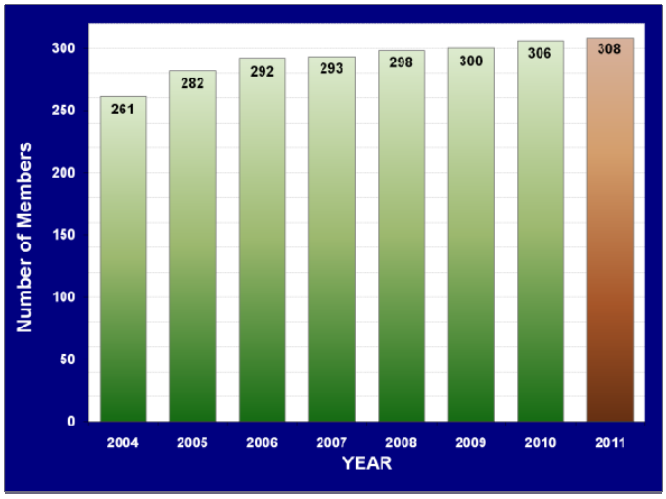
Membership box - summary of the income from memberships processed during the 2011 year.

Bank Accounts - summary of all interest accrued and bank fees deducted from all accounts combined during 2011.

Membership Officer's Report – Damian Milne
membership@ausbats.org.au

The total number of ABS members at the end of 2011 was 308. This was a small increase on 2010 and the seventh successive yearly increase in ABS membership overall (Figure 1). The number of unfinancial members (i.e. those members who have not renewed their membership for up to two years) decrease slightly compared to the previous year (Figure 2). The were 35 new members who joined the society in 2011 and 33 members who chose to leave the ABS or whose membership expired (i.e. more than two years unfinancial).

This year, we introduced the option for new members to join the ABS, or existing members to renew their membership online. The address for the website is http://membership.ausbats.org.au which is hosted by the non-profit organisation eGive. So far the system has worked well with only a couple of minor hiccups (as expected with any new system). To date, of the 149 people who either joined or renewed with the ABS in 2012, 76 opted to use the new online membership website.



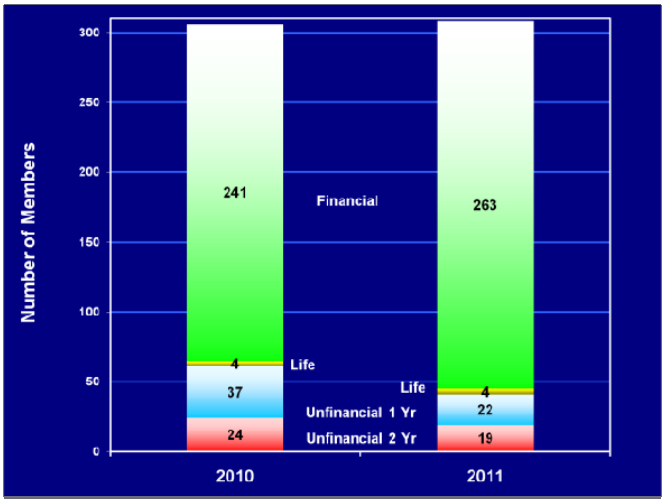


Figure 1. Total number of ABS members in 2011, in comparison with previous years.

Figure 2. Financial make up of ABS members in the year ending 2011, compared to 2010.

Newsletter Editor Report

As Susan Campbell was an apology, Michael Pennay presented the Editor's report.

"Thank you to all the members of the ABS for continuing to support the *Newsletter* with quality reports, articles, photographs and artwork. It is a both a credit to you all and a reflection on the good nature of our membership base that I am able to produce a publication that presents scientific findings alongside casual and often entertaining bat related stories. There's always space for more items, so please continue to support the *Newsletter* and send in all relevant articles.

A big thank you to Joanne Burgar and Lisa Cawthen who have gone a step further and assisted with assembling the last few *Newsletters*, and to Lindy Lumsden for ongoing fine tuning, editing and printing of the final production.

Thank you also to Faunatech and Titley Electronics for choosing the *Newsletter* to advertise their businesses. Hopefully such continued support will enable full colour printing of the *Newsletter* in the near future. It would be good to work out whether this is a financially-viable and membership-supported option for future editions.

Have a wonderful conference, and as always, I can't wait to receive loads of post-conference submissions – photos included. Please send these to me asap after the conclusion of the conference so I can get the next edition out to you in good time.

All the best,
Susan.
Newsletter Editor."

Discussion arising from Editor's Report

Lindy Lumsden advised that she had investigated the cost of full colour printing of the *Newsletter*:

Printing (black and white) (for a Newsletter the size of the last issue)	$6.50 per *Newsletter*
Printing (full colour)	$9.50 per *Newsletter*

It was noted that of the 308 membership, 170 receive printed copies, the rest opting to received electronic copies. The electronic version is in full colour. It was noted that electronic editions are easier to search, but that past copies are available on the website.

Members discussed reasons for opting for printed versions. These included a higher likelihood that members would read the Newsletter than if delivered electronically and promotional use of the Newsletter.

The members present at the meeting were interested to know if these reasons are common throughout the rest of the membership.

Action:
Send survey to members who receive print copies of the magazine, asking if

1. ***members read the magazine, and***
2. ***do they use the magazine for promotional purposes.***

Website Report
Michael Pennay presented the Website Report. He advised that Alexander Herr is no longer able to continue to manage the website and that he had taken on the management. The new website has now been up and running for some time. A few things have had to be tweaked including the on-line forums but all teething problems have now been fixed. He advised that as the site is Blog based, it is simple to edit. Michael said he was happy to continue to manage the website but would appreciate others learning to edit it and to help keep it up to date.

5. Election of Office Bearers

Nancy Pallin, Public Officer, conducted the elections.

Nancy reported that one nomination, duly seconded, was received for each of the Executive Positions. There being no other nominations, the following were elected for the next 2 year term:

President	Kyle Armstrong	Nominated by Susan Campbell
1st Vice President	Greg Ford	Nominated by Terry Reardon
2nd Vice President	Lindy Lumsden	Nominated by Stuart Parsons
Treasurer	Robert Bender	Nominated by Lisa Cawthen
Secretary	Bradley Law	Nominated by Maree Kerr
Membership Secretary	Damian Milne	Nominated by Katie Whiting
Newsletter Editor	Susan Campbell	Nominated by Margaret Turton

Public Officer
Nancy Pallin agreed to stay in this non-elected role. She informed the members that as the ABS is incorporated in NSW, the Public Officer must be in NSW.

Non-elected roles
New office holders were appointed to the non-elected positions of Website Manager and the newly created position of Bat Night Coordinator.

Website Manager	Michael Pennay
Bat Night Coordinator	Maree Kerr

6. General business

- **Australasian Bat Conservation Fund**

Michael Pennay spoke about the Australasian Bat Conservation Fund. 2011 was the first year of the program which is funded from ABS surplus funds from the preceding year.

In 2011, a total of $1,500 was granted for three projects. The recipients, each receiving $500, were:

- Julie Broken-Brow
- Cory Toth, NZ
- Jenny Maclean, Tolga Bat Hospital

A condition of the grant is that a report on the project that was assisted by the grant should be published in the ABS *Newsletter*.

For 2012, there will be $2,000 available for four projects. There will be two nomination periods with $1,000 funding for two projects.

The launch of the fund and deadlines for each round will be announced shortly.

- **Honorary life members**

The ABS Rules provides for granting of Life Memberships under clause 5.

Terry Reardon moved that Lindy Lumsden be elected to the standing of Honorary Life Member.

Lindy Lumsden has been a member since the formation of the society 21years ago, including donating $170 to kick start the organisation. She has held many committee roles including past President and Second Vice-President. She has served as 2nd Vice President for a number of years and been instrumental in the success of ABS conferences since the 1990s. As well as her official duties Lindy has helped behind the scenes in many areas including the *Newsletter* and has been an inspiration to many new members and students.

Michael Pennay seconded the motion.

The motion was unanimously approved by the members to standing ovation! Greg Richards presented Lindy flowers from one Life Member to another.

7. Other Business

There was no other business.

8. Next Meetings

The 2013 FAGM and 2014 Conference were discussed.

ABS conferences are held biennially with a Financial Annual General Meeting being held on the alternate years. It has become accepted practice, that every second conference is held in a place accessible to most members, generally South-east Australia, and in more exotic locations other years. Townsville was suggested for the 2014 conference and AGM.

The ABS discussed the format of the FAGM. The format has included workshops, field trips, fora and symposia.

The executive will discuss this further and advise the membership details of the 2013 FAGM and 2014 ABS conference and AGM.

8. Close

The meeting closed at 5.40 pm.

The 15th Australasian Bat Society Conference, Melbourne, 11-13th April, 2012

Welcome to the world of bats: My first Australasian Bat Society Conference

Micaela Jemison

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As a young scientist in the early stages of a career, often the words "conference presentation" can inspire a mixture excitement and dread in the bottom of one's stomach. Excitement and enthusiasm to share the knowledge you have gained about an animal you are so passionate about, mixed with the dread that somehow your presentation won't measure up in the eyes of your colleagues.

These are the nerves that our student presenters and I am sure at least one or two of our first time "Open Session" presenters may have felt at the 15th Australasian Bat Society Conference. I know at least I did. But something that I had not factored in when preparing my presentation for my first appearance at the bat conference was the passionate and supportive nature of this group of people which make up the ABS. It is this enthusiasm and camaraderie found within the ABS that makes the events like the conference and the first ever ABS "Managing our Nocturnal Neighbours" public forum such a success.

The conference started off bright and early at the University of Melbourne, with several fascinating student presentations ranging from mangroves, mud and *Mormopterus* (Anna McConville) to altitudinal distribution of microbats in Papua New Guinea (Tamara Inkster). The quality of the student presentations was astounding and really set the benchmark for the rest of us that were to follow! Following these first presentations it was time to have a squiz at the wide range of posters before heading off to the inaugural "Managing our Nocturnal Neighbours" public forum.

In keeping with this year's conference theme, the public forum focused on how managers and individuals can help conserve bat species in urban environments. This new venture for the ABS was a resounding success, with more than 300 people travelling from across Victoria to learn how to better manage bats in urban landscapes. The forum's success was largely due to the quality of the expert presentations given by twelve of our esteemed members. At the start of the forum participants from government agencies, local councils, friends groups and the general public were lead through the fascinating world of bats with Lindy Lumsden. Peggy Eby moved on to the big picture concerning flying-foxes in Australia with Rodney van der Ree narrowing this picture closer to home with the ongoing story surrounding Melbourne's Grey-headed Flying-fox. Caroline Wilson explained the importance of tree hollows and pruning guidelines for microbats in urban landscapes, followed by Caragh Threlfall placing the spotlight on the effects of artificial lights on insectivorous bats. The first section of the forum closed with Fiona Caryl explaining how environmental planning at the local and landscape scale can affect bats in urban landscapes and Ian Temby giving practical advice on how to manage bats in houses and other buildings.

After the delicious afternoon tea and a quick catch up with long lost colleagues and friends not seen in ages, it was back to the forum to hear Robert Bender give us practical information about the design, installation and maintenance of bat boxes. Rob Gration completed the theme with his discussion on the unexpected places that bats will use for roosting. Dan Edson from Biosecurity Queensland disentangled the myths surrounding bats and emerging diseases followed by Lisa Godinho who explored the opportunities and practical advice available to get the public involved in bat research. Ben Paris continued on this theme, illustrating a public engagement case study from his hometown in New Zealand which led nicely into an enthusiastic panel discussion with the participants.

The feedback from the forum's participants was fantastic with calls for similar events to be organised in the future. This is something that I think many ABS members agree on, but maybe we need to give our conference and forum organisers a rest first! Another highlight of the forum and achievement for the forum's organisers was the production of twelve factsheets based on the presentation topics. These factsheets are now available on the ABS

website (abs.ausbats.org.au) and are a valuable resource for everyone. So please spread them far and wide and feel free to use the printable file versions to print your own!

After the excitement of the public forum, the next two days were dedicated back to the exploration of recent research in the world of bats. And the range of research in the Australasian region was wide and varied. Highlights included the intriguing research by student Leroy Gonsalves on the ecological importance of mosquitoes to insectivorous bats and the work done by Peggy Eby on the responses of flying-foxes to food shortages in south-eastern Australia. Both of these projects won their authors the converted ABS Best Student and Best Conservation awards. These awards were definitely well deserved so congratulations!

Another well deserved honour was placed upon one of the ABS's longest serving members, Lindy Lumsden. Much to her surprise, she was awarded a lifetime membership to the society for her unwavering support and service to the ABS. Lindy has been an integral part of the ABS since its inception and her contributions have played a large role in making the ABS the wonderful organisation that it is today. She has worked tirelessly in many different roles within the executive committee, including President, 2nd Vice-President ensuring the conferences continue to flourish, and proof reading the *Newsletters*. Although her modesty will probably mean she will try to edit this paragraph out of the *Newsletter*, be assured dear readers I will fight to keep it in!

So here on this positive note I will end my recollection of my first ABS conference. It was a wonderful experience to be a part of the organising team and to have the chance to meet all the wonderful members of our society. The wide range of research and promotional work of ABS members is inspiring, and I am looking forward to the next conference to see the progress we will have achieved by then!

A trio of ABS Honorary Life Members – the newest Life Member, Lindy Lumsden, being congratulated by two previous recipients, Greg Richards and Elery Hamilton-Smith. Photo: Dan Lunney.

One of the social events organised as part of the conference in Melbourne was a visit to the Grey-headed Flying-fox camp at Yarra Bend. Rodney van der Ree outlined the history and management of the camp to the conference participants prior to the fly-out. Photo: Dan Lunney.

A local Yarra Bend resident Grey-headed Flying-fox enjoying the presence of ABS members. Photo: David Wilks.

Post-conference trip to Kinglake Ranges, 14-15 April 2012

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The post-conference field trip of the 15th ABS conference was held at the Kinglake Ranges Wilderness Camp, which is located 1 hour north of the Melbourne CBD in the middle of the Kinglake Ranges.

After all participants had arrived and sorted out their sleeping arrangements the program started with a presentation by Tony Fitzgerald from Parks Victoria about the impact of the Black Saturday bushfires in 2009. The Kinglake area was one of the most severely impacted areas in Victoria during these fires. However, within the fully rebuilt Wilderness Camp surrounded by mountain forest and beside the King Parrot Creek it was difficult to imagine such a dark history.

One focus of the post-conference trip was a bat detector workshop, lead by Michael Pennay. The aim of this workshop was to introduce participants to a range of bat detectors, including newly developed systems, and the most current analysis software. The workshop aimed to give people a 'hands on' sense of their capabilities. The workshop was divided into three segments – Saturday afternoon there were presentations on a range of detectors, which was followed by outside demonstrations of the detectors in the evening. The second day was dedicated to introducing various analysis software with practical demonstrations.

Presenters at this workshop included developers, users or representatives from the following companies:

- **Wildlife Acoustics** (www.wildlifeacoustics.com) – presented by Sherwood Snyder
- **Nanobat** (www.nanobat.net) – presented (and developed) by Roger Coles
- **Pettersson** (www.batsound.com) – presented by Kyle Armstrong
- **Batcorder** (www.ecoobs.com) – presented by Tanja Straka
- **SoundID** (www.soundid.net) – just software, presented by Neil Boucher.

But we didn't spend the entire time indoors, we also manage to enjoy the surroundings by searching for the best locations to set up the harp traps in the mountain forest and beside the creek. Later that night, the trapped bats were processed with less experienced attendees having the opportunity for individual guidance in bat handling. A range of species were caught, but the highlight for many was an Eastern Falsistrelle *Falsistrellus tasmaniensis,* as it was the first time that some of us had seen the species.

For those participants who were interested in even more technical equipment, Terry Reardon and Kristen Lear demonstrated their thermal imaging gear, while Steve Griffith brought an infrared camera, enabling people to watch a White-striped Freetail Bat *Tadarida australis* grooming.

Overnight, a few brave and toughened bat researchers slept in the 'tipis', while others snuggled up in their warm beds inside the cabins. After a tasty breakfast of hearty beans, eggs and toast, the third part of the bat detector workshop commenced, and around noon the bus was ready to take everyone back to Melbourne.

All in all, the post-conference trip was again a great opportunity for members at all levels to get together, sharing experiences and ideas. And as for me, I realized wherever you go in the world, our little bat family has the most amazing people I could ever hope to meet!

Sharing technology on the Kinglake field trip: Terry Reardon and Mark Carter discussing the finer points of bat chirpers. (photo: Cathy Dorling)

New technology side by side with traditional harp trapping. Thanks to Mark Venosta for the thermal camera image above of a bat flying along an aqueduct at Toorourrong Reservoir, and to Cathy Dorling for the image below of harp trap assembly.

Above: A Yellow-bellied Sheathtail Bat *Saccolaimus flaviventris* brought along to the Kinglake post-conference field trip, enthralling one of the participants, Josie Stokes. (Photo thanks to David Wilks).

Below: An equally enthralled audience watches while Lisa Godinho processes one of the captured bats on the field trip. (Photo thanks to Dan Lunney).

Abstracts from the 15th Australasian Bat Society Conference, Melbourne, 11-13th April, 2012

SPOKEN PRESENTATIONS

Mangroves, mud, and *Mormopterus* maternity roosts

Anna McConville[1], Brad Law[2] and Michael Mahony[1]

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Hollow-roosting bat species depend on day roosts to fulfil a number of aspects of their lifecycle such as shelter from weather and predators, thermoregulatory requirements and maternity sites for young. The protection of habitat features that are required to fulfil so many important lifecycle functions is essential to the conservation of threatened species, such as *Mormopterus norfolkensis* (East Coast Freetail Bat), which is listed as Vulnerable under the NSW *Threatened Species Conservation Act 1995*. The aim of this study was to explore what factors influence roost use at the roost, patch and landscape scales. A particular focus has been given to maternity roosts as these are likely to be critical to the species. The study was undertaken in the Hunter Estuary, NSW, where we recently discovered a large population of *M. norfolkensis*. A total of 19 lactating females and 2 adult males were radio-tracked to day roosts during two maternity seasons 2009/2010 and 2010/2011. Roosts were watched on dusk to record colony size and hollow entrance. Various roost characteristics were recorded for each roost tree and for a 10m radius plot surrounding each roost to compare to random plots. All bats located roosted in tree hollows and most were located within two patches of mangrove forest on the Hunter River within 1km of each other. A total of 38 roost trees were identified during the study, 35 being living *Avicennia marina* (Grey Mangrove), with two dead *A. marina* and one dead *Casuarina glauca* (Swamp Oak) also used. Roost plot comparisons are currently being analysed and will be presented.

Clutter influences relationships between bat activity and abundance of mosquitoes and non-mosquito prey in a coastal mosaic, New South Wales, Australia

Leroy Gonsalves[1], Susan Lamb[2], Cameron Webb[3], Bradley Law[4] and Vaughan Monamy[1]

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Conservation of insectivorous bat populations requires appropriate management of foraging habitats and the prey resources they sustain. Endangered saltmarsh communities support a diverse range of aquatic and terrestrial arthropods, including the saltmarsh mosquito (*Aedes vigilax*), a potentially important prey resource for insectivorous bats. Low-frequency echolocation is likely to limit prey detectability by bats, particularly in cluttered habitats, that may render abundant *Ae. vigilax* populations unavailable. To investigate the importance of *Ae. vigilax* to foraging insectivorous bats in a coastal mosaic of habitats with varying clutter levels, we measured nightly bat activity and abundance of prey (mosquito and non-mosquito) concurrently during neap and spring tides in saltmarsh (low clutter), urban (intermediate clutter) and forest (high clutter) habitats on the Central Coast, NSW. While prey abundances were greatest in saltmarsh and forest, bat activity was greatest in forest. However, proportional feeding activity was greatest in saltmarsh. Prey abundance was positively correlated with overall bat activity only in saltmarsh, suggesting that clutter negatively influences prey detectability. However, ecologically relevant correlations between small dipteran abundance and edge-adapted *Vespadelus* spp. were also observed in urban and forest habitats. Positive correlations between *Ae. vigilax* abundance and bat activity were restricted to small sized *Vespadelus* spp.,

that employ high-frequency echolocation suitable for detection of small prey along edges. These findings suggest *Ae. vigilax* may be an important prey resource for small, high-frequency echolocating bats capable of discerning small prey within forest tracks and exploiting abundant prey in open saltmarsh.

Microbat habitat use of *Avicennia marina* mangrove forests in south-east Queensland

Julie Broken-Brow and Luke Leung

University of Queensland

Recognizing vital roosting and foraging habitats is crucial for microbat conservation. Mangroves are an understudied flora group, which are threatened by both anthropomorphic and natural processes. Studies in New South Wales have recently found mangroves to be a significant habitat for many microbat species. To date there has been no research aimed at recognizing whether *Avicennia marina* mangrove forests are an important habitat for microbats in south-east Queensland. The aim of this study is to determine if different structured *Avicennia marina* mangrove forests are being used by microbats in south-east Queensland. Four harp traps and three passive Anabat monitors were used at each site, over four nights, to determine microbat abundance, species richness and activity. Three common *Avicennia marina* forest structures were examined: (1) open forest with high diameter at breast height (DBH) and high relative hollow abundance; (2) open forest with moderate DBH and moderate relative hollow abundance; and (3) closed forest with low DBH and low relative hollow abundance. The study used a complete randomised block design with four replications of each forest structure (twelve sites in total). Preliminary results from this study are currently being analysed and will be discussed during the presentation.

Bats in the floodplain: how important are the riverine and wetland habitats of the Murray-Darling to its bat communities?

Rachel V. Blakey[1], Brad Law[2] and Richard Kingsford[1]

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Large-scale clearing and alteration of water regimes within the Murray-Darling basin have resulted in well-documented negative impacts on floodplain biota. However, the majority of research has focussed on aquatic species or wetland specialists. Bats represent around 60% of mammal diversity within the basin and are likely to play an important functional role across riverine, wetland and terrestrial foodwebs. Our objective was to determine the importance of floodplain wetland and river systems for bats by testing the hypotheses: 1) bat activity, foraging activity, diversity and nocturnal insect biomass will decrease with decreasing flooding frequency; 2) river and wetland habitats will support different bat species assemblages than surrounding dry habitats; and 3) where structural complexity is low (e.g. no canopy trees), wetland habitats will support higher bat activity and foraging activity than dry habitats. We used systematic acoustic surveys in 2011 to measure overall bat activity, foraging activity, species richness and nocturnal insect biomass for 7 habitat types within 7 large freshwater wetland systems in NSW, Victoria and South Australia. Habitat types were selected to represent a flooding frequency gradient and a range of vegetation structures. They included: river channel, semi-permanent open wetlands (e.g. Lakes), treeless marshlands, floodplain forest , floodplain woodland, dryland vegetation (e.g. Mallee woodlands) and agricultural land. Overall, 140,000 Anabat files were recorded from 195 sampling nights. We will present preliminary results for one of the wetland systems sampled. Project outcomes will allow bat conservation to be integrated into Murray-Darling basin planning and provide a context for further research into the importance of bats in floodplain ecosystems.

Microbat altitudinal distribution and community structure in Papua New Guinea

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Papua New Guinea has a diverse and speciose bat fauna with approximately 8% of the world's species found on the island. This exceptional diversity may now be under threat due to anthropogenic changes such as global warming.

Such high diversity makes bats an ideal study taxon for investigating how species distributions and community structures may be affected by different climate change scenarios. In remote and under-studied regions such as PNG, basic baseline data such as species distributions still remain insufficiently recorded. Such baseline data is urgently needed in order to mitigate current and future threats to PNG's bat fauna. Understanding species current distributions is a crucial first step in predicting how species will be affected by climate change. The development of Papua New Guinea's first conservation area, YUS, in the Huon Peninsula, provided the perfect opportunity to survey bat distributions across a substantial elevational gradient (0m to 3000m elevation). Using a combination of ground truthed species locations and previously recorded occurrence data, we produced models of habitat suitability and species distributions. Here we discuss the altitudinal distribution and community structure of microbats in Papua New Guinea, and comment on the practical application of this information in determining how these species might be affected by global climate change.

Does urban noise affect vocal communication in Grey-headed flying-foxes *Pteropus poliocephalus*?

Tim Pearson

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Recent research has indicated that increasing levels of urban noise affects the acoustic structure of the songs of various urban dwelling bird species, with consequent implications for species ecology and conservation. Flying-foxes (*Pteropus spp.*) are highly vocal species that inhabit both urban and rural areas in Australia. As the animals' presence in urban areas appears to be increasing, the potential exists for these animals to also have their vocal communications affected by the increasing noise levels of urban environments. The hypothesis investigated was that acoustic characteristics of Grey-headed flying-fox (*Pteropus poliocephalus*) calls would vary between camps in urban and rural environments with differing levels of background noise, in a similar manner to urban dwelling songbirds that have been documented to alter their call characteristics during periods of high ambient noise. Vocalisations of flying-foxes were sampled in five flying-fox camps in urban and rural areas on the east coast of New South Wales, Australia, over a 12 week period (May-August 2011). Audio and video recordings were obtained of flying-fox behaviours and vocalisations. In addition, general soundscapes were obtained and background noise levels were measured. No differences were identified between flying-fox vocalisation characteristics in camps in urban or rural environments. However, calling ceased or was temporarily reduced for short lengths of time during periods of short duration, high amplitude noise (e.g. from low-flying aircraft) which greatly exceeded the background noise level. We suggest that extremely loud noises overlapping the frequencies used by flying foxes can interfere with their communication but, in general, urban noise does not alter the vocalisations of this species.

Ecology and management of flying foxes in urbanized south-east Queensland

Joanne Towsey

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In recent years, flying foxes have been coming into increasingly closer contact with people due to existing daytime camps becoming enveloped by urban sprawl, and as a result of flying foxes shifting into urban areas possibly in order to access more reliable food sources. This close proximity to people can lead to human-wildlife conflict situations. This conflict puts managers of flying foxes in a difficult position; they need to conserve populations of flying foxes but also need to manage the negative consequences. This presents a really interesting challenge for conservation, and my PhD is focused around (i) understanding how and why the animals are distributed across urban environments in the way that they are, and (ii) how we can manage Australia's urban flying fox populations to make sure we conserve them, while minimising the human-wildlife conflict. My research is being conducted in south-east Queensland, a rapidly urbanizing region where the dynamics of flying fox camps have been changing in recent years. In response to these changes, the Department of Environment and Resource Management (DERM) have been regularly monitoring camps in this region. I will provide a brief outline of the questions I am examining for my PhD, and then present some preliminary results based on the DERM monitoring data. How have the number of flying fox camps changed over time? Are the number of animals and ratio of different species in camps changing? Finally, I will discuss my

future plans for the analysis of this unique data set.

Health of a bat population in relation to the risk of zoonotic disease transmission: Longitudinal study of a flying-fox colony at Eastern Park, Geelong

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With bat colonies establishing more commonly in urban environments, it is likely that human factors will have a significant impact on the physiology and health status of these animals. One method of estimating the degree to which certain human factors and environmental factors adversely impact the physiology of bats is to measure stress. This project aims to reliably quantify stress levels in bat populations through an assay to measure cortisol; an important indicator of stress in both mammals and non-mammals. Bats are identified as reservoir hosts of a number of emerging viruses however little is known of the dynamics of virus infection among bat populations; in particular, what factors contribute to the increases in virus shedding which make spill-over events more likely. One possibility is that peaks of virus shedding occur when bats are stressed. This project will also determine the type and quantity of viruses shed throughout the year by a colony of predominantly grey-headed flying-foxes (*Pteropus poliocephalus*) residing in Geelong's Eastern Park, which will allow links between stress and surges of virus shedding to be identified. Urine will be collected from the colony weekly for at least 12 months. An enzyme-linked immunoassay will be used to measure urinary cortisol concentration and various virological techniques used to identify the presence of known and unknown bat viruses. The ability to quantify stress in bats will aid in assessing the health and welfare status of an individual or colony and high levels may forewarn the possibility of an outbreak situation.

Managing for microbats in stock routes and paddocks of the NSW wheat-sheep belt

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Travelling stock routes (TSRs) are roadside corridors of remnant vegetation. Originally established for the droving of livestock, they now form a large-scale network of connected habitat in heavily cleared regions, including the NSW wheat-sheep belt. Changes to management of the system could see some sections sold off and converted for agriculture, in spite of their clear value as habitat. In order to make recommendations regarding which TSRs should be retained for microbat conservation, we conducted bat and invertebrate surveys in 32 stock routes, and in the adjacent paddocks, using acoustic bat detectors and black light traps. We analysed data relating to both species richness (for conservation) and activity (for potential pest predation benefits). A total of ~92,000 microbat calls were recorded, attributed to 13 different species. Species richness was highest in wide stock routes with ample structures in the form of logs, trees with hollows, shrubs and native ground cover. Sealed roads exerted a negative effect in both stock routes and paddocks. Native pastures supported higher species richness and activity than crops and exotic pastures, and feeding activity was most affected by weather, not habitat variables. Patterns in bat species richness and activity only partially corresponded with those of insect abundance. A large number of factors at both the local and landscape scale need to be considered when managing for microbats in rural areas, including habitat cover, sympathetic land use practices and patterns of forage availability. Management recommendations will change depending on whether conservation or pest predation is a priority.

Unravelling the ecological importance of mosquitoes to insectivorous bats: can radiotracking and fecal DNA analysis help?

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The saltmarsh mosquito (*Aedes vigilax*) represents an abundant prey resource for insectivorous bats in coastal areas throughout summer. However, the importance of this mosquito to bat diet has not yet been investigated. Public health concerns associated with *Ae. vigilax* may warrant the application of broadscale mosquito control in some coastal areas, which may diminish this prey resource for local bats. To investigate the importance of *Ae. vigilax*, we initially characterised the diets of five eastern Australian bat species (*Vespadelus vulturnus*, *V. pumilus*, *Miniopterus australis*, *Nyctophilus gouldi* and *Chalinolobus gouldii*) by analysing prey DNA within guano collected from 52 individuals. Bats consumed a diverse range of prey dominated by lepidopterans. Consumption of *Ae. vigilax* was restricted to *V. pumilus* and *V. vulturnus*. In the same season, we radiotracked 13 *V. vulturnus* individuals during periods of relatively large and small population abundances of *Ae. vigilax*. Prey availability and radio-telemetry data were obtained concurrently in coastal saltmarsh and coastal swamp forest habitats using CO_2-baited encephalitis virus surveillance traps and standard light traps. Habitat compositional analysis revealed that *V. vulturnus* preferentially flew in coastal saltmarsh when *Ae. vigilax* abundance was similar in both habitats, but shifted to coastal swamp forest when abundance was lower in the saltmarsh. These findings highlight the need for appropriate management of mosquitoes that are ecologically important to local bats.

Population fluctuations of the maternity colony of Southern Bent-wing Bats (*Miniopterus schreibersii bassanii*) at Naracoorte Caves National Park, South Australia

Kristen M. Lear[1], Terry Reardon[2], and Lindy Lumsden[3]

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The Southern Bent-wing Bat (*Miniopterus schreibersii bassanii*) is an obligate cave-dwelling bat with a restricted distribution, occurring only in southeast South Australia and southwest Victoria. It is currently listed as Critically Endangered due to a severe population decline from an estimated 100,000 - 200,000 individuals in the 1960s to approximately 30,000 individuals in 2009. In addition, this species is dependent on just two maternity caves: Bat Cave in Naracoorte, South Australia and Starlight Cave in Warrnambool, Victoria. The purpose of this study is to accurately determine population numbers and trends at the Bat Cave maternity site so we can better understand how the population functions throughout the year. An automated counting system based on thermal imaging technology has been used to take estimates of cave population numbers several times per week since September 2011. The number of bats increased as individuals returned to the maternity cave from non-breeding sites. During the maternity season there were regular fluctuations in the number present, indicating for the first time that significant numbers of bats may use surrounding caves during this time. Preliminary results also indicate an increase in peak numbers from previous years. Despite this apparent increase, we cannot assume a sustained growth in population. Counts from previous years were taken only one to three times per summer and may have been taken at times when a significant proportion of bats had temporarily left Bat Cave. These results highlight the importance of regularly monitoring the population throughout the year, over multiple years, to accurately assess population trends and determine overall population health.

Genetic relationships within roosting groups of Gould's wattled bat (*Chalinolobus gouldii*): a study of social structure and kinship

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Long-term roosting associations have been observed between *Chalinolobus gouldii* individuals using artificial bat boxes. This study investigated the genetic relationships between *C.*

gouldii roost-mates to determine the influence of kinship on roost-mate choice. PIT tags and tag readers on bat boxes were used to determine roosting group composition and the proportion of time 37 (representing 666 pairs) bats spent roosting together. Eight microsatellites were used to calculate relatedness between individuals using artificial roosts. Two distinct social groups were identified within a suburban Melbourne population of *C. gouldii* using artificial roosts. Results indicated that kin genetic relatedness had a moderate influence on roosting associations in one of the two identified *C. gouldii* social groups. Social groups were found to use geographically distinct roosting areas to which individuals showed high fidelity. This study adds weight to existing evidence that kin selection may be one factor underlying long-term roosting associations within the Microchiroptera.

Temperate island insectivorous bat summer roost selection in a timber production landscape

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Hollow-bearing trees are an important resource for insectivorous bats as a place to roost and raise young. Yet for many species, such as the endemic Tasmanian long-eared bat *Nyctophilus sherrini*, there is no or very little information known of their roosting requirements and behaviour. Such information is crucial so that suitable roosting habitat can be retained for bats in modified landscapes. This study used radio-telemetry to investigate and compare the roost selection and behaviour of 29 individuals from four insectivorous bat species: *Nyctophilus sherrini, Nyctophilus geoffroyi, Chalinolobus morio* and *Falsistrellus tasmaniensis* at two sites on the temperate island of Tasmania, Australia. All species roosted in hollow-bearing trees, with reproductive female *Chalinolobus morio* roosting in large colonies of up to 340 individuals compared to non-reproductive individuals generally roosting solitary. Species differences in habitat use were also evident at multiple spatial scales, with *Nyctophilus sherrini, Chalinolobus morio* and *Falsistrellus tasmaniensis* selecting for trunk or branch roosts in mature forest, whereas *Nyctophilus geoffroyi* selected for basal roosts in retained habitat in harvested forest. This study was the first to document the summer roost selection and behaviour of *Nyctophilus sherrini* and assess the effectiveness of Tasmania's forest management strategies at providing suitable roosts for four species of insectivorous bat.

Restricted use of the urban landscape by long-tailed bats (*Chalinolobus tuberculatus*) in Hamilton City, New Zealand: Recommendations for management

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Reduced biodiversity in urban ecosystems is often attributed to the loss and fragmentation of suitable habitat for wildlife. Few studies have investigated if and how New Zealand bat species use human-dominated environments. To understand the distribution and habitat use patterns of bats in Hamilton City (New Zealand's fourth largest city) we used bat detectors to complete presence/absence surveys at 62 sites with a combined area of 628 ha. No lesser short-tailed bats (*Mystacina tuberculata*) were detected and it is assumed that this species is locally extinct. Long-tailed bat (*Chalinolobus tuberculatus*) activity was confirmed at only 16 habitats (25.8%), all of which were restricted to the southern most urban-rural fringe of the city. Moreover, 14 of these habitats (87.5%) were classified as being 'riparian margins' or 'major gullies' situated within 0-100m of the Waikato River – a major linear landscape feature and connection corridor. Only 6 sites had evidence of foraging activity and nightly activity patterns to suggest possible or likely roosting. Pass rates were consistently highest at habitats where houses, roads and street lights were lowest. Even small increases in the number of roads and street lights resulted in decreases in pass rates of 86.4% and 93.3%, respectively. Our results underscore the importance of well connected, less developed habitats for long-tailed bats in Hamilton City. Habitat restoration and bat conservation efforts should focus on preserving and improving habitat connectivity and

strategically reducing the effects of roads and street lighting in the face of urban expansion.

Reassessing the threatened status of microbats on Cape York Peninsula, Queensland, and the planned Australasian Bat Society Cape York Peninsula Blitz

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Our team undertook a Caring for Our Country funded project to assess the threatened status of microbats on Cape York Peninsular (CYP) that included a 28 day field trip in late 2009 covering much of the extent of CYP. The objectives of this project were to: 1. critically review the veracity of the known records and the reasons for each species conservation listing; 2. undertake limited targeted surveys in key areas; 3. provide a preliminary revised evaluation of the conservation status of priority species; and 4. make recommendations for conservation management and future research. The review of known records found that 15 of 31 microbat species were known from 10 or less localities on CYP, that large areas and key habitats had not been surveyed and that few surveys had been conducted in the wet season. The field survey aimed to include geographic gaps. Approximately 300 bats were captured and processed during the survey and 89,000 Anabat calls were recorded from 277 sites. Significant findings include: the first record of *Phoniscus papuensis* from eastern CYP; the first call recordings of *Saccolaimus mixtus*; and the discovery that *S. mixtus* occurs widely over CYP. Predictive distribution mapping was performed on all species and their conservation status reviewed. The final report and data are available from the first author. Several recommendations were made including that "a project be commenced to build a reliable bat call reference library and key" – an ABS organised project is now proposed for late 2012 to achieve this.

Is the Northern Leaf-nosed Bat (*Hipposideros stenotis*) disappearing or is it just naturally rare?

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The Northern Leaf-nosed Bat, *Hipposideros stenotis*, is an Australian endemic, cave roosting microbat , that occurs across the Top End of the Northern Territory and Western Kimberley. There are relatively few records for the species. It has been recorded 80 times, mostly since 1970. However since 2000 there are just 8 known records from the Australian mainland, even though a number of bat surveys have been conducted during this period within its preferred habitat, notably using echolocation recorders (Anabat). Although the high frequency echolocation call of *H. stenotis* is not readily recorded via Anabat, this method has been shown to reliably detect the species is areas where it is known to occur. *H. stenotis* has also disappeared from at least two sites where it was previously known to occur; at Pine Creek, 200 km south of Darwin; and at Red Bank Mine in the eastern Top End, possibly the only maternity colony to have ever been recorded for the species. Furthermore, distribution modelling suggests that, compared to other microbat species, *H. stenotis* is patchily distributed, and likely occurs in isolated populations which increases the species susceptibility to the risk of extinction. *H. stenotis* is cryptic, difficult to catch and probably naturally occurs in low numbers, however the available evidence suggests that the species may be declining, and should at least be a target for further research to re-survey areas where it has previously been recorded, and attempt to better understand the species current distribution and abundance.

Organisation of Kimberley bat communities

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Two compositionally distinct communities of zoophagic bats occur in the Kimberley. One comprises 19 species and occupies landward environments, while the other comprises 16 species and occupies mangroves. In each

community, the search-mode calls of syntopic species are dispersed in spectral space, with few showing more than peripheral overlap in their spectral variables (Q and F_{peakC}). Species of both communities were arrayed according to differences in echolocation call designs that were functionally appropriate to differences in (1) foraging niche determined from empirical data on species' flight capabilities and foraging behaviours and (2) relevant airframe variables related to flight performance and control. These observations imply a niche-assembly model of metacommunity structure.

The recent extinction of the Christmas Island Pipistrelle: a harbinger of doom for insectivores on this and other tropical islands?

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The decline of the Christmas Island Pipistrelle (*Pipistrellus murrayi*) was monitored from 1998 until its eventual extinction was declared in August 2009. A number of explanations have been proffered, but the invasive Yellow Crazy Ant was implicated as the major culprit. The ant's three-dimensional range from the ground to the highest leaf gives it the capacity to encounter any prey during its activity cycle, such as Pipistrelles in their tree roosts and insect eggs or pupae. However, the linear (rather than exponential) decline of this species alerted us to other means by which the YCA may have been involved in the extinction. Experiments with passive ant baiting, combined with insect light trapping, revealed an alarming impact of the ants. Where ants were suppressed or eradicated, the available insect prey quadrupled at some sites when compared with nearby untreated areas. Suppression of ants increased the numbers and biomass of flying insects. We concluded that the reduction of insect prey available to Pipistrelles through Yellow Crazy Ant infestation initially suppressed breeding at the onset of the decline, and then lowered the survival of adults, eventually starving to death as they aged. Our conclusions have huge implications for the future of other vertebrate insectivores on Christmas Island but, worse, almost seal the fate for those on other tropical islands where this voracious ant is present.

Recent survey of microbats on Lord Howe Island, southwest Pacific

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During November 2010 and January 2012 survey of microbats was undertaken on Lord Howe Island. The main aim of the surveys was to verify the absence of the Lord Howe Long-eared Bat (*Nyctophilus howensis*) and to determine the status of the Large Forest Bat (*Vespadelus darlingtoni*) prior to future planned rat eradication. Anabat detectors were placed at sites sampled previously during 1997 and 1998 as well as additional sites not sampled during these surveys. Harp trapping of bats was also undertaken at accessible locations to provide information on breeding as well as allow marking of individuals for estimates of population size and mortality.

Assessing the impact of the 2009 bushfires on microbat populations in Victoria

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Fire is a prominent component of the Australian landscape. While it is known that many species of Australian flora and fauna have adapted to fire, very little is understood about the response of microbats. In February 2009, the 'Black Saturday' bushfires burnt 430,000 ha of Victoria. These fires took a significant toll on both human life and wildlife. The impact of this fire on microbat populations and their foraging habitat was investigated in 2011. Impact was inferred by comparing the level of bat activity between forested sites with different fire history and severity. Sixty-eight sites were surveyed using Anabat detectors. Two-thirds of the sites were in areas burnt in 2009, with the remainder in nearby unburnt areas. The burnt category was further divided based on previous fire history (i.e. the frequency of fire in the preceding 40 years). Thirteen species and one genus of microbat were recorded. While all sites had some bat activity, significantly higher activity was recorded in unburnt habitats compared to burnt habitats. Within the burnt category there was no significant difference in overall bat activity based on

previous fire regimes. Fire severity was a significantly strong influence on the overall bat activity, with higher activity at less severely burnt sites. Five of the 14 taxa also followed this pattern. These were the smaller, slower-flying species that were likely to have suffered the highest mortality during the fire and be the most influenced by subsequent changes to the vegetation. The species that did not show a significant relationship were larger, fast-flying species. This study highlights that morphological and behavioural characteristics may influence mortality rates and the response of bats to fire.

Tadarida revisted

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The context of my research on *Tadarida australis* was to investigate the increasing impact of urbanisation and the potentially threatening factors to forest dependent fauna. Very little is known about the ecology and conservation biology of hollow-dependent bats in urban environments. Hence, the research focused on roost tree categorisation, roosting and foraging behaviour of *T. australis* in urban Brisbane. Despite being spread over a large geographic area (> 200 km^2), each roost was connected to others by less than three roosts. One roost (the communal roost) had the most links to all other roosts. This communal roost exhibited a hub of socialising between members of the roosting group especially at night, with vocalisation and swarming behaviour not found at any of the other roosts. *Tadarida australis* was capable of flying at high speeds and covering large distances in search for food. It foraged over all land-cover types. However, its observed foraging behaviour was non-random with respect to both spatial location and the nature of the ground-level habitat. The main feeding areas were predominantly over the Brisbane River flood plains. This presentation will revisit the conservation outcomes and recommendations presented in my thesis. Specifically, I will outline what happened to the protection of the roost trees, the communal tree and its local fission fusion society. Brisbane saw a devastating flood in 2011 and I will present old radio-tracking data on the 2011 flood map. Finally I will briefly discuss what impacts Brisbane's ongoing urbanisation had on the foraging habitat of *T. australis*.

Long term bat research in Australian forests: what will the future look like if we don't know the past?

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Long term research on Australian bats has been glaring in its absence. Unlike many other taxa, base-line data by which we can identify changes in status overtime is virtually non-existent for bats. Such data are vital for understanding climate change impacts and their importance has been highlighted recently in the U.S. with the occurrence of the new disease, white-nose syndrome, which has resulted in catastrophic declines in bats. Another area where long-term research is essential is the response of bats to logging or fire, because of the complex and dynamic ecological processes that pervade long-lived systems like forests. This presentation will outline a series of long-term studies (> 10 years) that have been documenting the response of bats to logging, wildfire, prescribed burning and plantation establishment. Techniques range from annual banding to estimate changes in survival and population size (virtually unknown world-wide for forest bats), systematic counts at subterranean roosts, repeat sampling with bat detectors over time in relation to disturbance events and landscape-scale monitoring. One example will be discussed in detail, which uses radio-tracking over a 12 year period to document changes in habitat use of the Golden-tipped bat *Kerivoula papuensis* in relation to logging. Radio-tracking was undertaken in Bodalla State Forest, NSW before logging, and subsequently, one and 9 years post-logging. We urge funding authorities to place a greater emphasis on establishing, maintaining, analysing and publishing long-term research. Such studies need to be rigorously designed to maximise return on the significant investment over–time.

BAT HEALTH – ONE HEALTH: Working Together

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The 'One Health' concept has grown out of the recognition that human health, domestic animal health and wildlife health are strongly interlinked with each other and the environment. Interest from the media and the public in issues relating to bat health has risen over the past few years due to events like the Hendra virus spillovers in Queensland and white nose syndrome in North America. The Australian Wildlife Health Network (AWHN) is an example of One Health in action, as AWHN coordinates a growing network of more than 500 wildlife health professionals around Australia including federal and state/territory conservation, agriculture and human health departments, universities, zoos, private veterinary practitioners, wildlife carers and members of the public. The role of AWHN is to improve communication and coordination within this network, to achieve better investigation and management of wildlife health in Australia. One way that AWHN engages with this large network is through focus groups, one of which is a Bat Health Focus Group. Members of this group represent a wide variety of organisations and individuals, including federal and state/territory government agencies dealing with public health, agriculture and environment, universities, researchers, ecologists, virologists, veterinarians, wildlife/bat carers and cavers, and includes representation from key stakeholder groups such as the Australasian Bat Society. The group considers issues relating to bat health including disease surveillance, testing protocols and data collection for diseases such as Australian Bat Lyssavirus (ABLV) and Hendra virus, development of health and safety guidelines for handling bats, and investigation of mass morbidity and mortality events in flying foxes. Using a collaborative One Health approach, AWHN and the Bat Health Focus Group consider bat health issues in relation to the broader context of biosecurity, public health, livestock health and environmental impacts in Australia.

Antiviral immunity in the black flying fox

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Bats have been identified as natural reservoir hosts to a variety of viruses, including Hendra and Rabies viruses, among others. A number of bat viruses are known to cause significant disease and even mortality in other species including humans and companion animals. In contrast, bats appear to be capable of coexisting asymptomatically with viruses and rarely show clinical signs of disease. Presumably, bats are capable of controlling viral replication more effectively than other species and may have developed novel immune adaptations for the control of viral infections. To date few studies have examined any aspect of antiviral immunity in bats. Our group is currently examining the immune responses of the Australian black flying fox (*Pteropus alecto*) as a model species to understand virus-host interactions. The results of this work have provided evidence for differences in the innate immune response, the component of the immune system that represents the first line of defense against viral infection. Our results are consistent with the possibility that bats may use novel immune mechanisms for the control of viral replication that have not been identified in other species. The identification of unique mechanisms or factors involved in bat antiviral immunity has important implications for the development of novel therapeutics to treat viral infections in humans and other species.

Recent Hendra virus spillover events - infected property profiles

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Hendra virus was first described in 1994 in Australia. Prior to 2011, Hendra virus had spilled from its natural flying-fox host on 14 known occasions, infecting at least 45 horses and seven people. In mid-2011, an unprecedented cluster of 18 separate flying-fox to horse spillovers within a 12-week period occurred in Queensland (n = 10) and New South Wales (n = 8). This temporal clustering of cases provided a unique opportunity for systematic and consistent profiles to be conducted on each of the 18 infected properties, with the aims of improving knowledge of Hendra virus transmission to horses and improving risk management strategies. Each infected property was surveyed, together with environmental factors, in three main ways for: 1) human, 2) horse and 3) flying-fox contributions to the likelihood of spillover. In addition, pooled urine samples were collected from nearby flying-fox camps and screened for Hendra virus. These samples consistently showed elevated levels of Hendra virus compared to previous years. GPS

dataloggers were deployed on 12 flying-foxes at one location to investigate localised foraging patterns and food resources. This data revealed flying-foxes were foraging on a range of weed species including climbing asparagus and wild tobacco. Our property profiles have shown that there is more to Hendra virus spillover from bats to horses than the presence of infected flying-foxes on a property.

Virus Discovery in urine from Flying Foxes (*Pteropus* species)

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Bats are the natural reservoir of a number of new and emerging viruses, including Hendra virus (HeV), Nipah virus, SARS coronavirus and Ebola virus. However, the range of viruses carried by bats remains unknown. Internationally, attempts to isolate viruses of bat origin using various mammalian cell lines have been largely unsuccessful. Bat cell lines have been developed in our research group to study bat immunology and host-virus interactions. These cell lines have provided us with useful tools that have enabled us to isolate known and novel viruses from the urine of flying foxes. The Hendra virus surveillance program in Queensland and New South Wales which involves the collection of urine from beneath roosting flying fox colonies has resulted in the isolation of HeV from the urine of flying foxes on a number of occasions, at different locations. However, isolations from pooled flying fox urine samples have also led to the discovery of a number of novel viruses including paramyxoviruses, herpesviruses and adenoviruses. Our continuing investigation of virus infection dynamics in bats will improve the understanding of bat-virus interaction and, hopefully provide insight into the key factors which trigger spillover events of bat-borne zoonotic viruses.

Establishment of new Grey-headed Flying Fox camp in a climatically extreme location

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Prior to 2001 Grey-headed Flying Foxes (*Pteropus poliocephalus*) were recorded as occasional visitors to Canberra in the Australian Capital Territory. In 2003 a camp of 300 Grey-headed Flying Foxes established in exotic trees at Commonwealth Park near the shore of Lake Burley Griffin between the city centre and Parliament House. Since 2008 this camp has been regularly occupied with the population reaching up to 6000 bats; young have been born there. Grey-headed Flying Foxes are known to be sensitive to climatic extremes, mortalities due to hyperthermia are well documented, however the response of the species to low temperatures is poorly known. At 580 m asl and 35.30^{o} S, the climate of the Canberra camp is substantially colder and drier than Grey-headed Flying Fox camps elsewhere in the species' range. The mean annual rainfall is 629mm and on average Canberra receives 99 frosts and 1-2 days of snow each year. Grey-headed Flying Foxes have been observed in Canberra in temperatures as low as -7° C, representing climatic tolerance not previously observed from this species. This presentation compiles our observations of the establishment of this unusual camp, including notes on the population, behaviour, reproduction, mortality and public reports of foraging and feeding bats in the region surrounding the camp.

Does public prejudice, amplified by the media, constitute a key threatening process for flying-foxes?

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The NSW Fauna Protection Act 1948 was a landmark piece of legislation that provided protection for birds and mammals. Exceptions under the Act were formally listed on Schedule 11, unprotected fauna. The flying-foxes were not removed until 1986, i.e. they were unprotected species. In 1992, the Black Flying-fox was included on the first-ever formal list of threatened

fauna in NSW, because it was known from only one location, but it was removed from the schedule in 2008 because of clear evidence of increases in distribution and abundance. The Grey-headed Flying-fox was included in the schedule of threatened species in NSW in 2001, as well as in the Commonwealth. Flying-foxes continue to be shot in NSW under licence as pests. Flying-foxes are variously liked, unpopular or resented by some orchardists and some neighbours of flying-fox camps. Lyssavirus and Hendra virus have compounded the problems of seeing any virtue in conserving flying-foxes. Lost in the noise of the resentment to flying-foxes is their keystone role in pollination and seed dispersal, and the fact that they are native species in need of protection. The problems for flying-foxes, and the corollary, flying-fox managers, is the concentration in the media on human-flying-fox conflicts. The media amplifies the conflicts that managers have to deal with, and diminishes the likelihood for recovery actions, as well as steer funding dollars to alleviate local problems, such as Hendra virus, crop damage or managing nuisance camps, but do not resolve issues based on sustained gathering of ecological information.

Famished – the responses of flying-foxes to food shortages in south-east Australia

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Flying-foxes in south-east Australia occupy a complex and variable feeding landscape in which the risk of starvation is predictably high relative to more stable environments. Periodic food shortages have been identified as a key threat to the vulnerable species the Grey-headed flying-fox *Pteropus poliocephalus.* Nine food shortages were documented in New South Wales between 1989 and 2011. They typically affected discrete regional areas, were of short duration (<6 wks) and occurred in winter or spring, seasons when feeding opportunities are limited. Each was associated with a consistent suite of altered behaviours and shifts in population parameters. An atypically lengthy and widespread food shortage was recorded in 2010. Information on the distribution and behaviours of flying-foxes during the episode were acquired from systematic monitoring programs, reports of unusual aggregations and from a coincidental telemetry study conducted in urban Sydney. The data provided insights into the range of strategies adopted by individual animals exposed to increased competition for scarce resources. Broad-scale strategies included 1) incursions into new or rarely occupied habitats; 2) the formation of temporary camps, elevated population densities and unusual persistence in a selection of known habitats. Individuals in the Sydney study area progressively reduced travel costs associated with feeding, relaxed colonial behaviours, used foods of comparatively low nutrient quality and reduced minimum feeding heights. Birth rates immediately after the food shortage and indices of adult mortality during the event were assessed against long-term data sets to gauge the impact on Grey-headed flying-foxes.

A measure of body condition in flying-foxes: an assessment of methods based on mass and length

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Body condition is an important measure of animal's fitness, health and wellbeing, and is integral to understanding broader aspects of animal ecology. There are many methods for quantifying body condition, and generally their aims are to be non-destructive, and to control for absolute body size when comparing body mass across individuals. For the vulnerable Grey-headed Flying-fox (*Pteropus poliocephalus)* no

measure of body condition has been formally evaluated to date, however, the ratio index (body mass/forearm length) has been commonly used in the past bat studies. An extended food shortage across NSW in 2010 and a concurrent study of flying-foxes in the Sydney Botanic Gardens resulted in the collection of measurements for individuals exposed to scarce food resources. The data are compared to animals previously captured at the same location under better environmental conditions to determine how these factors are reflected in the body condition of individual flying-foxes, and if sexes are affected differently. We assess the ratio index as an indicator of body condition, and evaluate its application in estimating the wellbeing of flying-foxes under variable environmental factors. Our results are consistent with the notion that the relationship between body mass and any one-dimensional parameter is not linear, making the ratio index unreliable measure of body condition.

"Stressed Out" Grey-headed Flying-foxes living on the edge!

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This study investigates the stress hormone level (as determined by faecal glucocorticoid analysis) and physical condition of individuals from an urban colony of the vulnerable Grey-headed Flying-fox, *Pteropus poliocephalus* during a food shortage, and compares them to flying-foxes in a more rural location that had a constant supply of food. The rural flying-foxes, were in good condition and had faecal glucocorticoid levels that we consider to be the normal range for this species. In comparison, urban flying-foxes were in poor condition and had elevated levels of faecal glucocorticoid metabolites: 75% had levels that were higher than the rural range and 30% were an order of magnitude higher. While rural male and female flying foxes showed no significant difference in either their levels of faecal glucocorticoid metabolites or their Body Condition Indexes, urban males had higher BCIs and higher levels of faecal glucocorticoid metabolites than the urban females. Variations in food availability between the two locations and the demands of the reproductive cycle on food-restricted flying-foxes probably explain the differences observed. Droppings collected under a urban colony site gave similar results to those collected from captured flying-foxes at the same location indicating that this methodology could provide a non-invasive method of determining the levels of stress at flying-fox colonies.

Eocene biogeography of Southern Hemisphere bats

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Bats first appear in the world fossil record in the Early Eocene, with Australia's *Australonycteris clarkae* from the 55 million-year-old Tingamarra Local Fauna of south-east Queensland being among the world's oldest. Other Early Eocene bats are known from both Northern and Southern Hemispheres. Their ancestors are hypothetical constructs and the immediate sister-group of bats and their place of origin unknown. Biogeographically, the presence of *Australonycteris* in the Tingamarra Local Fauna indicates that dispersal routes to Australia were available for archaic bats by the earliest Eocene and that these bat faunas were probably shared globally. At that time, as part of Gondwana, Australia was 25° latitudinally further south and ~3000 km more distant from northern continents than it is today. In the Late Cretaceous to early Paleogene, Australia, Antarctica and South America remained connected, with a forested corridor enabling dispersal of small terrestrial mammals including marsupials and bats between South America and Australia. With the final breakup of Gondwana ~35 Ma, the Antarctic Circumpolar Current became established and began to drive palaeoclimatic change from greenhouse to icehouse conditions in the Southern Hemisphere with ice sheets developing in Antarctica by the earliest Oligocene. The fossil records of South America, Antarctica, Australia and New Zealand, combined with new phylogenetic understanding for many groups, indicate that for bats and other good dispersers such as birds, insects and some plants, a trans-Antarctic corridor remained open throughout the Eocene and possibly longer, at least while climatic conditions remained favourable along the Antarctic coast.

Behavioral thermoregulation or parasite cleansing in *Myotis blythi*

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A colony location change within summer roosts was observed in sinantropic *M. blythi* in Central Asia. Colony relocation from the immediate under roof space closer to the ceiling always coincided with the hottest period of the year. It allowed us to consider such a colony shifting as a behavioural thermoregulation when day time temperatures reached 48-50ºC under roofs, but were significantly lower in building interiors. Similar movements were observed in underground cave colonies where temperature is stable all year round in the range of 9-15 ºC. Further observations showed that moving just 2-3 m away from the initial colony location the bats prevent infestation by the freshly hatched bat flies *(Diptera, Nycteribiidae)* which short host searching range prevents them from finding hosts outside 0.5 m radius. Mass emergence of the flies from pupae takes place during the warmest period in underground bat roosts. Shifting colonies originally developed as a parasite cleansing adaptation still exists in sinantropic roosts while Nycteribiids don't develop beyond pupae stage in hot conditions.

Ants in bat roost boxes

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Ants are the major intruders into artificial roost boxes in Melbourne, Australia, at Organ Pipes National Park in the western urban-rural fringe and at Ivanhoe on the middle Yarra. Several ant species have been found, but the smallest constitute the largest problem. They constitute one of the major constraints on the seasonal usage of the boxes by bats, confining bats to using the boxes mainly in dry periods when ant colonies are not seeking weather-proof spaces to set up breeding colonies. They make some boxes unavailable to bats for whole years thus having a major impact on the pattern of long-term usage of the boxes by bats and also on assessment of relative success of design of the boxes as the ants' power to divert bats away from the boxes has at least as large an impact on box usage as the box' attractiveness as a roost site. Ants mine into soft wood to create labyrinths of ant tunnels, seriously weakening box timbers and shortening box working life, increasing the cost of providing an ongoing box at a specific location. All control techniques have advantages and disadvantages. Characteristics of boxes preferred and avoided by bats are discussed.

Bat recognition technology cuts monitoring costs

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Introducing a new technology developed in New Zealand to cut the costs of indexing general bat activity. TrakaBat detectors use a microprocessor programmed to recognise the universal echolocation patterns used by commuting bats. They are designed to detect general bat activity rather than for species identification, but they can comfortably isolate New Zealand's two bat species by frequency. In December 2010, an array of ten Trakabat detectors was placed in the remote Landsborough Valley by piggybacking on the back of a routine predator control programme that services kill-traps in the area every few months. The Landsborough array produced more than 400 detector-nights worth of monitoring for just two-hours extra fieldwork by the predator control team. The data revealed the presence of the endangered lesser short-tail bat (*Mystacina tuberculata*) in a previously unknown location. Comparison tests undertaken in the Eglinton Valley show that the TrakaBat technology rivals the NZ Department of Conservation's standard heterodyne recorder and offers massive labour savings by eliminating post analysis labour costs. Data from Germany shows that this technology is just at home in Europe as it is in the temperate rain forests of New Zealand's West Coast.

Technology and bats: Two case studies of on-line and mobile systems for bat research

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Technology aimed at the efficient capture and storage of data, as well as its presentation online, is used increasingly as a foundation for large biological projects that involve both organisations and the public. Software solutions that underlie the online systems employed for data presentation, access and analysis also incorporate mobile tools. These allow for field data capture on smartphones and other field devices. Under funding from the Atlas of Living Australia (ALA), Gaia Resources developed a fully customisable, open source, web-based system known as the Biological Data Recording System (BDRS) for receiving, storing and querying data submitted as part of large collaborative or public-involvement projects. This software has been used in two bat related projects that are currently underway. The Australasian Bat Echolocation Database, developed for the ALA, has the capacity to receive and manage call recordings submitted by interested parties, and also presents species profiles with general information and examples of calls. A comprehensive set of guidelines and standards ensures that submissions are received in the correct formats. This resource will be made public soon. The second project, begun by Gaia Resources in 2012, is an inventory-style survey of urban bats in the Perth Metropolitan Region, with a focus on how the BDRS could be used in this research. Here, we will present these two projects and highlight how the BDRS system could become the foundation for similar conservation related projects that involve bat data collection and interpretation.

The ongoing challenge of characterising the echolocation calls of a rare tropical bat

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The bare-rumped sheathtail bat (*Saccolaimus saccolaimus*) is listed as Critically Endangered under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and as Endangered under Queensland's Nature Conservation Act 1992 (NCA). As such, the species is receiving increasing attention from regulators, developers and consultants in north-eastern Queensland, where energy infrastructure development and growth in coastal urban communities is placing considerable pressure on its habitat. The species is difficult to trap or locate in suitable roosting habitat, so the primary method used to survey for it during EIS and related studies is echolocation detection. Most consultants working on projects relevant to this species are using the Anabat system, but differentiation of *S. saccolaimus* calls from those of similar species remains difficult using zero-crossing analysis. Full-spectrum ultrasound recordings have been shown to be more useful in differentiating this species; and recent advances in the availability and cost-effectiveness of full-spectrum detectors have meant that many consultants are now collecting both zero-cross and full-spectrum data in an effort to locate *S. saccolaimus* during their surveys. Reference calls were collected from a roost in Cairns, using several detector types and analysed using a range of software. The results and reliability of identification are compared and discussed in the context of a data set collected during a recent fauna impact assessment survey in the Ayr region.

Discovery of a highly unusual alternating call frequency pattern used by the echolocating emballonurid bat, *Saccolaimus saccolaimus* during foraging

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In Australia, distribution of *Saccolaimus saccolaimus* is confined to the northern tropics with two disjunct populations: one in the Northern Territory (Top End) and the other in Queensland (eastern Cape York extending to south of Townsville). Knowledge of this Critically Endangered species is very limited due to relatively few records, as it is very difficult to trap alive. Even less is known about its foraging behavior as it hunts above the canopy and in open areas. Identifying the echolocation call of this species in flight can be unreliable because of

the similarity of call characteristics in the frequency range 28-18kHz, shared with other sympatric emballonurid and molossid bats. In this context, it has been discovered that *S. saccolaimus* uses another, hitherto undescribed, echolocation calling pattern, completely distinct from the typical 'monotonic' sequences. This pattern is based on two call types that are usually combined to form a triplet and was first discovered from recordings around the Darwin region. The triplet consists of two similar pulses (40msec duration; 230msec interval) both with energy concentrated in the dominant first harmonic (11-12kHz) for about 11msec with a slight linear downward frequency sweep. The second harmonic in these pulses, at lower energy, sweeps from 23kHz downwards convexly to 13kHz forming a long tail. The third pulse in the triplet is harmonically unrelated to the other pulses and consists of a 38msec duration, almost linear downsweep from 20-17kHz (dominant second harmonic). The inter-triplet interval is 650 msec and the pattern is perceived as rhythmic when listening in the field through the audio output of a suitable bat detector. The identity of the triplet calling species which forages high in open areas, was initially unknown. Monotonic echolocation call sequences were recorded in the vicinity based a dominant 24-23 kHz shallow sweeping second harmonic, suggestive of an emballonurid bat. Subsequently, this highly unusual triplet calling pattern was found to belong to *S. saccolaimus* as the same two call types are identically paired in a duplet alternating frequency pattern used by this species in Indonesia (Bogor), and recorded also in Brunei and Sabah. This unique triplet calling pattern has been used to positively identify *S. saccolaimus* at several sites in the NT, ranging from Kakadu NP to Keep River close to the NT/WA border. Importantly, the same type of calling pattern has now been detected in Queensland from several areas south of Townsville, in the greater Cairns region, northwards to Cooktown and tentatively from Lakefield NP and Iron Range.

The role of habitat reflectivity in the detectability of bat echolocation calls by moths. Refuting the allotonic frequency hypothesis?

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The preponderance of eared moths in the diets of some bats whose echolocation frequencies do not match the auditory sensitivities of moths has lead to the proposal that these mismatched (i.e. allotonic) frequencies are an evolutionary response to insect hearing (Allotonic Frequency Hypothesis, AFH). However, auditory sensitivity is a function of both frequency and intensity and until recently there has been little data on the intensity of bat calls and none for the family Rhinolophidae. We measured the intensity of the calls of *Rhinolophus capensis* (peak frequency, PF 84 kHz) and *R. clivosus* (PF 92 kHz), both of whom are known to take moths, and *Neoromicia capensis* (PF 39), which takes no moths. We played back recorded calls of all three species at the measured intensities in vegetated and open habitats to determine if habitat reflectivity offers a better explanation for the relative proportions of moths in the diets of bats than a consideration of whether or not their echolocation frequencies are allotonic. *Rhinolophus capensis* and *R. clivosus* emitted their calls at higher intensities (99.1±1.4 dB and 101.6±1.0 dB, respectively) than did *N. capensis* (97.8±0.9 dB) and, at these intensities, the calls of all three species would be audible to sympatric moths. On the other hand, the calls of the two rhinolophids were heard over shorter distances in vegetation than the calls of *N. capensis*, suggesting that habitat reflectivity in the dense vegetation within which rhinolophids forage reduces the audibility of their calls to moths, allowing them to take more moths.

The use of open cut mine rehabilitation by microbats at Ulan, New South Wales

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As part of fauna monitoring consent conditions, the monitoring of microbats within rehabilitated open cut mine overburden has been undertaken at Ulan Open Cut mine near Mudgee, New South Wales. Surveys undertaken from 1995 until the present have included the recording and analysis of echolocation calls, capture of individuals in harp traps and the selected radio tracking of individuals to diurnal roosts. The results of this long term monitoring are presented.

POSTER PRESENTATIONS

A pastoral suite: microbat community patterns within a farmland mosaic

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The New England Tablelands in north-eastern New South Wales is a variegated pastoral landscape. Patterns of land use have resulted in a modified landscape where patches of remnant native vegetation occur in a matrix of grasslands with scattered trees at varying densities. I used AnaBat detectors with CF Storage ZCAIMs to survey the microbat community within contiguous forest, smaller remnant patches and scattered trees in farmland. Calls were identified to species wherever possible using keys and my own reference call collection. From my survey results I compare microbat species richness, community composition and activity in scattered trees, patches and contiguous forest.

Nocturnal tours: Peeking through the dark for a brighter ecological future

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Museums in the 21st century are focusing on participation by the visitor that allows for experiential learning. To enhance nature appreciation and communicate the need for an ecologically sustainable future, the Waikato Museum has extended its gallery experience outdoors. It is increasingly pertinent to integrate communities with environmental matters and in Hamilton, the focus has been on raising awareness about New Zealand's longest river, the Waikato River. The museum's Nocturnal Tours moves beyond the indoors, taking visitors on a night time excursion to locate bats and other cryptic nocturnal animals. Bats are New Zealand's only native land mammal, and the long-tailed bats are a threatened species which still occur in Hamilton. Pooling expertise from local scientists and council officials, the tours offer participants an informative, practical nature experience suitable for all ages. Tour participants were surveyed to investigate the programme's effectiveness at lifting the bats' profile and increase understanding of its ecological value. Adults showed changes in attitude towards a nature based activity like bat spotting and indicated positive behaviour when it came to protecting the bat's habitat. Through highlighting their role in the city's ecological health and how they can be protected from further demise, visitors gained an enhanced respect and stewardship of Hamilton's long-tailed bat population. This poster describes the process of planning, execution and the future considerations for community conservation awareness and scientific participation, using the Waikato Museum's Nocturnal Tours as a template.

Monitoring Eastern Bent-wing Bats and other cave dwelling bats near Kinglake, following bushfire

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I was commissioned by Parks Victoria to undertake a monitoring program of two roosts of *Miniopterus schreibersii oceanensis* Eastern Bent-wing Bat in the Kinglake region. The roosts are located 13 km apart, Mt Slide Mine at Kinglake and One Tree Hill Mine at Smiths Gully. The vegetation at Mt Slide was impacted by the Black Saturday Bushfires whereas the vegetation at One Tree Hill wasn't. I hypothesised that bats from the Mt Slide roost would move to the One Tree Hill roost post-fires due to limited local foraging resources. The first stage of the monitoring program was to undertake exit surveys at both roosts to determine the number of bats present and compare them with historical data. A trapping and banding program was then instigated to monitor the movement of the bats between the roosts. To date 149 Eastern Bent-wing Bats have been captured at the two roosts, 90 at One Tree Hill and 59 at Mt Slide. There has been 15 recaptures, 3 bats banded at One Tree Hill were recaptured at Mt Slide indicating there is movement between the two roosts. This is however the reverse of my hypothesis. The exit surveys indicate that the population numbers at the Mt Slide roost have reduced post 2009 fires when compared to the pre-fire records and supports my hypothesis. What conclusions can be drawn? There is still a lot more research to do!

Developing a 3D cave image to assist with bat counting

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Victoria has only one known maternity site for the critically endangered Southern Bent-wing Bat, a cave with two large chambers approximately 45 meters high. The bats and pups roost in bell holes of various sizes, shapes and microclimates within the roof of the cave. The height of the cave and the different size and shapes of the bell holes makes obtaining an accurate count of the bats difficult. The current project aims to develop a 3D image of the cave using multiple photos taken from different angles. Specially designed computer software will be used to manipulate the photos into a 3D image. The length of known points in roof of the cave will be used to more accurately determine the surface area of the bell holes. Knowing the surface area of each bell holes will enable a more correct count of the roosting bats to be undertaken.

Shelter elicits passive avoidance behavior in walking crickets (*Teleogryllus commodus*)

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Although female crickets (Orthoptera; Gryllidae) spend a significant proportion of their life on the ground where some echolocating bat species are known to forage, current research suggests that only during flight do crickets evade these acoustic predators. Since male crickets are solely ground dwelling, evolutionary pressures on bat avoidance behavior by crickets in this setting may result in differences between the sexes in their response. We investigated the behavioral strategies that male and female field crickets (*Teleogryllus commodus*) use to avoid predation by bats on the ground. During acoustic simulation of bat encounters, neither male nor female walking field crickets demonstrated evasive behavior to any stimulus presented, across a range of bat species or predator proximities (based on call repetition rate). When cover was introduced to simulate the micro-habitat structure of the ground environment, males did not reliably demonstrate shelter seeking behavior, however *T. commodus* females showed a clear preference for covered areas in the absence of bat echolocation. In contrast, when stimulated by echolocation calls from *Nyctophilus bifax*, female crickets avoided the covered area, choosing instead to remain in a high risk setting, in the open. To our knowledge, this is the first time that bat echolocation has been shown to directly affect behavior in walking crickets.

Encounters of the terrestrial kind: long range detection of aerial hawkers by ground dwelling field crickets (*Teleogryllus oceanicus*) is possible, but requires close proximity to a gleaning predator

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Localization of microbats is a challenging process for field crickets in the wild since attenuation of sound by both the calling bat and environmental factors, alters the cues available for perception. Laboratory-based investigations have established the thresholds of bat call parameters required to elicit cricket responses, however, research has not yet determined what crickets can hear from echolocating bats flying near-by in the field. Extrapolating from the neural audiogram of field crickets (*Teleogryllus oceanicus*), we evaluated the relative audibility of search, approach and buzz phase calls recorded in the field from two bat species sympatric with a wild cricket colony. We then calculated the critical distance at which crickets would first detect the search phase calls of these bats, based on estimates from previous research of source levels. Mean relative amplitude of all call types from *Scotorepens greyii* (aerial specialist) and *Nyctophilus gouldi* (gleaner) were below cricket auditory thresholds (< 70 dB SPL), but would be detectable if crickets were 1.37 m and 0.9 m closer, respectively, to these bats. For *S. greyii*, the critical distance of detection by crickets was 5 m, beyond the detection range of the bat, but only 0.86 m for calls from *N. gouldi*. These findings are consistent with the species specificity in auditory sensitivity to echolocating bats reported

previously for field crickets. Moreover, our field work suggests that crickets may only detect those bats they are likely to encounter on the ground (gleaners), at a point when the bat has already detected the cricket.

Does the diet of *Mormopterus norfolkensis* contribute to its vulnerable status? DNA barcoding reveals all

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Diet is an important aspect of the ecology of a species since it may be instrumental in determining distribution, foraging behaviour and possibly provide causes for decline. *Mormopterus norfolkensis* (East Coast Freetail Bat) is a rarely captured microbat species that is listed as vulnerable under the NSW *Threatened Species Conservation Act 1995*. No previous studies have investigated the diet of *M. norfolkensis* and little is known of its foraging behaviour. The aim of this study was to document the diet of *M. norfolkensis* and to examine whether there is any difference between male and female diets during the maternity season. Traditionally, non-lethal dietary studies on microbats have been biased towards hard-bodied prey items which are more likely to survive mastication and digestion. To minimise such bias in this study, DNA barcoding methods were used to identify prey items in bat faecal pellets. Faeces collected from free-living *M. norfolkensis* individuals (five adult males and 15 lactating females) were stored dry and frozen prior to analysis. For each individual, DNA was extracted from the pooled faecal samples (five pellets) using a commercial faecal DNA isolation kit. Polymerase chain reaction (PCR) was used to amplify a section of the Cytochrome Oxidase I gene conserved only in arthropods. PCR products were then cloned and sequenced, with DNA sequences identified using the Barcode of Life Database (BOLD). DNA sequences from four orders and 13 families were identified, with Lepidoptera and Diptera dominating. More detailed results will be presented.

Do Australian megachiroptera menstruate? (A plea for assistance)

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Little is known about the uterine changes during the oestrous cycle and pregnancy in Australian megabats. During a mammalian oestrous cycle, the uterus undergoes cyclical changes which are critical for the initiation and maintenance of pregnancy. In a subset of primates, these changes are extended to include the differentiation of uterine stromal fibroblast cells – in other mammalian species this differentiation only occurs if pregnancy is established. This differentiation is termed 'decidualization' which involves both morphological and functional changes and is an important feature of the uterine menstrual cycle. Menstrual cycles therefore are only found in this subset of primate species. However, recent studies have suggested that megabats also have a menstrual cycle similar to women. We aim to determine whether Australian megabats have a menstrual cycle. Only 7 species of primates have menstrual cycles. If megabats also have a menstrual cycle, this would suggest that either menstruation evolved twice or that they are more closely related to primates than the current phylogeny indicates. Is it flying which has actually evolved twice in mammals? We are experts in human menstrual cycles and have considerable experience in comparative reproductive biology. Therefore, we aim to compare the oestrous/menstrual cycle in Australian megabats to the human menstrual cycle. In order to carry out these experiments we require the reproductive tract of *Pteropus* spp. To minimise the impact of this research on the bat population, we are asking carers if they would be willing to donate animals which are euthanized due to ill-health.

Bat reserve selection in areas with poor biological data

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Areas where biological information is very limited are commonly areas where conservation actions are urgently required and appropriate conservation strategies are often

underdeveloped. Lack of research and researchers is one of factors contributing to the delay in recognising the degree of threat faced by bats. When empirical data are lacking, information on basic life history and habitat requirements, which is already known for most species; landscape features and distances from topographic maps and vegetation data from aerial/satellite photos can identify some bat ecological neighbourhood components. Bat reserve site selection based on low sampling effort and use of information available from various sources as well as investigative research beyond traditional trapping studies proposed for such areas in form of a few generalised guidelines. The proposed strategy for describing bat habitat is GIS compatible and could be presented in visualised form to decision makers and the public.

The role of water bodies for microbats in urban areas

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Water bodies provide an important feeding ground for some insectivorous microbat species due to emergent aquatic insects, as former studies in the Northern Hemisphere have shown. Most studies on microbats in urban areas have neglected standing water bodies as feeding habitats so far; therefore, knowledge about the role of this habitat in an urban area is lacking and is critical for urban planning. In this study we investigate the role of standing water bodies for microbats in an urban environment, and what features, such as adjacent vegetation, size, and water quality influence bat activity. The activity and diversity of microbats and the abundance of nocturnal insects will be surveyed at 65 urban and suburban water bodies and compared to 44 ecologically similar habitats (´urban green areas`) without water. The water bodies have been stratified after Latin Hypercube sampling and the ecologically similar habitats function as control sites to detect the importance of water bodies as feeding grounds. Surveys will be undertaken each season for one year to determine if water bodies are more important at certain times of the year. The primary survey methods are a combination of ultrasonic surveys of microbats (Anabats), light trapping of nocturnal insects and habitat assessment. The aim of this research is to investigate the role of water bodies for microbats in urban areas, and based on this knowledge to develop guidelines so that bats can be considered during the development of new wetlands in urban areas.

Microbats of the Mandapam Islands in the Gulf of Mannar: a preliminary study

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There is very little information about the status, and distribution of microbats on the 21 Mandapam islands in the Gulf of Mannar, located between India and Sri Lanka. It is a priority area for conservation because of its richness of species and ecosystems and one of the first Marine Biosphere Reserves established in India. A preliminary microbat study was undertaken in November 2010 on three of these islands. The islands (Rameswaram, Krusadai and Hare islands) differ in size and distance to the mainland, but all hold diversified fauna and flora in their insular forests. Primary research methods were ultrasonic surveys (Pettersson D240x) and diet analyses of three microbat species (*Hipposideros speoris, Hipposideros ater* and *Megaderma lyra*). The ultrasonic surveys showed the highest microbat activity and diversity on the largest and closest island to the mainland, Rameswaram, with 8 different bat species (3 different *Pipistrellus spec.*, *Scotophilus spec.* and four unidentified bat species), followed by the Krusadai island with 6 different bat species (3 different *Pipistrellus spec.* and three unidentified bat species). The lowest activity was recorded on Hare island, a large island, but located far away from Rameswaram and Krusadai. The diet analyses of *Hipposideros speoris* and *H. ater* showed Lepidoptera to be the major composition, followed by Diptera, Hemiptera and Coleoptera. The diet of the carnivorous bat *Megaderma lyra*, consisted mainly of small vertebrates such as

bats, birds, rodents, lizards and fish, followed by large insects such as Lepidoptera and Orthoptera. The ecology of the microbat fauna and their role in the ecosystem of the islands in the Gulf of Mannar will be addressed in further studies. The results will provide knowledge for specific conservation measures to protect these island bats.

Use of thermal imaging to count roosting and exiting Southern Bent-wing Bat in SW Victoria

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Biosis Research has recently conducted roost and exit counts of Southern Bent-wing Bat *Miniopterus schreibersii bassanii* at Byaduk Caves in SW Victoria. The caves are occupied by non-breeding individuals and previous records of relatively large numbers of bats exist for the caves. An estimation of current numbers of individuals occupying the caves is required to inform the planning process for the proposed Penshurst wind farm located approximately 18km to the east of Byaduk Caves. Roost and exit counts were achieved with the use of Flir E60 thermal cameras and portable digital video recorders. Counts during October and December 2011 revealed very few Southern Bent-wing Bat at Byaduk Caves, while counts in late Feb 2012 revealed much larger numbers as being present. Automatic tracking software is currently being trialled for use with this recording hardware to more accurately and efficiently achieve exit counts. Benefits and limitations of the above methods and implications of the results are discussed.

Going batty – Grey-headed Flying-foxes in Tarcutta???

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Threatened species monitoring often relates to species identified during targeted surveys for construction projects. Key species are identified through the environmental assessment process and are monitored through construction and operation of a project's life. However, sometimes a spanner is thrown in the works and an adaptive approach is required, particularly when unexpected species show up in unexpected places. A camp of 500 Grey-headed Flying-foxes (*Pteropus poliocephalus*) mysteriously appeared in Tarcutta Creek, hundreds of kilometres outside their normal range. They set up camp in River Red Gums next to the existing Hume Highway and less than 250 metres away from construction works for the Tarcutta Bypass. This was a concern, given that noisy construction works were planned a few weeks after their unexpected arrival. The situation led me to ask many difficult questions: Would the bats 'hang around' long enough to give birth? If so, did they run the risk of becoming stressed from sudden, loud noises, and losing their unborn babies or dropping newborn young? Would they also decide to tempt fate and roost in the construction area where trees were being felled, leaving them at risk of injury or even death? If they did move into the construction area, would we cause more stress to the bats by creating noise disturbances in an attempt to get them out of harm's way? Find out our answers and solutions at the conference poster session.

Flying Foxes, a maternal camp, Council and neighbour relations

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Ku-ring-gai Local Government area is home to an important long-term maternal camp for the threatened Grey-headed Flying Fox which can house up to 80,000 bats. The Ku-ring-gai Flying Fox Reserve is situated in an urban setting less than 30 km from Australia's largest city the relatively small reserve is surrounded by houses and a retirement village. The ever changing camp varies from 5 to 100 metres from dwellings and the seasonally variable flight paths of the bats mean there is always potential for noise, odour and bat splat impacts on the local residents. This poster will look at the seasonal and annual variations in bat numbers and camp extents at the Ku-ring-gai Flying Fox Reserve over the last 18 years. It will also examine the results of local resident attitude surveys in relation to the reserve and the bats and how these relate to camp population variations, bat behaviour and reports in the media.

Managing our Nocturnal Neighbours Public Forum

One afternoon of the 15th Australasian Bat Society conference was opened up to the public to reach a larger audience to discuss bat management issues. The public forum explored the interactions between people and bats in a rapidly urbanising world. A range of key issues including urban planning, on-ground management, tree pruning and community education were explored.

In addition to the conference registrants, the forum was aimed at:

- Government environmental and biodiversity officers;
- Ecological consultants, arborists, landscape planners;
- Educators and students of environmental sciences;
- Friends and naturalists groups;
- And anyone else interested in learning about bats and their management in the urban environment.

The following presentations were given.

Lindy Lumsden. Bats: Fascinating and beneficial creatures of the night.

Peggy Eby. Flying-foxes across Australia – the big picture.

Rodney van der Ree. Flying-foxes closer to home: the ongoing story of the Grey-headed Flying-fox in Melbourne.

Caroline Wilson. Where do bats roost? The importance of tree hollows for bats and tree pruning guidelines.

Caragh Threlfall. The impacts of artificial night lighting on insectivorous bats.

Fiona Caryl. Local and landscape scale perspectives on the abundance and distribution of bats in urban and suburban landscapes.

Ian Temby. Bats in my belfry! The use of houses and other structures by bats – with management solutions.

Robert Bender. So you want to install a box for bats? Practical information on the design, installation and maintenance of bat boxes.

Robert Irvine. The role of nest boxes for bats in the ecological restoration of the Organ Pipes National Park – a selective history.

Rob Gration. Bats roosting in unexpected places: Mines, caves and bridges.

Dan Edson. Bats and emerging diseases – disentangling the myth from reality.

Lisa Godinho. Getting engaged in bat research – examples and opportunities.

Ben Paris. Communicating bat facts to the public – case studies from New Zealand.

The session finished with a facilitated question and answer time and panel discussion.

A series of fact sheets covering each topic was distributed at the forum. These fact sheets are now on the Australasian Bat Society website (www.abs.ausbats.org.au). They are a great resource and can be downloaded and printed, so have a look.

The forum was fantastically well supported with over 300 people attending. We received very positive feedback from the audience both at the forum and afterwards.

Generous sponsorship from Wildlife Acoustics and Earthwatch Institute enabled us to offer free registration to people who were unemployed, retired, low incomes or for any other reason couldn't afford the registration fee.

What a line up! Vast depths of knowledge lined up in front of the 'Managing our Nocturnal Neighbours' public forum held in conjunction with the ABS Melbourne conference. L-R: Rob Gration, Ben Paris, Dan Edson, Ian Temby, Robert Bender, Rod van der Ree, Fiona Caryl, Lisa Godinho, Caroline Wilson, Peggy Eby, Lindy Lumsden and Caragh Threlfall. Photo: Dan Lunney.

Australasian Bat Society

Bats: Fascinating Creatures of the Night

Forget all those myths about bats!

Many people don't realise that bats are actually gentle, furry native mammals that are highly beneficial to our Australian ecosystem. Although there is myth and mystery surrounding bats, the reality is much more interesting – bats are actually fascinating creatures!

The very friendly Gould's Wattled Bat (*Chalinolobus gouldii*).
Photo: Lindy Lumsden

Bats: our nocturnal neighbours

- There are approximately 1,200 species of bats around the world, in every environment except the poles. All bats in Australia are native species – none of them are introduced.
- There are two kinds of bats: large flying-foxes or fruit-eating bats (often called megabats), and the small insect-eating bats (often called microbats).

- In Australia, flying-foxes are the bats people are more familiar with because of their large size, and tendency to roost in large camps, often in proximity to people. Flying-foxes feed mainly on nectar, blossom and native fruits.
- Microbats are actually very diverse and abundant, but most people haven't encountered them because these bats are small, nocturnal, use ultrasonic calls inaudible to humans, and are hidden during the day in roosts. Microbats eat a wide variety of insects. They are widespread and common in all environments including forests, farmland and even cities.
- Victoria is home to 21 species of microbats and three species of flying-foxes. Seventeen species of bats can be found in Melbourne, and bats are now one of the most common groups of native mammals in the city and suburbs.

Grey-headed Flying-fox
Photo: Vivian Jones

- The largest species in Victoria is the Grey-headed Flying-fox (*Pteropus poliocephalus*) which weighs up to 1 kg and has a wingspan of over a metre. In contrast, most of the microbats are tiny. The smallest Victorian species, the Little Forest Bat (*Vespadelus vulturnus*) weighs only 4 g (less than the weight of a 10 cent piece) and would easily fit inside a matchbox!
- Some species are threatened with extinction. In south-eastern Australia, the most critically endangered species is the Southern Bent-wing Bat (*Miniopterus schreibersii bassanii*) which occurs only in caves in south-western Victoria and south-eastern South Australia.

An adult Little Forest Bat, weighing just 4 grams
Photo: Lindy Lumsden

Australasian Bat Society

Flying-foxes in Melbourne

Photo: Michael Pelusey

Did you know that Melbourne is home to as many as 30,000 Grey-headed Flying-foxes (*Pteropus poliocephalus*) in one large 'camp' or colony? Flying-foxes, also known as fruit bats, are an important part of Melbourne's ecosystem, even though they have only recently moved in!

The history of flying-foxes in Melbourne

The first records of Grey-headed Flying-foxes in Melbourne are from 1884, and until the early 1980s they were only occasional visitors to Melbourne, usually spending the summer months in Victoria and returning northwards to warmer climes during the Melbourne winter. In 1986, 10 – 15 individuals stayed in The Royal Botanic Gardens Melbourne over winter, and the first permanent colony in Melbourne was established. The size of the colony quickly grew, with about 20,000 – 30,000 bats resident in the Botanic Gardens by 2003.

Quick facts about Grey-headed Flying-foxes

- They are the second largest species of bat in Australia – weighing up to 1.1 kg with a wing-span of over 1 m.
- They feed on nectar, fruit and pollen from a wide range of plant species.
- Grey-headed Flying-foxes live along the east coast of Australia, from Maryborough in Queensland to Melbourne in Victoria. In 2003 a permanent colony formed in Geelong and in 2010 a colony formed in Adelaide. If the colony in Adelaide persists, it will be the most westerly colony of Grey-headed Flying-foxes in Australia.
- Despite their large numbers in some localised areas, they are listed as vulnerable to extinction due to loss of habitat and being killed by humans.

Grey-headed Flying-fox
Photo: Nick Edards

Fun Fact!
Research from Sydney has shown that male Grey-headed Flying-foxes often return to the same branch in the colony year after year to establish a territory

Why have flying-foxes started living in Melbourne?

The establishment and growth of the Melbourne colony is probably due to a number of factors.

- As the city has grown and developed, Melbourne's temperature has risen at least 1.13°C over the past 20 years, with fewer frosts (this is called the urban heat island effect). Flying-foxes are a sub-tropical species, so the warmer temperatures in recent years is more suited for them.
- Although Grey-headed Flying-foxes consume nectar, fruit and pollen from a wide range of plant species across Australia, prior to European settlement the Melbourne region had only 13 species of plants that are eaten by Grey-headed Flying-foxes. With extensive tree planting, especially in the last 50 years, there are now an additional 87 species of trees and shrubs that provide the bats with a year-round smorgasboard of food.
- Regular watering of plants by residents also ensures a reliable source of food for flying-foxes, especially during drought conditions.
- Habitat loss in other areas of their geographic range may also have contributed to their use of urban and suburban areas.
- Flying-foxes need to drink water on hot days, so camps that are close to a water source (such as the Yarra River) are more likely to thrive. They drink by dipping their belly in the water while flying (see overleaf) and lick the water from their fur.

Looking for more information about bats? Please see our fact sheets on a range of issues, available for download from: www.ausbats.org.au
We also recommend: www.dse.vic.gov.au/plants-and-animals/flying-foxes-home-page

The front page of two of the 12 fact sheets produced for the public forum, now available on the ABS website.

AWARDS

Congratulations to the following award recipients from the 15th Australasian Bat Society conference.

Best Conservation Paper – sponsored by Bat Conservation International

- Peggy Eby, John Martin, Rodney van der Ree, Billie Roberts, Anja Divljan and Kerryn Parry-Jones: *Famished – the responses of flying-foxes to food shortages in south-east Australia.*

Best Student Paper – sponsored by Wildlife Acoustics

- Leroy Gonsalves, Bradley Law, Cameron Webb, Vaughan Monamy and Brian Bicknell: *Unravelling the ecological importance of mosquitoes to insectivorous bats: can radio tracking and fecal DNA analysis help?*

Best Student Poster – sponsored by Greg Richards

- Anna McConville, Leroy Gonsalves and Brad Law: *Does the diet of* Mormopterus norfolkensis *contribute to its vulnerable status? DNA barcoding reveals all.*

Student Runner ups – sponsored by Ecological Consulting Services

- Pia Lentini, Joern Fischer, Phil Gibbons, Brad Law, Jan Hanspach and Tara Martin: *Managing for microbats in stock routes and paddocks of the NSW wheat-sheep belt.*
- Julie Broken-Brow and Luke Leung: *Microbat habitat use of* Avicennia marina *mangrove forest in south-east Queensland*.

Rob Gration presenting awards to Peggy Eby, Leroy Gonsalves and Anna McConville, showing his versertility in congratulatory techniques!

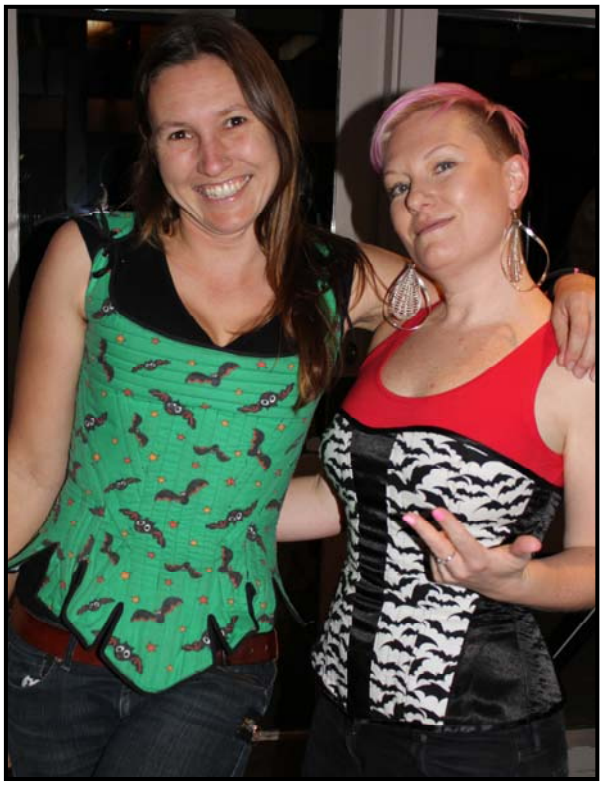
Faces from the Melbourne conference

Left: David Gee, Greg Richards and Rob Gration presenting their limericks at the conference dinner. Thanks to Greg and Rob for their ongoing support of the ABS conference awards. Photo: Gillian Bennett.

Right: the very serious Glenn Hoye and Michael Pennay. (Photo: Moni Rhodes)

Left: Lisa Cawthen and Narawan Williams perfecting the bat shake at the conference dinner. (Photo: Moni Rhodes)

Above: Nancy Pallin and Elery Hamilton-Smith deep in conversation (Photo: Gillian Bennett).



Left: Rachel Blakey and Josie Stokes resplendent in their bat outfits. (Photo: Dan Lunney)

–Research Notes –

Climate change and the microbats of Australia and Papua New Guinea

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Bats generally have not been given close attention when assessing the potential impacts of climate change. For example, a recent review of the conservation status of Australian bats (Law *et al.* 2011) gave no consideration to the impacts of climate change. This is despite pioneering efforts in the mid 1990s (Brereton *et al*. 1995; Scheel *et al*. 1996) and recent studies in other parts of the world highlighting the potential impacts on microbats (Yancey II and Jones 2006; Lundy *et al*. 2010; Rebelo *et al*. 2010).

I have sought to address the lack of a comprehensive review of the potential impacts of climate change by modelling the relationship between the occurrence of 101 species of Microchiroptera found in the Australian and Papua New Guinea region and current climate, and then projecting those models onto predictions of future climate conditions.

The purpose of this note is to introduce this work and illustrate how including predictions of climate change impact may lead to very different conservation assessments and management priorities. More information, including maps for all modelled species, is available at www.peterwilson.id.au/sdm/ozpngbats/sdm_ozpngbats.html.

A significant constraint on this work is the state of species taxonomy for microbats in the region. Despite excellent recent papers (Cardinal and Christidis 2000; Cooper *et al.* 2001; Reardon *et al.* 2008; Parnaby 2009), there remain many known but formally unresolved forms in the regional bat fauna (see general accounts in van Dyck and Strahan 2008, and Churchill 2009), a situation that has prevailed since I began looking into modelling bat species distributions and species richness in relation to climate in 1989.
I developed a list of known species from several sources including Bonaccorso (1998), Flannery (1995), van Dyck and Strahan (2008), Reardon *et al*. (2008) and Parnaby (2009) and it includes only formally described full species as listed in Table 1. That is, intra-specific forms were not considered, a rule applied to the data because museum records cannot give consistent and reliable assignments of sub-specific ranks. Therefore, several species complexes are modelled as though they are discrete taxa and include *Mormopterus planiceps* (incorporating *Mormopterus* sp. 2, 3 and 4 of Adams *et al*. (1988)), *Miniopterus schreibersii* (incorporating *M. s. bassanii*, *M. s. oceanensis* and *M. s. orianae*), *Rhinolophus phillipinensis* (incorporating large and small forms), and *Rhinonicteris aurantia* (incorporating the "standard" and Pilbara forms). I followed Miller-Butterworth *et al*. (2007) in elevating the Miniopterinae to family level.

Species occurrence data was downloaded from the Global Biodiversity Information Facility (GBIF) data portal (www.gbif.org) and from the Atlas of Living Australia data portal (www.ala.gov.au). Only records with valid latitude and longitude information were retained for the study, and duplicate records were removed prior to fitting models. Fifteen taxa had too few records for modelling leaving a set of 86 species for modelling as noted in Table 1.

Current climate data was provided by bioclim derived variables (Nix 1986; Busby 1991) from the WorldClim current climate data set (Hijmans *et al.* 2005; www.worldclim.org) which is based on weather data averaged over the period 1961 to 1990. I used data on a 5 arc minute grid (roughly 8 km by 8 km grid cells at the latitude of Sydney).

Future climate data came from 13 General Circulation Models (GCMs) produced for the Fourth Assessment Report of the Inter-governmental Panel on Climate Change (IPCC) (Solomon *et al.* 2007). These data were interpolated from the coarse lat-long grids of the GCMs to the same grid as the WorldClim data using bicubic spline interpolation (Press *et al.* 2002). The anomaly rescaling method (Hijmans *et al.* 2005) was applied to the WordClim baseline climate data where the anomalies represent the difference between each GCMs Climate of the 20th Century model run and predicted climate for the decade centred on 2050 (i.e. 2046 to 2055).

Models of the relationship between climate at the known locations of each species were created using the MaxEnt software package (Phillips *et al*. 2006; Elith *et al.* 2011). Models of the relationship between environmental conditions (which in this case is limited to climate) and species occurrence are often referred to as "species distribution models" but are also known as "climate envelop models" or "climate niche models". I will use the term "climate envelop model" as this is a more accurate indication of the nature of these models. They can only be considered to predict species distribution under very strict conditions which cannot be met using museum data and a simple correlative model between environment and occurrence. I have interpreted all models described here as indicating only the distribution of suitable climate conditions for a given species.

The take-home message from the models is that the majority (55 species or 69%) of the 86 modelled microbats in the region will experience a strong decline in climate suitability by 2050 amplifying the stresses experienced by populations due to other key threatening processes such as habitat loss through land clearing. There are also, however, a few surprising good news results. For example, *Nyctophilus corbeni*, which was recently described by Parnaby (2009) and is distributed in very heavily cleared landscapes of western NSW and central Queensland, was predicted to see an increase in climate suitability.

I also examined the potential relationship between conservation status and change in climate suitability for the Australian species by correlating conservation status assigned in Duncan *et al*. (1999) with the percent change in climate suitability values (see Table 1 and Figure 1). There is no statistically significant relationship between IUCN conservation status and change in climate suitability calculated by excluding the DD category (Spearman's rank correlation, $r_s = -0.1$, $p = 0.49$). This suggests that if predicted change in climate suitability was factored into conservation assessments (something that is not directly incorporated within the IUCN assessment procedure at present) we would come to rather

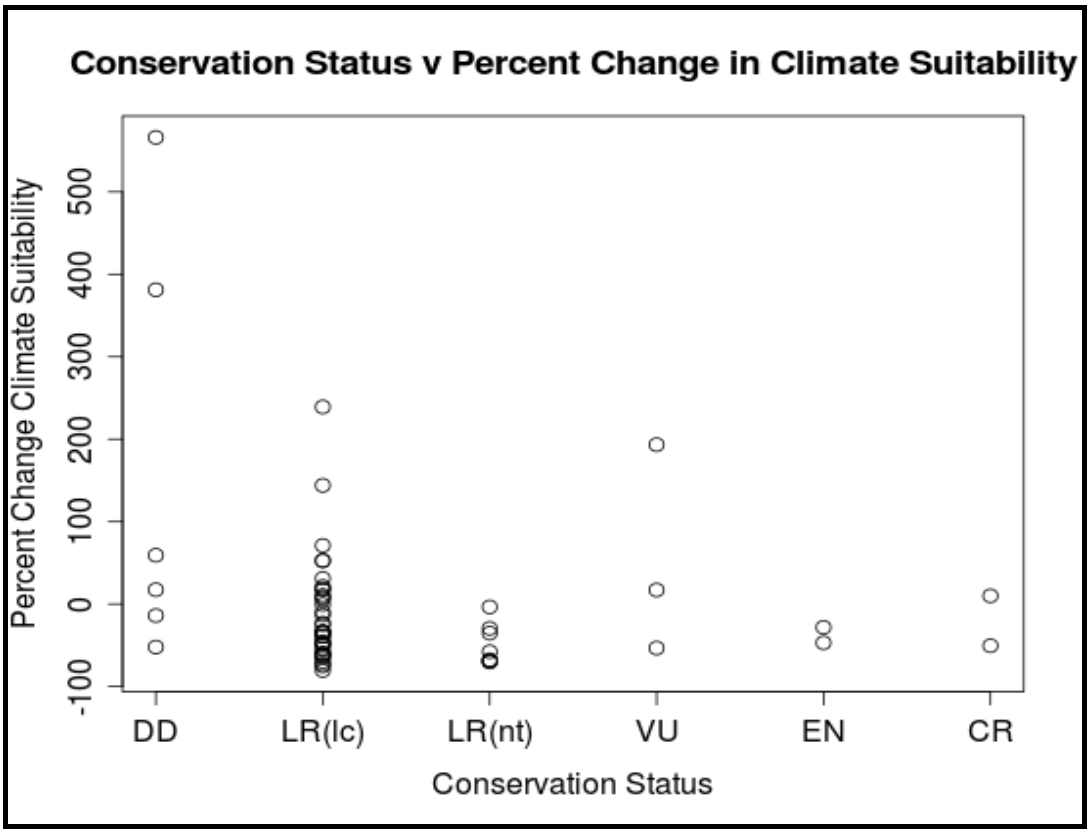

Fig. 1. Relationship between predictions of change in climate suitability between current (1960-1990) and future (2046-2055) climates, and conservation status of Australian Microchiroptera listed in Duncan *et al*. (1999). Conservation status codes are IUCN categories assigned in Duncan *et al*. (1999): DD = data deficient; LR(lc) = low risk (least concern); LR(nt) = low risk (near threatened); VU = vulnerable; EN = endangered; and CR = critically endangered. There is no statistical relationship between change in climate suitability and conservation status when the DD category is excluded.

different conclusions regarding conservation risks for Australia's microbats. This is highlighted by the fact that the species with the most dramatic predicted loss of climate suitability, *Nyctophilus sherrini*, was ranked by Duncan *et al*. (1999) as "Low Risk (least concern)".

Human-induced climate change is expected to add additional stress to species and will likely become a dominant threatening process for many species in our region during the 21st Century (Steffen *et al.* 2009). Species may be affected by direct (e.g. increased physiological stresses from higher temperatures) and indirect (e.g. impacts on food resources) pathways, and the ways in which bat species could be affected will probably mirror those identified for birds (Crick 2004; Chambers *et al*. 2005; Foden *et al.* 2008; Hamer 2010). However, much more work needs to be done before a clear understanding of the pathways emerge for microbat species in our region.

Although the MaxEnt method produces models with good performance (Elith *et al.* 2006; Graham and Hijmans 2006; Hernandez *et al.* 2006; Wisz *et al.* 2008) one modelling method alone may not encompass all possible outcomes (Elith *et al.* 2006; Araújo and New 2007). It is considered best practice to develop ensembles of models fitted by an array of methods to span possible relationships in the same way that an ensemble of GCMs is used to account for inter-GCM variability. Work is continuing to produce climate suitability models using random forests, support vector machines, boosted regression trees, generalised additive models and several other methods. Models will be constantly refitted as new occurrence data becomes available. Results will be provided at www.peterwilson.id.au.

Table 1. Species modelled in this study and summary of results. Action plan status codes are IUCN categories assigned in Duncan *et al*. (1999): DD = data deficient; LR(lc) = low risk (least concern); LR(nt) = low risk (near threatened); VU = vulnerable; EN = endangered; and CR = critically endangered. Change in climate suitability is the percent change in overall climate suitability relative to the overall suitability for current or baseline climate.

Family	Species	Raw records	Filtered records	Model fitted?	Action plan status	Change in climate suitability
Emballonuridae	*Emballonura beccarii*	152	20	Yes	-	28.38
	Emballonura dianae	126	7	Yes	-	4.88
	Emballonura furax	70	9	Yes	-	-20.71
	Emballonura raffrayana	301	28	Yes	-	-66.30
	Emballonura serii	4	1	No	-	-
	Mosia nigrescens	104	21	Yes	-	0.81
	Saccolaimus flaviventris	370	214	Yes	LR (lc)	-13.18
	Saccolaimus mixtus	6	5	Yes	DD	59.28
	Saccolaimus saccolaimus	65	29	Yes	CR	-50.42
	Taphozous australis	53	25	Yes	LR (nt)	-70.12
	Taphozous georgianus	498	149	Yes	LR (lc)	-24.69
	Taphozous hilli	238	70	Yes	LR (lc)	-33.56
	Taphozous kapalgensis	16	5	Yes	DD	381.30
	Taphozous troughtoni	4	4	Yes	CR	10.11
Hipposideridae	*Anthops ornatus*	1	1	No	-	-
	Aselliscus tricuspidatus	540	43	Yes	-	-52.33
	Hipposideros ater	412	122	Yes	LR (lc)	21.45
	Hipposideros calcaratus	489	43	Yes	-	-28.80
	Hipposideros cervinus	1215	115	Yes	LR (lc)	-23.01
	Hipposideros corynophyllus	25	4	Yes	-	-38.11
	Hipposideros diadema	1421	239	Yes	LR (lc)	-34.46
	Hipposideros dinops	26	4	Yes	-	-35.62
	Hipposideros edwardshilli	6	1	No	-	-
	Hipposideros maggietaylorae	149	16	Yes	-	-41.63
	Hipposideros muscinus	4	4	Yes	-	109.68
	Hipposideros papua	41	7	Yes	-	-71.07
	Hipposideros semoni	30	17	Yes	EN	-46.82
	Hipposideros stenotis	32	18	Yes	DD	-13.81
	Hipposideros wollastoni	37	4	Yes	-	-41.92
	Rhinonicteris aurantia	340	74	Yes	VU	193.39
Megadermatidae	*Macroderma gigas*	384	113	Yes	LR (nt)	-3.41
Miniopteridae	*Miniopterus australis*	1120	412	Yes	-	-51.22
	Miniopterus macroneme	80	9	No	-	-
	Miniopterus magnater	82	22	Yes	-	82.93
	Miniopterus medius	194	47	Yes	-	88.45
	Miniopterus propitristis	110	32	Yes	-	63.25

Family	Species	Raw records	Filtered records	Model fitted?	Action plan status	Change in climate suitability
	Miniopterus schreibersii	3876	242	Yes	-	-12.89
Molossidae	*Chaerephon jobensis*	599	139	Yes	LR (lc)	31.17
	Mormopterus beccarii	300	117	Yes	LR (lc)	71.19
	Mormopterus loriae	96	36	Yes	LR (lc)	-60.28
	Mormopterus norfolkensis	74	23	Yes	DD	-52.03
	Mormopterus planiceps	1100	385	Yes	-	-60
	Mormopterus eleryi	11	10	Yes	DD	17.41
	Otomops papuensis	1	1	No	-	-
	Otomops secundus	1	1	No	-	-
	Tadarida australis	856	552	Yes	LR (lc)	-64.21
	Tadarida kuboriensis	7	2	No	-	-
Rhinolophidae	*Rhinolophus arcuatus*	362	70	Yes	-	-17.55
	Rhinolophus euryotis	197	34	Yes	-	-34.91
	Rhinolophus megaphyllus	1655	440	Yes	LR (lc)	-46.90
	Rhinolophus philippinensis	73	37	Yes	EN	-28.17
Vespertilionidae	*Chalinolobus dwyeri*	33	19	Yes	VU	-53.33
	Chalinolobus gouldii	4049	1429	Yes	LR (lc)	-59.55
	Chalinolobus morio	1306	498	Yes	LR (lc)	-33.39
	Chalinolobus nigrogriseus	573	259	Yes	LR (lc)	8.39
	Chalinolobus picatus	137	63	Yes	LR (nt)	-57.71
	Falsistrellus mckenziei	63	30	Yes	LR (nt)	-69.43
	Falsistrellus tasmaniensis	224	111	Yes	LR (lc)	-60.58
	Kerivoula agnella	1	1	No	-	-
	Kerivoula muscina	11	6	Yes	-	37.80
	Kerivoula myrella	23	1	No	-	-
	Kerivoula papuensis	55	39	Yes	LR (nt)	-68.57
	Murina florium	12	11	Yes	LR (nt)	-35.16
	Myotis macropus	500	163	Yes	LR (nt)	-29.44
	Nyctophilus arnhemensis	124	56	Yes	LR (lc)	52.37
	Nyctophilus bifax	201	113	Yes	LR (lc)	-38.48
	Nyctophilus corbeni	70	46	Yes	VU	17.11
	Nyctophilus daedalus	56	34	Yes	LR (lc)	144.08
	Nyctophilus geoffroyi	3250	1618	Yes	LR (lc)	-63.13
	Nyctophilus gouldi	732	388	Yes	LR (lc)	-53.57
	Nyctophilus heran	1	1	No	-	-
	Nyctophilus lophorina	7	1	No	-	-
	Nyctophilus major	232	102	Yes	LR (lc)	-33.94
	Nyctophilus microdon	8	2	Yes	-	-
	Nyctophilus microtis	22	11	Yes	-	24.69
	Nyctophilus nebulosus	3	1	Yes	-	-
	Nyctophilus sherrini	8	6	Yes	LR (lc)	-80.46
	Nyctophilus shirleyae	4	1	Yes	-	-
	Nyctophilus walkeri	88	34	Yes	LR (lc)	-0.37
	Pharotis imogene	2	1	No	-	-
	Philetor brachypterus	66	20	Yes	-	15.11
	Pipistrellus adamsi	65	34	Yes	LR (lc)	5.91
	Pipistrellus angulatus	39	13	Yes	-	-51.92
	Pipistrellus collinus	55	8	Yes	-	-43.78
	Pipistrellus papuanus	485	24	Yes	-	22.81
	Pipistrellus wattsi	28	5	Yes	-	31.51
	Pipistrellus westralis	32	20	Yes	LR (lc)	53.00
	Scoteanax rueppellii	90	69	Yes	LR (nt)	-67.40
	Scotorepens balstoni	592	277	Yes	LR (lc)	10.58
	Scotorepens greyii	1001	442	Yes	LR (lc)	17.65
	Scotorepens orion	159	90	Yes	LR (lc)	-69.51
	Scotorepens sanborni	158	77	Yes	LR (lc)	-39.05
	Vespadelus baverstocki	387	142	Yes	LR (lc)	-9.53
	Vespadelus caurinus	510	135	Yes	LR (lc)	239.18
	Vespadelus darlingtoni	533	223	Yes	LR (lc)	-48.79
	Vespadelus douglasorum	152	36	Yes	DD	566.12
	Vespadelus finlaysoni	1204	279	Yes	LR (lc)	18.69
	Vespadelus pumilus	323	175	Yes	LR (lc)	-48.29
	Vespadelus regulus	1211	487	Yes	LR (lc)	-74.98
	Vespadelus troughtoni	192	85	Yes	LR (lc)	-72.74
	Vespadelus vulturnus	723	343	Yes	LR (lc)	-45.69

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– Reports and Viewpoints –

Australasian Bat Night 2012

Maree Kerr

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The inaugural Australasian Bat Night was held throughout Australia during March 2012.

Australasian Bat Night is based on the European Bat Night, which has been running for 15 years. It is designed to raise awareness of bats and educate the community about bats throughout Australasia. In the first year of the European Bat Night, two countries participated and a handful of activities were held. In 2011, 30 countries, including in Africa and South America, participated and over 200 activities were held with numbers attending reaching over 2000. Some events attracted 500 participants.

Australasian Bat Night differs from European Bat Night in that it is held over a month rather than one week with a focus on one weekend.

Fourteen events were planned during March 2012, and 10 took place. Four were cancelled or postponed to later in the year due to extreme weather events.

Activities included a bat survey as part of a field trip component in a Macquarie University Masters of Wildlife Management degree, a Batty Boat Cruise on Brisbane River, an open weekend at Tolga Bat Hospital, visits to see flyouts, and a range of bat talks and bat walks.

While some well attended events actually were "bat-free", participants still enjoyed the night and learned about these fascinating animals. Some events had upper limits for attending, but others had up to 100 participants.

Bat Night events are posted on the ABS website along with other batty events.

Australasian Bat Night is an annual event and the ABS expects it to grow each year. The ABS welcomes notice of Bat Night events for March 2013. Please send details to Bat Night coordinator on cantcatchme@netspeed.com.au.

A selection of reports on Bat Night Events, Australasian Bat Night 2012

The 2012 inaugural Australasian Bat Night kicked off on 1st March with an event for students at a Queensland school learning about microbats and how scientists study them, and finished on Sunday 1st April with a community barbecue and bat talk and walk in Canberra and a Batty evening and flyout in Townsville. The 1st of April is known for April fool jokes – perhaps nature was playing a joke this night as neither event recorded any bats! Never-the-less, people who came enjoyed the evening, learned about bats and are looking forward to the next batty event.

Two events which were postponed due to bat weather were scheduled for later in the year. The Bush Neighbours and Bat Display in Gordon, Sydney, where people could meet a flying-fox up close, happened on 3rd June and the NNQ, Bats and Banter in Bredbo, NSW, will be held in September or October.

Bat Watching at Bullocky's Rest, Crows Nest Qld. 1st March 2012

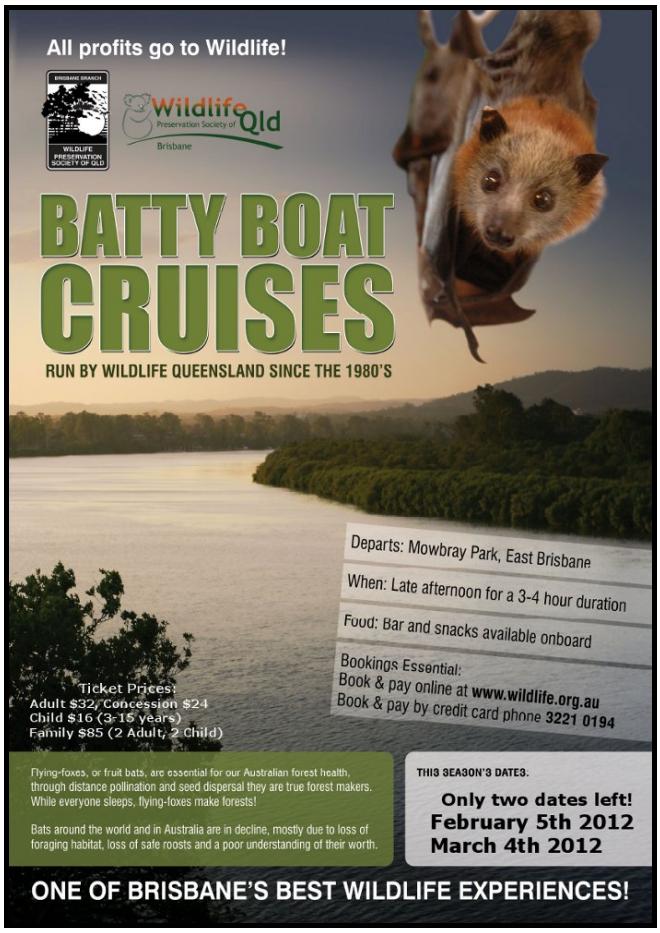
Twenty-nine budding biologists, aged 9 to 13, with their parents, learnt about microbats and their importance and also about how scientists study bats, at an evening hosted by ecologist Greg Ford at Crows Nest. The event was reported in the Crows Nest State School Newsletter.
https://crownestss.eq.edu.au/Calendarandnews/News/Pages/Australasian-Bat-Evening.aspx

Batty Cruise, Brisbane River, Sunday 4th March
Report by Jo Towsey

One of Brisbane's most inspiring natural events is to see the flying-fox flyout on the Brisbane River. Wildlife Queensland's Brisbane Branch's Batty Cruises on the Brisbane River have run monthly between October and March for 20 years, and is an increasingly popular wildlife tourism event.

We ran a cruise as part of Bat Night (on the Sunday) with around 80 passengers on board. We also had bat carers from Bat Conservation and Rescue QLD Inc. and their baby flying-foxes on board to show people. On our cruise we travelled up the Brisbane River listening to expert commentary about the history of the river and its wildlife. After about an hour and a half of cruising we got to the Indooroopilly Island flying-fox camp and waited for the fly-out while listening to a commentary on flying-foxes. The fly-out was spectacular with hundreds of animals belly-dipping all around our boat. After the fly-out, the boat headed back down the river through the city lights of Brisbane.

Batty Boat Cruise on the Brisbane River. Photos: Brisbane Branch of the Wildlife Preservation Society of QLD.



Bat Surveys, Master of Wildlife Management – Macquarie University
Myall Lakes National Park, near Smiths Lake, NSW. 22-25 March 2012
Report from Adam Fawcett, Lecturer

Our planned bat surveys went well. I organised and lodged it as part of the Bat Night event to get participants outside of the university system and we had some interested from NPWS staff. Surveys were conducted over three nights from 22-25 March in Myall Lakes National Park, to the south of Seal Rocks Road. We set three harp traps over the three nights (9 trap nights), two within open forest (dominated by Blackbutt and Smooth-barked Apple) and one along the edge of Myall Lake within a gallery Melaleuca forest.

We captured a total of 46 bats of 5 different species including *Miniopterus australis* (16), *Chalinolobus morio* (2), *Vespadelus pumilus* (2), *Vespadelus vulturnus* (22) and *Myotis adversus* (4), the last being captured by the lake.

Anabat surveys were also conducted and resulted in a number of detections including *Miniopterus australis*, *Nyctophilus* sp., *Vespadelus pumilus*, *Vespadelus vulturnus*, *Tadarida australis* and *Mormopterus norfolkensis*.

Overall, the surveys were very successful and while we missed some species captured in previous years we did pick up the *Myotis* which was not caught in the previous three years.

Year of the Bat event, Katoomba Falls Kiosk
Report by Marg Turton
marg@turton.com.au

Four rooms of the Katoomba Falls kiosk were overtaken by hoards of 'batty' people on the 23rd March 2012 for this celebration of the 'Year of the Bat' bat night. A bat cave was constructed in the rear room which was extremely popular with the children, with them making masks, flapping bats and colouring in bat pictures.

Talks were given by Vickii Lett, who gave a very informative talk on flying-foxes, and by Marg Turton who spoke on microbats. Both talks were well received. DVD's from Bat Conservation International showcasing astonishing bat photography were also shown, and four posters made especially for the occasion were on display. These will be used in the future for other environmental events.

Discovery Ranger, Carol Probets led walks to the lookout to show people bats hawking for insects in the spotlights, and also carried a bat detector so people could hear the bats. Despite windy conditions, several bat species were detected at the lookout, one being the endangered Eastern False Pipistrelle (*Falsistrellus tasmaniensis*).

It was a highly successful event with over 100 people attending. The organisers were extremely pleased, stating 'every one of those 100 people have walked away appreciating and knowing more about bats than when they arrived, that alone is a fantastic result.'

Thanks to the owners and staff of Katoomba Falls Kiosk, Blue Mountains City Council, NPWS, Blue Mountains Conservation Society and the Year of the Bat organisation for their support.

Excited children making bat masks in the bat cave during the Year of the Bat event at Katoomba Falls Kiosk.

The Bat Whispers. Upfront Club, Maleny, Qld. 29th March 2012

Go batty at the Upfront Club – a flying-fox awareness session. Approximately 17 people attended this event hosted by Bats Qld.
Link to video: http://www.upfrontclub.org/live

A Bat-free Bat Night: Batty evening and Flyout, Townsville. 1st April 2012
North Queensland Wildlife Care Inc and North Queensland Conservation Council
Report from Dominique Thiret

Bat night in Townsville was interesting to say the least. There was a gorgeous sunset and perfect still weather. About 50 people turned up and all seemed to be very wildlife friendly. Jon Luly gave a little info speech about bats and we got ourselves ready to watch the tens of thousands of bats fly out along the river. We had lovely drinks and nibblies, handed out leaflets, received donations and had good talks with people interested in caring for wildlife. The only thing that was lacking though was the bats!!! The spot we chose at the mouth of the river is just across from the main Black Flying-fox colony in South Townsville. Jon and I used to live just one street away and used to see them fly out of there every night for years. I was there a couple of weeks earlier to check and there were thousands flying out along the river. But on bat night, we saw only 4 bats far in the distance, flying away in the other direction. It was totally unheard of and incredibly unlucky. We also had the anabat detector but not a single insect-eating bat was recorded. Anyway, we all a great time and everyone thought that a bat-free bat night was pretty funny!

Additional events held as part of the Australasian Bat Night 2012

Saturday 3rd March
Bat Lovers BBQ. Yarra Bend Park, Bellbird Picnic Ground, Kew, Victoria.

Saturday 3rd and Sunday 4th March
Open Days at the Tolga Bat Hospital Visitor Centre, Atherton Qld

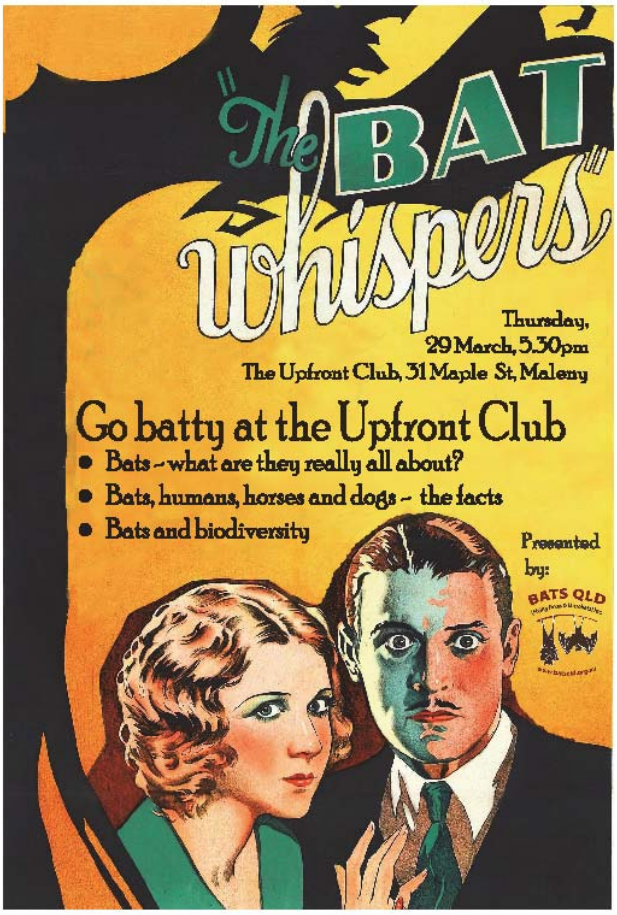
Saturday 31st March
Earth Hour Festival – Mad about Bats Talk & Bat + Possum Spotlighting Guided Walk, Coal Loader Centre for Sustainability, Waverton, NSW

Saturday 31st March
Celebrate Earth Hour with the Boroondara Greens, Bell Bird Picnic Area, Kew, Victoria. Picnic and flyout of Melbourne's flying-foxes.

Sunday 1st April
Bat evening and BBQ. Mulligans Flat, Forde, ACT.

Sunday 3rd June
Bush Neighbours and Bat Display, Darnley Oval, East Gordon, Sydney, originally planned for 4th March but unable to take place due to extreme wet weather. It was run on Sunday 3rd June.

September/October 2012
The BBQ, Banter and Bats in Bredbo, Bush Heritage Australia Reserve Scottsdale, Bredbo, NSW has been re-scheduled for Spring 2012**.** Dates to be advised.



– Gadgets, Techniques and Photos –

Product Review: EM3 EchoMeter bat detector/ recorder by Wildlife Acoustics

Michael Pennay

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Background: The EM3 EchoMeter (EM3 for short) is an exciting newcomer onto the bat detector scene, it is claimed to be an 'all in one' bat detector, featuring uninterrupted (live) full spectrum real time expansion, heterodyne and Anabat compatible zero crossings modes. It is designed for active monitoring of bats with an inbuilt screen and speaker so you can see and hear the calls you record, and microphone and tag buttons so you can annotate calls as you record them. There is also an optional GPS attachment which will record GPS location to files. Released in January 2012 by the United States company Wildlife Acoustics, it is intended to complement their other bat detector suited for passive monitoring of wildlife calls (including bats) the Song Meter 2 or SM2.

I purchased an EM3 for a project where I need to collect reference calls. Like many Australian bat researchers I 'grew up' with Anabat detectors, having used them extensively (exclusively!) way back to the dark ages of cumbersome zcaims and 30 minute audio cassettes and horrible DOS program commands. Making the step to learn how to fully utilise a new detector was a bit daunting but I couldn't look past the attraction of the EM3. Whichever way I looked at it, I was promised four times the features in the EM3 for less than half the price of an Anabat SD2 detector.

Look and feel: The EM3 is a surprisingly small and light weight detector, it's about 75% the size and weight of an Anabat SD2 detector. I found it very easy to hold and point around. It's not a big issue, but in the age of sleek looking smart phones, like most bat detectors, it's not going to win any design awards for appearances, the body is a kind of 1970's khaki safari suit green plastic (but it's no worse than Anabat's 1980's Commodore 64 beige). But for me, like most bat workers style takes a back seat to substance. The front panel contains the screen and control buttons. The screen display is black and white and can be inverted (white or black background) for day or night use, likewise the brightness and X and Y axis for displaying calls is also easily adjusted, it also displays battery, memory card status, time, GPS location, call information, and can also view setup options. The single directional microphone fits fully within the top of the device and has a textile cover. The GPS attaches to the back of the device via some strong looking Velcro. The input jacks and SD card slot are all open which might be a problem in humid areas. Being designed for active monitoring it is not meant to withstand rain, but it is claimed to be built to withstand humidity.

Use: The EM3 comes fully supplied with rechargeable batteries, charger, a 4GB SD card, and manual. I also got the optional GPS Attachment ($199). It is amazingly simple to use, the default options pretty much allow you to start recording bats immediately. The instruction manual is short and sweet, and after about an hour of reading the manual and fiddling I felt confident using the detector, great news for anyone a bit nervous about the potential learning curve in making the cross over to a new detector.

True to the promises, the EM3 records bat calls simultaneously in both full spectrum .wav files and AnalookW compatible frequency divided files (it can also record in Wildlife Acoustics proprietary 'WAC' format). The live spectrogram displays the calls well. I found viewing at about 3ms scale suited my taste, but what is truly impressive is the audio. Wildlife Acoustics claim their real time expansion is the closest thing to having 'bat ears'. I loved it: it was an amazing and new experience to hear the spectral richness and changes in intensity of the calls. It made me realise how simplified my impression of what bats sounded like really was. You can also listen in heterodyne mode.

The microphone has three levels of gain adjustment, the default is the highest (36db). When in record mode you can adjust the threshold of when a call triggers recording, which is handy, the default is 12 kHz which I dropped to 10 kHz because I was worried about missing White-striped Freetail Bat calls. Sensitivity appeared good but varied with frequency, when recording bent-wing bats emerging from a cave calling around 48 kHz it was consistently detecting many more bats than an Anabat SD2 detector that was running at the same time.

It's a little confusing sometimes to know what is happening when you are recording calls, the different listening and data recording modes differ in their behavior, and the display status and sounds coming from the device didn't always give me confidence I was recording what I wanted to. A few times I noticed it has the same frustrating difficulty as Anabat detectors to detect clearly audible White-striped Freetail Bat calls, often missing entire passes, or only recording the loudest pulses, however when reviewing my recorded calls I can see I actually recorded far more than I expected based on the audio/visual output of the detector.

The optional GPS was a breeze, just plugged it in and it worked. It picked up a fix under my verandah almost instantly and I doubt it would have problems even in dense bush. The GPS data appends to the call files and can be used to locate calls in the landscape. I imagine it'll be very handy for transect surveys. I really like that the GPS also sets the internal clock, having battled with internal clock issues with other detectors in the past, its logical simplicity was very much appreciated.

The detector modes and functions can also be set, adjusted or checked on the inbuilt screen, you don't need to connect to a computer or use another program which is very handy. The functions are all very straight forward; they include a schedule timer mode to automatically turn the detector on and off.

Recording in full spectrum generates a lot of data. The detector comes supplied with a 4GB SD card. You'd probably fit a night full of WAV files at pretty average levels of bat activity on the card. A bit of tweaking with trigger thresholds may improve this as I noticed about 50-60% of the call files I recorded were entirely noise rather than bat calls. A WAV file with a good sequence of calls seemed to use 3 – 10 mb of data. One good thing about full spectrum recording as opposed to zero crossings is that when the detector is recording all frequencies in the detectable range are recorded not just the loudest, this means even with noisy backgrounds such as crickets or rustling trees, bat calls are still clearly visible. The down side is that even audible frequencies are recorded so be warned about sharing secrets while bat detecting…

What to do with all your calls is a big question. The Zero Crossings calls can be viewed in AnalookW, and there are a number of software packages that can handle WAV files (if you record in WAC you may have to convert to WAV). I won't go into details of analysis software in this review other than to say that the main bat packages are expensive ($300-500) so you need to factor that into the costs associated with getting this detector. For the review, I used free 15 day trial version of Song Scope made by Wildlife Acoustics. The potential to build 'recognizers' and batch process calls is no doubt very attractive to anyone recording lots of calls. I had a bit of an experiment with it and found it to be quite simple to use, although building good recognisers took a bit of trial and error. Unfortunately the batch processing won't give you automatic ID's just yet (competitors SonoBat software can do this, but only for United States bats and at extra cost) but I could see the very exciting potential to do so with a good call library, lots of tweaking and some fiddling in Excel.

I had high hopes for the EM3, however, my initial experience was marred a little by a number of minor issues to do with finish and manufacturing quality: the front panel had some bumps, the battery compartment was a little temperamental, the battery charge indicator was unreliable, and the detector emitted a constant high frequency whine. The EM3 is a newly released product (the serial no. on mine was 00061) and understandably issues sometimes appear in early production models.

My high hopes have since been restored. Wildlife Acoustics demonstrated exceptional customer service, when I raised these concerns. Not only did they respond to my questions almost immediately and provide very detailed and satisfactory explanations to the issues, to my surprise within weeks of raising my concerns Wildlife Acoustics actively fixed all of these annoyances and provided purchasers of very early models with an improved replacement model. I haven't had as much time to play with the replacement but it seems to be problem free. I've been very impressed by the speed and attentiveness of Wildlife Acoustics to address any problems and would expect that if users did encounter any problems they would receive a similar level of service. The EM3 comes with a 12 month warranty.

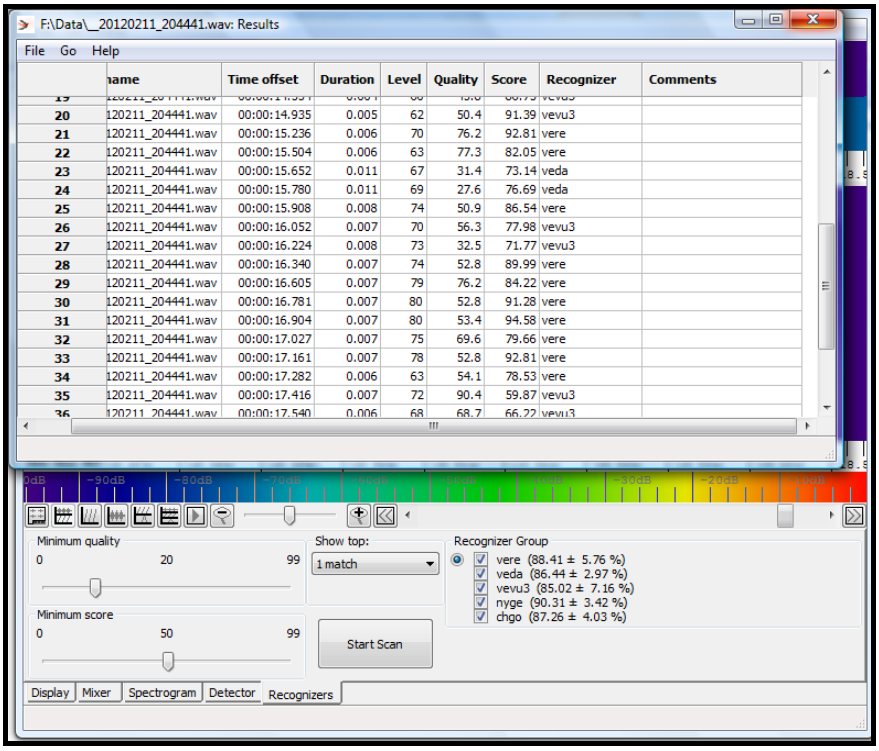
In summary, the EM3's extensive features, ease of use and value for money has huge potential to change the face of bat detection in the region. Wildlife Acoustics has proven their credentials in customer service and rapidly fixed minor early production problems. Only time will tell if the EM3 can demonstrate it has the strength and

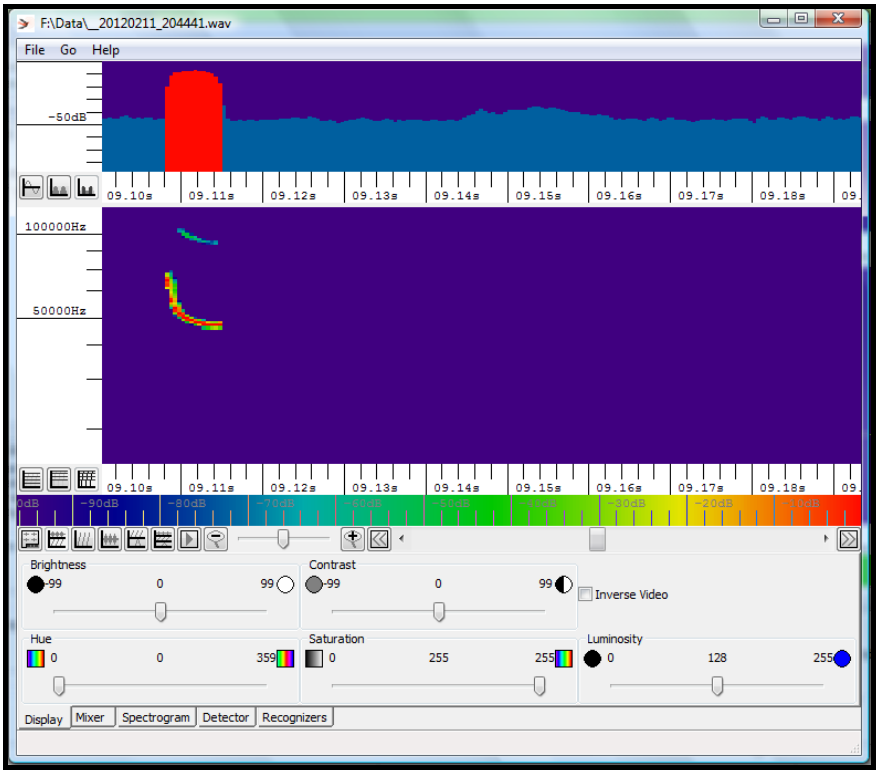
robustness to survive use in the field. The EM3 is available in Australia via Faunatech for $1085 AUD plus GST. Outside of Australia, it is also available direct from Wildlife Acoustics for $999 USD.

Specifications

Dimensions:

- 5.7 in (14.5 cm) long
- 3.6 in (9.1 cm) wide
- 1.25 in (3.2 cm) high
- Weight: 12 oz (0.34 kg) with included batteries
- Operating Temperature Range: -20ºC to +85ºC
- Battery Run Time: up to 12 hours per charge
- Battery Charge Time: 4 hours
- Audio Sample Rate: 256 kHz or 384kHz
- Microphone Directionality:
- Optimal signal is ±30º vertically and ±60º horizontally
- Effective Microphone Bandwidth: 1 kHz to 192 kHz





Figures: Output data after running the recogniser (top) and spectrogram (below) output displayed in SongScope (Wildlife Acoustics) using calls recorded with an EM3 detector. [Michael Pennay]

– News and Announcements / Classifieds –

Maclean High School students track bats by satellite

Billie Roberts[1] and Kelly Roche[2]

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In what is likely to be a national first, Maclean High School students will be using satellite tracking as part of a school program to study flying-fox movements and behaviours. Maclean High School is situated adjacent to a large continuously occupied flying-fox camp in the north-east of New South Wales on the banks of the Clarence River. This camp has been used by flying-foxes since (at least) settlement of the Maclean township in the late 1800s and has always been a source of conflict with the community. It is hoped that the hands-on experience with conducting satellite telemetry and the monitoring of flying-fox movements gained from this project will give students a fascinating and accessible introduction to cutting edge wildlife biology research and bring an educational focus to the outstanding natural resource that is on the School's doorstep.

Solar-powered satellite trackers will be attached to flying-foxes as part of the study of flying-fox movements. The tracking devices were donated by Microwave Telemetry Inc's "PTTs for Schools Program", which aims to create opportunities for students to experience wildlife research projects first hand.

While students will not be handling flying-foxes, they will have the chance to get involved with all aspects of field work including mist netting, recording body measurements, and closely observing attachment of the satellite trackers whilst the flying-foxes are under sedation.

Students will also be involved in monitoring local flying-fox numbers and will regularly download, analyse and map satellite telemetry data as well as writing a collaborative article on the project.

The 'Maclean High Bat Tracking Project', (or "Flying-fox Diaries") is a joint venture with the School's science department, local flying-fox biologist Billie Roberts and the Office of Environment and Heritage (OEH). The project is being supported by Valley Watch, Wildlife SOS, and Clarence Valley Council.

For more information or to assist with funding this national first research project please contact the project coordinators above.

Serventy Conservation Medal awarded to Jenny Maclean

Jenny Maclean from the Tolga Bat Hospital, has won the Serventy Conservation medal for 2011. It was announced at the AGM of the Wildlife Preservation Society of Australia in Sydney on 14 March 2012. This Award honours conservation work that has **not** been done as part of a professional career for which the person has been well paid and honoured. It is given to those who labour in the conservation field for a love of nature and a determination that it should be conserved. The Serventy Conservation Medal was inaugurated by the Wildlife Preservation Society of Australia in 1999 to commemorate the wonderful wildlife conservation work by the Serventy family.

The medal was awarded for Jenny's work since 1990 through the Tolga Bat Hospital. She has previously won awards from the Wet Tropics Management Authority (Cassowary Award) and International Fund for Animal Welfare.

The Bat Hospital has for the past 15 years managed the tick paralysis problem affecting the local Spectacled Flying-fox camps. Each year there is an animal welfare crisis when over a thousand flying-foxes usually come into care over a period of a few months. Education is also a major focus for the Bat Hospital. The onsite Visitor Centre has Advanced Ecotourism accreditation through Ecotourism Australia. The Centre helps deliver educational programmes to locals, tourists, tertiary students and schools. Jenny has put a lot of work into the Wildlife Friendly Fencing and Wildlife Friendly Fruit Netting projects, developing educational resources for use throughout Australia. The Hospital has also contributed to research when ever possible, facilitating work by organisations such as CSIRO, James Cook University and Queensland Centre for Emerging Infectious Diseases.

In her acceptance speech Jenny drew attention to the website www.dontshootbats.com. With the change of government in Queensland it is likely there will be a return to the bad old days of legalising the use of shooting and electric grids by orchardists. These practices were banned in 2008 and 2001 respectively. "This sort of animal cruelty was found to be inhumane and unacceptable by Queensland's Animal Welfare Advisory Committee". There is comprehensive information on the website about a range of issues affecting flying foxes.

For more information:
www.tolgabathospital.org – Tolga Bat Hospital
www.dontshootbats.com – website of the Don't Shoot Bats campaign
www.wpsa.org.au – Wildlife Preservation Society of Australia
www.wildlifefriendlyfencing.com – The Wildlife Friendly Fencing project
www.wpsa.org.au/awd_serventy.html – The Serventy Conservation Medal

Volunteers needed!

Southern Bent-wing Bat winter census; 21st July 2012

[Possibly extending to 22nd July 2012]

Volunteers are needed to assist with the winter census of the Critically Endangered Southern Bent-wing Bat in south-eastern South Australia and western Victoria. The census will provide us with information about dispersal patterns from the maternity colonies at Bat Cave in Naracoorte, SA and Starlight Cave near Warrnambool, VIC as well as information about sites/caves of priority for restoration and protection. This is a great way to explore some caves in the region while participating in conservation efforts of a Critically Endangered species.

For SA, census areas include Naracoorte, Mt. Burr, Mt. Gambier, Penola, etc. Targeted Victorian areas include Condrington/Yambuk, Bats Ridge / Bridgewater / Heywood, Lower Glenelg, Byaduk/Penshurst, Mt. Porndon / Timboon, Otway's Coast and Warrnambool. The aim will be to have a team for each different caving area to search and record the numbers of Southern Bent-wing Bats within caves with known utilisation on Saturday 21July (and possibly Sunday 22 July if not completed on Saturday). If you are interested in participating or have any queries please contact Kristen Lear at kristen.lear@gmail.com indicating your interest and any caving areas you are familiar with to assist us in organising teams to cover each area. (Victorian contact Amanda Bush, Amanda.Bush@dse.vic.gov.au). Thank you and we look forward to hearing from you!

Bat reference calls in the Murray-Darling basin?

Rachel Blakey

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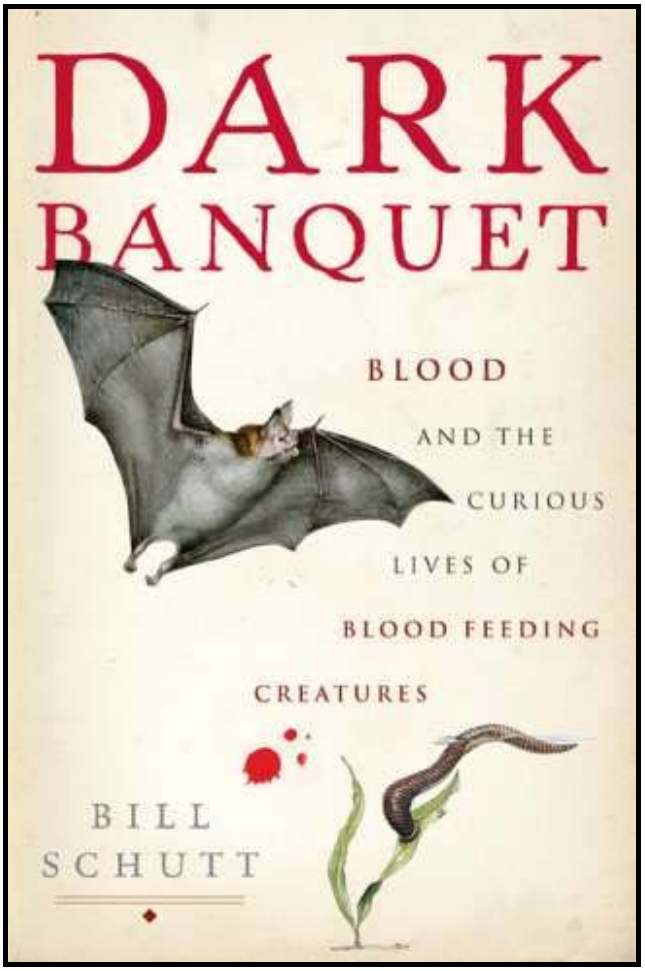
Hi all, some of you will remember me from the recent Melbourne bat conference where I presented some preliminary work on bat communities in Murray-Darling wetlands. At the moment I'm working with my supervisor Brad Law to develop a suitable key to use with Anascheme to apply across all of my sites. The trouble is, I need independent regional data in order to test and evaluate the key and I was only able to collect a small amount of reference calls during my fieldwork. This means I'm in need of some regional calls to test the key on and make sure it works. The region I'm interested in is anywhere within the Murray-Darling basin (see map of boundary: http://www.mdba.gov.au/files/cartographicmapping/8_Murray-Darling_Basin_Boundary.pdf), particularly near any of the rivers and wetlands. The species I'd particularly like to include are: *Vespadelus baverstocki, V. darlingtoni, V. regulus, V. vulturnus, Chalinolobus morio, Mormopterus* sp. *2, M.* sp. *3, M.* sp. *4, Scotorepens balstoni* and *S. greyii*. If anyone would be generous enough to share some of their reference calls with me from these or other species throughout anywhere within this region it would be greatly appreciated and acknowledged. None of the calls will be used for any commercial purposes. Thanks in advance for supporting student bat research!

– Book reviews –

Dark Banquet – Blood and the Curious Lives of Blood Feeding Creatures



Bill Schutt

Reviewed by Lisa Cawthen

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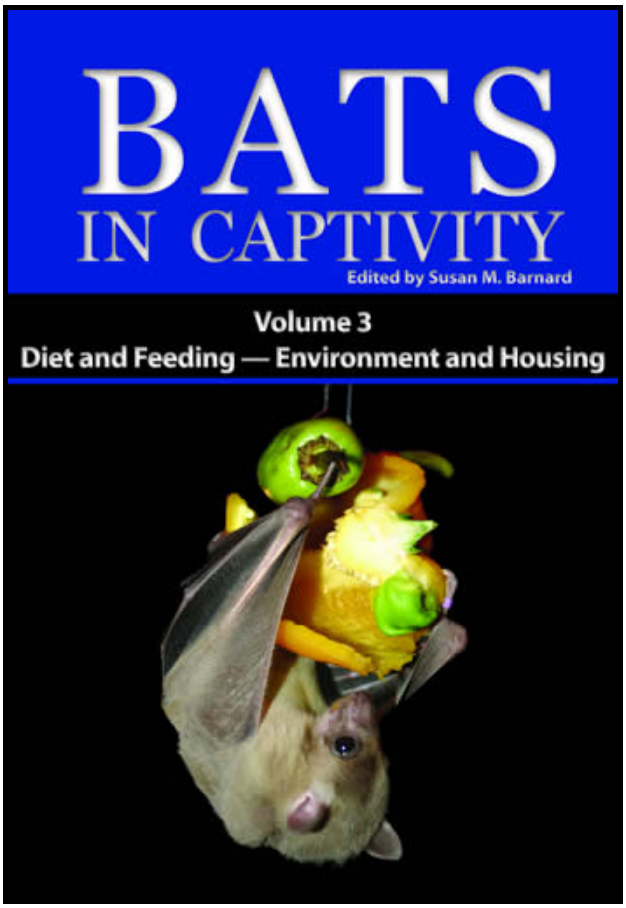
If you are looking for the perfect bedtime or field companion I completely recommend Dark Banquet. At first I was apprehensive over my latest Christmas present; sure it had a beautiful illustration of a vampire bat on the front, but was this just going to be a book about blood sucking stereotypical bats?

The answer is no. Bill Schutt is a bat researcher and you guessed it, he studies vampire bats.

But this is more than a book about vampire bats, in fact it covers everything from the ins and outs of blood and all those animals which feed on blood – bats, ticks, leeches, bed bugs, mites and more. This book is also filled with marvelous facts about the history of human medicine (including the demise of George Washington) and the 'chiropteran disinformation campaign' of the 1800s. For example, did you know that early explorers in the 1800s travelling through Brazil thought pollen feeding bats where in fact 'a very cruel blood sucker'. They hypothesised that the brush-like tongue of pollen feeding bats was used to reopen wounds and somehow the bat then inflicted the animal with its tiny teeth.

This book is part ecology, part natural history and human history. A great read!



Bats in Captivity: Volume 3 Diet and Feeding – Environment and Housing

Susan Barnard, 2011

Logos Press

Reviewed by Jenny Maclean

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This book is intended for anyone caring for bats in captivity, both microbat and megabat. It comprises 420 pages, and 26 papers by 22 contributing authors. Australian authors include Brad Law on Old World Nectarivorous Bats, with Les Hall and Tom Steginga on the Australian Ghost Bat, as they did in Volume 2.

This is the third of four books planned. The first was Biological and Medical Aspects in 2009 (book review in ABS newsletter No. 33 Nov 2009)**;** the second Aspects of Rehabilitation (book review in ABS newsletter No. 35 Nov 2010) this the third, and the fourth that has just come out in early 2012 Legislation and Public Education.

The sections in Volume 3 are as follows: "Food" for Thought (an overview of the essentials for a good diet including the metabolism and digestion), Diet and Feeding, Rearing Insects for Bat Food, Collecting Wild Insects for Bat Food, Environmental Enrichment for Long-term captive Bats, Roosting Ecology and Captive Environment, An Inexpensive Humidifying Device for Captive Bat Colonies, Family Phyllostomidae, and finally Environment and Housing.

As with the previous books, this book contains a wealth of information, more than 70 pages of it in appendix tables. Again this book is also well illustrated by a generous use of photographs. Much of the book is devoted to Microbats, and that is not surprising since they are a large percentage of the world's bat species.

In previous reviews, I've mentioned two complimentary sources of published information on the captive care of bats. These are Dave Pinson's *Flying fox Manual* from Australia, and Lollar and Schmidt-French's '*Captive Care and Medical Reference for the Rehabilitation of Insectivorous Bats*' from USA. I've since come across a third, Stephen Jackson's *Australian Mammals: Biology and Captive Management.* Chapter 10 is devoted to Bats and is comprised of 160 pages. Like Sue Barnard's series *Bats in Captivity*, Stephen Jackson's information is based largely on experiences in the zoo community.

I think the chapter on Old World Fruit Bats has a lot of good information from the American perspective on captive care, but it could have been enriched with contributions from the Australian perspective. There is no mention of several husbandry methods used here – such as the use of drippers for water, juice and milk; and the non-use of primate chow and high protein cereals, foods that are 'commonly used' in the USA. I believe an Australian perspective could offer a much broader experience as we have large numbers of wild bats coming into short-term captive care – both adults and young. There are also several Australian facilities with megabats in permanent care.

Barnard's book is easy to navigate and read. I look forward to Volume 4 as this will complete an excellent resource.

– Recent Literature –

Compiled by Lisa Cawthen (University of Tasmania, Hobart) from Web of Science
(early October 2011 – early May 2012)

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Yarra Bend Park, Melbourne, the location of the Grey-headed Flying-fox camp.
Thanks to David Wilks for the panoramic photo.

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Echo Meter EM3

Handheld Bat Detector / Recorder

EM3 – The latest addition to the Wildlife Acoustics product family

- The Echo Meter 3 is an all-in-one handheld detector and recorder designed for the active monitoring of bats. The EM3 offers all the features *and more* of competing solutions, but at a fraction of the price.
- Built-in real-time spectrogram displays current and recent bat passes, in expanded or compressed mode.
- Listen to bat calls in the method of your choice: Heterodyne, Frequency Division or Wildlife Acoustic's patent pending Real Time Expansion – all while simultaneously recording bat passes.
- Record direct to Analook compatible Zero Cross file format or in 16-bit full spectrum (in either .WAV or compressed .WAC format).
- Zoom in and out of recently heard bat calls (on both vertical and horizontal axes) while continuing to monitor and record.
- Playback bat calls in Time Expansion mode at desired speed to hear details of the call.
- The most flexible heterodyne detector on the market:
  - Auto-Het feature automatically selects frequency based on call dynamics.
  - Program up to four frequency presets to rapidly tune into a bat call.
  - Fine tune any feature setting with easy to use button navigation.
- Monitor bat calls with headphones or the built-in speaker.
- Tag a bat call in real-time in one of four categories to facilitate post processing.
- Capture voice notes with bat passes.
- Easily programmed for scheduled recording.
- Fully self-contained, the EM3 is easy to hold, lightweight and requires no additional hardware.
- External microphone and power connectors.
- Optional GPS accessory maps bat signal to location.

SPECIFICATIONS

POWER:
Four AA rechargeable NiMH batteries and integrated battery charger included.

STORAGE: One SDHC/XC card slot supporting up to 128GB.

BATTERY LIFESPAN:
Up to 10 hours on a single charge.

SAMPLING RATE: selectable, 256 or 384 kHz

RECORDING BANDWIDTH: 1kHz to 192kHz

RECORDING TECHNOLOGY: 16-Bit full spectrum or frequency division (zero cross).

WEIGHT: Less than 0.35kg with batteries.

For more information on the EM3 or other Wildlife Acoustics products, navigate to a product sheet at www.faunatech.com.au

Local stocks support and warranty by:
Faunatech Austbat Pty Ltd

Sole Australian Distributors
Phone: *03 5157 9001*
Email: *goodgear@faunatech.com.au*
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