The Australasian Bat Society Newsletter

Number 41 November 2013

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ABS Discussion list - email: discussion@list.ausbats.org.au
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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 black and white photographs can be reproduced in the *Newsletter* after scanning and digital editing (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 –

G'day,

I hope that this edition of the ABS *Newsletter* finds you all well and ready to embark on another productive spring / summer of bat activities.

My family and I were lucky recently to spend two weeks on the border of northern NSW and QLD. I thoroughly enjoyed the flying-foxes cruising over head in Mullumbimby. It is saddening therefore to see the reports of approved dispersal permits in this region. As raised on the Discussion List, the cumulative effect of these individual dispersal events is unknown, but one fails to see how it could be anything other than negative for the species concerned.

On a brighter note, the ABS hosted a very productive Financial AGM in Sydney this June. The minutes from this meeting can be found on page 7. Many members attended this meeting physically and several others like myself were 'virtually present' with the aid of Skype. I hope that all attendees felt they were able to express their concerns and opinions and were left with a positive impression of the role the ABS is playing in bat conservation, education and advocacy.

Thank you to all the contributors to this *Newsletter*. Our members have once again been travelling far and wide in pursuit of knowledge. Mark Venosta was lucky to travel to Hawaii for a bats and wind energy workshop hosted by Bat Conservation International (page 38). Several ABS members had the good fortune to attend the International Bat Research Conference in Costa Rica recently. Thanks to Anna McConville for providing an entertaining wrap-up of this important event (page 30).

Closer to home, bat night activities have continued throughout the country (page 34) and as always, children seem to be thrilled to take home a positive message about bats. There's also been no shortage of activity on the research front, see pages 24 to 27 for current research findings on microbat habitat use in NSW and bat detection.

I would like to think that this medium remains an important, up-to-date and exciting publication for sharing and archiving our knowledge. So, as always, please continue sending through your contributions.

Susan Campbell
ABS *Newsletter* Editor

Cover: The Honduran white bat *Ectophylla alba*, Costa Rica. Photo credit: Brad Law.

Top: Editor enjoying a peaceful, toddler-free moment in Coolongatta, Qld.

Below: Julie Broken-Brow, Lisa Cawthen, Rachel Blakey and Brad Law enjoying a drink in Costa Rica. Photo credit: Anna McConnville

– From the President –

As usual, so much has happened since the last *Newsletter*. We had our Financial Annual General Meeting (FAGM) nestled in amongst three days of strategic and informative discussions on various topics between 8 – 10 June. Thank you to everyone who attended, our speakers, and those who helped organise what was a great meeting. It was held at the Queensland Museum, and there were three main aims:

1. Discuss how we can collate the vast and multifarious experience in our society into more resources we can use for our advocacy work.
2. Develop a collective strategy to help to place our limited energy where it is most effective.
3. Seek involvement to spread the load within the society.

On the first day, we talked of standards for acoustic surveys and windfarm assessments, and an update on the Bat Blitz was given. On the second day we talked about our communications strategy and advocacy in some detail, plus our thoughts on the Mammal Action Plan. On the third day, we had an incredible line up of speakers on a variety of topics related more specifically to flying-foxes, including some special guest speakers from Biosecurity Queensland.

Thanks to Peggy Eby, Terry Reardon, Brad Law and Lindy Lumsden for helping to organise the speakers and the FAGM, and of course a big thank you to the speakers themselves for presenting. The venue allowed us to have people presenting by Skype, which worked marvellously – at one point we had four people Skyping in together, with a powerpoint prez up and a little TV window in the corner showing the speaker. We kept poor Micaela Jemison up until at least 3am in Poland, as she gave her talk and joined later discussions.

Since that time, there has been some good progress regarding input into flying-fox dispersals documents within and outside the society. The ABS position statement (written by Billie Roberts, Peggy and with input from several others) was available at the FAGM and is now finalised and available on our website (and in this *Newsletter* on page 17). This may be used by anyone needing some quotable information, and it can certainly be updated in the future if need be. The society also had input into a draft document by the Local Government Association of Queensland "Guide to Best Practice: Flying-fox management in Queensland" and the accompanying "Case Studies". Thanks to Billie and Peggy (and others as well), the ABS was able to submit some critical and helpful comments on the draft before a tight deadline, which were received with thanks. Similar input was given to the Queensland Department of Environment and Heritage Protection on their "A new approach to managing flying-fox roosts" Discussion Paper (http://www.ehp.qld.gov.au/wildlife/livingwith/flyingfoxes/pdf/roost-management-discussion-paper.pdf), though I received no communication back upon submission of our comments. From their website, it looks like the final version is not yet available. Our comments on this document are available upon request.

Some of the other initiatives discussed at the FAGM are still to come about, notably two standards / recommended guidelines documents on windfarm assessments and acoustic surveys. We had many people interested in helping with these documents and I will see that they get underway soon. Likewise, there are moves already underway to update our website in several ways (an ongoing task), and improve our communications within the public sphere.

The ABS also had some influence through its submission to a recent Senate Inquiry – "Effectiveness of threatened species and ecological communities' protection in Australia". The report from the Inquiry is available at http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/Completed_inquiries/2010-13/threatenedspecies/report/index
The documents cites our input several times. It will be interesting to see what comes of this report, and it is heartening to know that we have been heard, even when faced with the current formidable challenges posed by the audacious anti-environmentalism movement.

In August I was fortunate enough to attend the 16th International Bat Research Conference in San Jose, Costa Rica, along with several other Aussies and Kiwis. I think the final count of delegates was around 640 people, making it the largest IBRC to date. It was certainly well organised – thanks to our Costa Rican colleagues for such a great experience. The many presentations were squeezed into four concurrent sessions, and while that meant

missing some talks, I managed to attend most of what I was keen to hear. I was especially interested to hear about the many studies being done on phyllostomid bats. There were pre- and post-conference field trips to various places around the country organised by 'Costa Rica Rainforest Experience', who did a great job in introducing us to the tropical rainforest and many of its amazing animals. In one day I saw both humming birds, and humming bats, plus a sloth, and a toucan – awesome. My own conference talk was on the terrible things that are happening in Australia, including the various flying-fox issues and the erosion of our environmental laws. It was part of a session organised by Bat Conservation International (BCI) entitled "Building a Global Network for Bat Conservation". Our little society is structured differently than some of the other organisations, but we are certainly an active part of what is fast becoming a global network, thanks to BCI's recent efforts.

Just briefly on that – BCI is undertaking a major push to create links amongst bat societies worldwide. It began with the formation of Bat Conservation Africa earlier this year, and our Australasian region is also on their radar. Recently, a small grant application was submitted for work on the conservation of some bats in our region, and there are intentions to submit others soon. BCI is also proposing closer links via a Memorandum of Understanding, though there has not yet been discussion of specifics. David Waldien (BCI's Director of Global Programs) is planning to come to our next conference to talk about these links, and I know he is keen to help with some of the flying-fox issues we have both in Australia and other parts of our Australasian region. This is still early days and there needs to be much discussion, but it seems especially important these days for environmental groups to work together in order to achieve more.

I have been somewhat silent since the Costa Rican conference because of field commitments in September and October as part of my postdoc. I visited quite a number of localities in northern Queensland and the gulf country of the Northern Territory to collect non-lethal tissue samples of bats for my taxonomic research. It was a great experience, as I had not seen those parts of Australia previously. My great thanks go to Luke Hogan and Glenn Hoye for their invaluable help. In the last few days of the trip, I was accompanied by David Hill from Kyoto University (Japan), who was interested in testing out his Autobat acoustic lure on Australian species in Australian habitats. We also visited some sites east of Adelaide. David has contributed a short piece in this *Newsletter* (page 27), and I am certainly convinced that it is a great tool, with a lot of potential for field experiments and targeted surveys.

To end off, I was happy to get my hot little hands on a copy of the new Field Companion to the Mammals of Australia book. A big congratulations to Steve, Ian and Andrew for what is a ground-breaking book. I'm thinking that the 'frustration index' could be more widely applicable.

Looking forward to seeing you all at our next conference in Townsville.

Kyle Armstrong, ABS President

Kyle catching *Taphozous* amongst the dead kangaroos at Bladensburg National Park (Photo: Luke Hogan).

– Australasian Bat Society Inc: Business and Reports –

AUSTRALASIAN BAT SOCIETY, INC.

ABN: 75 120 155 626

MINUTES OF THE ABS FINANCIAL ANNUAL GENERAL MEETING 2013, QUEENSLAND MUSEUM 9 June 2013

1. Present

Attendees: Brad Law, Maree Kerr, Nancy Pallin, Robert Bender, Lindy Lumsden, Dianne Vavryn, Mary McCabe, Tony Mitchell, Luke Hogan, Cathy Dorling, Deb Melville, Terry Wimberley, Jan Virgo, Chris Clague, Roger Coles, Anna Lloyd, Louise Saunders, Tim Pearson, Glenn Hoye, Joanne Towsey, Greg Ford, Terry Reardon, Trish Patterson-Wimberley, Kyle Armstrong.

Apologies: Susan Campbell, Marg Turton, Greg Richards, Michael Pennay, Stu Parsons, Ann Augusteyn, Annette Scanlon, Rob Gration, Lisa Cawthen, Damian Milne, Andy Spate, Les Hall, Olivia Whybird, April Reside, Micaela Jemison.

2. Ratification of Minutes of last AGM meeting.

Minutes from the last AGM on 12 April 2012 are published in the ABS Newsletter 38 (April 2012).

Move to ratify minutes of the last meeting: Lindy Lumsden
Seconded: Tim Pearson

Carried.

3. Business arising from AGM minutes

The following actions from the AGM minutes were noted as not completed.

3.1. Survey members who receive print copies of the newsletter, asking if (to ascertain why printed copies are preferred):

1. **Members read the magazine, and**
2. **Do they use the magazine for promotional purposes.**

Survey not undertaken. It was recognised that people already have the choice between electronic and hard copy versions and a number of people have already transferred to the e-version. It was decided that a survey was not required at this stage.

4. Reports

4.1. President's Report – Kyle Armstrong

In the past year it seems like quite a lot has happened, and I would like to say a special thank you to the members of the executive and extended executive that have been tremendously supportive of the president and the society with advice and actions. The great experience and the legacy of memory of past events and discussions in this group is an important resource for the society and its new president.

Together we have achieved quite a few things. In response to an observed need to have a public face on some issues, we have responded in various ways. Some highlights include:

- drafted and finalised a public draft of a position statement on shooting of flying-foxes, Hendra, and most recently on flying-fox dispersals - thank you very much to Greg Richards, Greg Ford and Billie Roberts for taking the lead on these and to everyone who commented;
- helping to establish Bat Conservation Africa network with Bat Conservation International and our African friends;

- written to Commonwealth Environment Minister Tony Burke regarding the issue of devolving Commonwealth powers to the States;
- written to Queensland Premier Newman and Environment Minister Powell seeking engagement to help resolve issues with flying-foxes;
- emailed letters to Andrew Mullins and Rebecca Williams at Department of Environment and Heritage Protection in Queensland regarding the dispersals policy;
- the roaring success of the Bat Nights (with a special thank you to Maree Kerr and all that helped and ran these events);
- signed an agreement with Rio Tinto Aluminium Weipa for sponsorship of the Bat Blitz;
- responded to invitations to make a submission to two Senate Inquiries;
- supported Carol Booth's response to the *Land Protection Legislation (Flying-fox Control) Amendment Bill 2012;*
- released several media statements regarding flying-fox issues directly to the media or to our own website only, as deemed appropriate to the issue.

This is in addition to all the great work that ABS members do every day to further bat conservation.

As always, we face some large challenges to do with flying-fox conservation because of attitudes in State Governments, particularly Queensland. The pressure to reduce environmental safeguards in the areas of environmental assessments for development proposals and agriculture is enormous. Our ABS voice on issues of bat conservation is small in relation to the powerful business and political interests, and there is a great breadth of issues. We have heard so much in the past 2 days at this meeting surrounding the 2013 FAGM, and I look forward to much more engagement within the society to progress the things we have identified as important.

Lindy moved a vote of thanks to Kyle for his massive efforts over the past year. Seconded by Maree Kerr. Motion carried with applause.

4.2. 1st Vice President's report – Greg Ford

The Rules of the Australasian Bat Society state that:
"The First Vice-President is responsible for information flow within the Society and will:

(1) coordinate the convenors of commissions and the subcommittees;
(2) facilitate information flow between convenors and members of the Executive;
(3) act as President in the absence of the President."

The past year has been a busy one for the ABS, particularly in relation to upgrading our public interface and communication abilities with both our membership and wider society. Consequently, there has been a fairly constant flow of information and ideas amongst the Executive (both elected and extended membership), sub-committees and all ABS members.
Several key sub-committees continue to operate, albeit on a somewhat 'as-needed' basis. These committees function in the following key areas:

- Communication and education
  - Members - Marg Turton, Maree Kerr, Lisa Cawthen, Brad Law, Lindy Lumsden, Micaela Jemison, Michael Pennay (Webmaster) and Susan Campbell (Newsletter Editor);
- Flying-fox management
  - Members - Peggy Eby, Nancy Pallin, Kerryn Parry-Jones, Carol Booth, Billie Roberts and Greg Richards;
- Cape York "Bat Blitz"
  - Members – Terry Reardon, Kyle Armstrong, Judit Kibedi, Luke Hogan and Greg Ford;
- Australasian Bat Conservation Fund
  - Members – Maria Adams, Michael Pennay, Brad Law, Kyle Armstrong and Greg Ford.

The ***Communication sub-committee***, and individual members thereof, produced a number of valuable resources during the year and continue working on improvements to our ability to communicate and educate on issues pertaining to bat conservation throughout our region. Products/resources generated in 2012-13 include:

- Australasian Bat Night – coordinated ably by Maree Kerr (see Maree's separate report);
- ABS Fact Sheet series – adapted from the series produced for our 2012 Melbourne conference to give a more national (rather than Melbourne-based) focus;
- ABS Position Statement: Hendra Virus and Flying-foxes;
- ABS Position Statement: Shooting and Flying-foxes;
- DRAFT ABS Position Statement: Camp dispersal and Flying-foxes;
- DRAFT Strategic Communication Plan;

- New and improved ABS web page; and
- Three issues of the ABS Newsletter (see also Editor's report).

The ***Flying-fox sub-committee*** is probably the busiest of all, with a seemingly endless barrage of negativity directed at the megabats this last year. The primary role of the FF sub-committee is to advise the President on critical FF management issues, particularly in relation to the Society's input to Government inquiries but also in relation to ABS responses to negative treatment of FF's in the media. The FF group has played a pivotal role in establishing the ABS position on a range of FF-related issues, including their vital input to the three ABS Position Statements listed above. The FF sub-committee was involved in the ABS response to the two Australian Senate inquiries relating to the strengthening of the EPBC Act; and sub-committee member Peggy Eby was endorsed by the Executive to represent the ABS at a meeting to discuss flying-fox management issues with the Queensland Environment Minister, Andrew Powell.

The ***Cape York "Bat Blitz"*** was originally proposed for September-October 2012, but a number of financial and logistical issues arose that saw its postponement until 2013. Sub-committee members Terry Reardon and Kyle Armstrong have done much behind the scenes work to develop a terrific working relationship with Rio Tinto Aluminium Weipa (RTAW), who have committed to provide major funding ($80,000) and logistical support to the ABS for the Blitz. It is planned that the much-anticipated event take place in late 2013, with a probable second event in mid-2014.

The ***Australasian Bat Conservation Fund (ABCF) sub-committee*** has responsibility for managing the Society's small-grants fund program. Since its inception in early 2012, the ABCF has been offered to ABS members through two "competitive bid" rounds (May 2012 and October 2012), with two grants of up to $500 on offer in each round. The committee received four applications in each round, one of which was revised and resubmitted in the second round after missing the cut in the first round. After considerable discussion on the relative merits of each project and their ability to meet ABS objectives, the following four projects were funded:

- *Bats, birds, insects and floods: understanding ecosystem processes to better conserve our River Red Gums.*
  - Rachel Blakey, University of New South Wales.
  - $500 provided to assist with the purchase of field equipment for PhD project.

- *Where to live? Investigating the efficacy of artificial hollows (i.e., bat boxes) in a production landscape*.
  - Joanna Burgar, Murdoch University (WA).
  - $500 provided to assist with the purchase of field equipment for PhD project.

- *John Paul High School Maruia Forest Bat Survey*.
  - John Paul II High School, Greymouth, NZ, through Ian Gill (TrakaBat).
  - $500 to assist with student travel to undertake bat population trend monitoring.

- Efficacy of artificial bat-boxes as tool in the conservation of tree-roosting insectivorous bats
  - Stephen Griffiths, University of Melbourne
  - $500 to assist with micro-chipping bats for MPhil project

Many thanks to all sub-committee members for their tireless efforts to support the ABS objectives; and, in particular, for their readiness to support the Executive in our day-to-day management of the Society. While all have made excellent contributions to the ABS this past year, I would like to make special mention of the professional and thorough attention given by Micaela Jemison to developing the new ABS Strategic Communication Plan and thank her for her guidance on standardising the style and content of our various public documents and communication devices.

In addition to coordinating the various sub-committees, I have also had several opportunities to "take the helm" of the ABS whilst President Kyle was away on remote field work. Fortunately, in all instances, the ABS managed to avoid becoming embroiled in any major controversies, so my job was much easier than that faced by Kyle through most of the year. Issues that needed Presidential attention mostly revolved around our ongoing contributions to FF management, public awareness of 'bats and disease' issues and ensuring that we had a 'voice' in various government arenas.

In closing, I would like to applaud President Kyle for his mammoth efforts to keep the ABS running smoothly over the last year and for his vision and enthusiasm for taking us into the future with a more polished and professional image. Thanks also to the other Executive members and the many supporters on the extended executive and from with our general membership ranks who have contributed to make the ABS a much stronger organisation.

4.3. 2nd Vice President's report – Lindy Lumsden

The role of the 2nd Vice President is to ensure the ABS conference is organised every second year. The next ABS conference is to be held in Townsville in April 2014. Lindy also assists Robert with payment of bills, being the second signatory on cheques and electronic payments. Lindy's other role is to do a final proof read of the newsletter and organise printing and posting.

4.4. Treasurer's Report – Robert Bender

Treasurer's report for year to 31 December 2012

Income
This was a conference year so as usual the bulk of income related to conference attendance fees: 91.3% of income from all sources. $5,573 came from membership fees and $285 from interest on bank accounts as most of the ABS money was held in non-interest-bearing accounts. The total income for this year was $63,911 compared to $24,690 in the previous year.

Expenditure
In a conference year, the main item is conference costs for the venue and catering. This used up $57,650, or 82.6% of income, leaving a conference surplus of $6,260, partly due to the ABS receiving generous sponsorship for the conference, and so financially the conference was a great success. As the twice-yearly newsletter is one of the ABS's main activities, this is a major cost at $2,455 (compared with $2,751 last year). Bank fees, mostly due to credit card fees, at a total of $1,339 cost far more than interest earned on the Society's money, yielding a deficit on this item of $1,055. An honorarium was paid to Nicola Markus to assist in the preparation of a Submission to the Senate Inquiry that the ABS was invited to make (*Inquiry into the effectiveness of threatened species and ecological communities' protection in Australia)*. The Conservation Fund was used to provide three grants of $400 to students. Total expenditure of $68,030 compares with $8,447 the previous year – that's what happens in a conference year.

Surplus
The surplus of $1,753 is 2.5% of income. The conference generated a surplus of $6,260 but other activities used up more than the other income sources so this year's surplus is much smaller than the previous year's of $16,243, which was generated partly from unspent grants and partly from a big catch-up in overdue memberships received.

Assets
The various bank accounts grew in total balance last year from $45,000 to $56,000 but this year shrank a little, by $760. This fluctuation was due to a grant received from the ACT government for a Bat Watch project that spanned two financial years. During the year $15,000 was shifted out of the non-income-earning Transaction account into an interest-bearing Saver account.

Since balance date
To end of May 2013, one new development has occurred, which is a shift in mid-January of $28,000 extra into the Online Saver account, with the cheque account reduced to $10,000. This has not jeopardized ABS' ability to make payments on time but has significantly increased interest income from $30 a month to over $100 a month. Current account balances total $56,325, just about back to where it was at the end of 2011. The cheque account has fluctuated between $9,800 and $13,100 over this period.

GST for 2012 was somewhat understated as there were problems creating an online connection to the ATO and the last two payments for 2012 were made in April 2013, totalling about $400.

ABS financial history
The file on financial history shows that income has fluctuated between conference years and non-conference years, which a huge increase in 2012 as the public forum run as part of the Melbourne conference generated much extra revenue. Total costs have fluctuated largely in unison, though some years advance payments for the forthcoming conference are paid before the end of the previous December, and income still trickles in from slow payers up to a year later, so the impact of a conference is spread over three years. Surpluses and deficits have also been subject to large fluctuations, especially in 2011 when unspent grants and a big catch-up by overdue members boosted income more than expenditure. Assets have grown steadily from $15,000 in 1999 to $56,000 now. ABS financial health is in a very good state.

Robert Bender, Treasurer
2 June 2013

The meeting discussed donations to ABS. ABS does not yet have tax deductable status. Robert considered donations to be a small component of ABS funds and that it would require significant administration.

Action: what needs to happen to get tax deductible status? One signature required for charity status. Info provided to Brad from Maree. Exec to discuss tax deductibility for ABS.

Vote to accept accounts. Moved: Robert Bender. Seconded by Chris Clague. Carried.

TREASURERS REPORT FOR THE YEAR ENDING 31 DECEMBER 2012

	$	% (of income)
Income		
ABS Conference 2010	$170.00	0.2%
ABS Conference 2012	$63,741.00	91.3%
Membership subscription	$5,573.29	8.0%
Interest (Bus Transaction Account (BTA)	$30.00	0.0%
Interest (Gift Account)	$0.08	0.0%
Interest (Online Saver acct)	$254.71	0.4%
Grants received	$0.00	0.0%
Advertising	$15.00	0.0%
TOTAL INCOME	$69,784.08	100.0%
Expenditure		
ABS Conference 2012	$57,650.74	-82.6%
Membership Management (renewals postage, etc)	$320.34	-0.5%
Newsletter (production & postage)	$2,454.93	-3.5%
Insurance (public liability)	$453.75	-0.7%
ABS conservation fund	$1,842.86	-2.6%
Merchant Fees (Credit Card Facilities - BTA)	$1,202.57	-1.7%
Bank fees (BTA)	$136.84	-0.2%
Equipment *	$2,868.80	-4.1%
Submission honorarium	$1,100.00	-1.6%
TOTAL EXPENDITURE	$68,030.83	-97.5%
SURPLUS	$1,753.25	2.5%
GST Refunded from ATO	$0.00	
GST Paid to ATO	$2,974.00	

Conferences	
Income	$63,911.00
Costs	$57,650.74
Net result	$6,260.26

Membership	
Income - subscriptions	$5,573.29
Costs	$320.34
Net result	$5,252.95

Bank accounts	
Cash inflow	$284.79
Cash outflow	$1,339.41
Deficit	$1,054.62

Summary		
Membership	$5,252.95	299.6%
ABS grants	$0.00	0.0%
Advertising	$15.00	0.9%
Newsletter	$2,454.93	-140.0%
Insurance	$453.75	-25.9%
Bank accounts	$1,054.62	-60.2%
ABS conservation fund	$1,842.86	-105.1%
Conferences	$6,260.26	357.1%
Equipment	$2,868.80	-163.6%
Submission honorarium	$1,100.00	-62.7%
Net result	$1,753.25	162.7%

ASSETS AT 31 DECEMBER	*2011*	*2012*	*Difference*
ABS Cash Management Trust	$0.00	0.00%	$0.00
ABS Business Transaction Account	$55,203.46	$39,186.70	$16,016.76
ABS Gift Fund	$1,166.55	$1,166.64	$0.09
ABS Online Saver	$0.00	$15,254.71	$15,254.71
TOTAL ASSETS	**$56,370.01**	**$55,608.05**	$761.96

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.
***** Payment of a grant received from the ACT government for the Canberra Bat Watch project.

4.5. Membership Officer's Report – Damian Milne

The total number of ABS members was up again at the end of 2012 to 331. This was a significant increase in the total number of members compared to previous years and is the eighth year in a row that the overall membership of the ABS has increased (Figure 1). There were 43 new members and 20 members who either resigned their membership or whose membership expired (i.e. unfinancial for more than 2 years). The large increase in new memberships can most likely be attributed to the success of the 2012 Melbourne ABS Conference and the interest in the Society that resulted from it.

Unfortunately, the total number of unfinancial members (i.e. members who have not renewed their membership for up to two years) also increased significantly in 2012, up from 41 in 2011 to 63 in 2012 (Figure 2). This is in spite of three reminder notices being sent out to members with outstanding membership fees during the year.

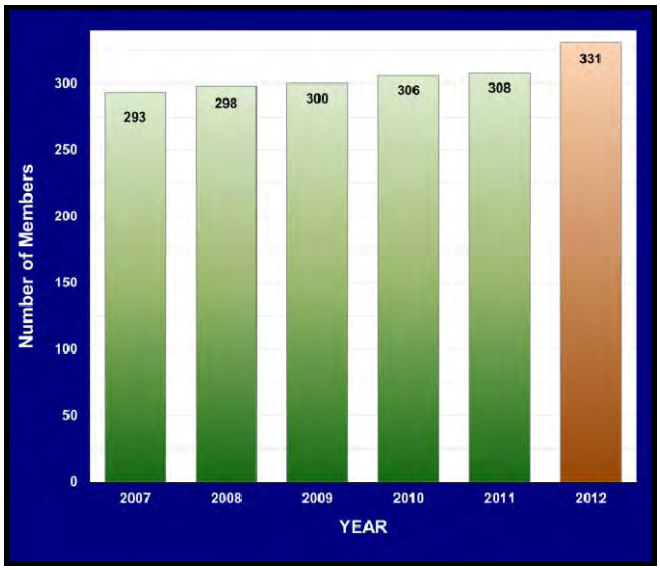

Figure 1

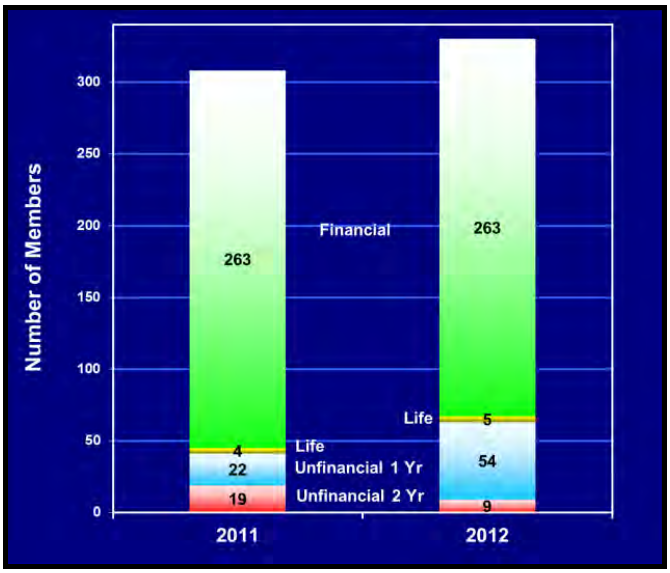

Figure 2

Figure 1. Total number of ABS members in 2012 with comparison against previous years.

Figure 2. Financial make up of ABS members in the year ending 2012 compared to 2011.

Late last year, Suzie Lamb agreed to take the ABS Discussion List off my hands for a while and act as the Discussion List administrator. Behind the scenes, maintaining the Discussion List involves a significant amount of work. Suzie is doing a great job at maintaining the Discussion List and keeping it running smoothly. Thanks for your help Suzie. If you are not already on the ABS Discussion List and you wish to join, contact Suzie at Susan.Lamb@epa.nsw.gov.au.

4.6. Secretary's Report – Brad Law

There's little to report from the secretary's role. Aside from collating the minutes of the executive meetings through the year, I have received very little official society correspondence. There are occasional email enquiries that I receive from the public about bat ID's. If I can't answer these myself I email them onto the bat discussion list and this has always resulted in helpful replies. Occasionally there is an email asking for assistance with community bat activities in regional areas. Again I distribute these requests to the discussion list, with it seems varying success. In the past year ABS has received almost no paper mail in the post, which Nancy Pallin collects. This is a sign of our modern times. I think it is likely that the society's presence on Facebook will begin generating correspondence through that medium and Micaela has been keeping an eye on activity there. Social media is clearly a space to watch. As my final point, I want to officially acknowledge and thank Jenni and Jim Reside for a generous $500 donation to the society.

4.7. Newsletter Editor's Report - Susan Campbell

Thanks always to Lindy for her final edits, printing and mail out of the *Newsletter* and to Lisa Cawthen for continuing to prepare the current literature section of each edition – a huge help.

Contributions from our membership base continue to trickle in for each edition, ever so slowly. The book review section is proving to be particularly popular recently, especially as reviewers get to keep a copy of the publication. Thanks must therefore also go to the publishers (including Logo Press for the Sue Barnard series of books, to Royal Zoological Society (via Brad Law) for 'Biology and Conservation of Australasian Bats', and to CSIRO publishing (via Greg Richards) for a copy of 'Working the Night Shift').

My feeling is that the *Newsletter* is due for another shake up. This may come in the form of a new look through reformatting with new software, and / or combination of a new format and a new Editor. I am willing to continue as Editor *provided* there is no expression of interest from any other members to take over the reign. I have not looked into purchasing of new publication software, but will endeavour to if I carry on as Editor into 2014 and I will run any purchasing decisions via the executive at the time.

Faunatech continue to be loyal advertisers and I have had no complaints from the membership base over the presence of advertising in the *Newsletter.* No other companies have approached me to advertise in future editions. According to our membership officer, the ratio of members opting to receive the printed v's online version of the *Newsletter* is decreasing, which is good news in terms of freeing up ABS funds.

4.8. Webmaster's Report - Michael Pennay

How many people visit?
- Visitation has increased 50% in past 12 months (540 visitors/month up from 362 in 2011-2012)
- Seasonal pattern (follows bat population!) peaking late summer early Autumn
- Peak partly associated with Australasian bat night – but same pattern seen in other years

Who are our visitors?
- Majority (72%) new visitors.
- View on average 4 pages and spend about 1 minute per page.

Where are our visitors?
- Majority (74%) Australian

Need to consider how we can better represent the Australasian region – under represented in visitors.

How do visitors find us?
- Most visitors find us through Google or other web links.
- 35% know our url - consistent with 28% return visitors suggest about 1/3 of our visitors know us (members/ friends) and 2/3 of visitors are members of the public.

What are our visitors searching for?
- They are looking for information about bats or about us.

Search engine query	Clicks
1. Bats	200
2. Australasian bat society	110
3. Australian bats	60
4. Bats in Melbourne	60
5. Bats in Australia	35
6. Australian bat society	22
7. Bat	22
8. Bat society	16
9. Are bats dangerous?	12
10. Bat boxes	12

Our most popular resources?
- The bat fact resources (both excellent pdf brochures, and the FAQ/ about bats pages) are heavily sought
- Unsurprisingly flying foxes and disease fact sheets popular.

Summary
- Our web presence has grown about 50% in past 12 months
- Most of our visitors (c.2/3) are not members or 'friends'
- They arrive via search engines and are looking for information about bats.

Suggestions
- We should think of ways to improve our representation of the Australasian region, not just Australia.
- We should focus on building our public resources and information on the website as this is what visitors are seeking.

Technical issues and the future

Moonfruit platform upgrade – Planned conversion of all sites from Flash to HTML5 later this year. Good news and important because flash does not work on iOS (Ipads etc) so the web site currently does not function properly on iOS mobile devices.

Seeking new web master – I'll be unable to do web master from March 2014, would like to do a handover before then, please contact me if you're interested in the role.

A vote of thanks was given to Michael for the excellent work on the web-site over the past year. Micaela Jemison expressed an interest in the web-site manager's role.

4.9. Bat night Coordinator's Report (Maree Kerr)

Australasian Bat Night 2013

The second Australasian Bat Night was held in all states and territories of Australia and in New Zealand during March and April 2013 culminating in Mandurah WA on 1st May.

Australasian Bat night is based on European Bat Night, which has been running for 16 years, and is designed to raise awareness of bats and educate the community about bats throughout Australasia. Australasian Bat Night differs from European Bat Night in that it is held over a month (or months) rather than one week with a focus on one weekend.

Following a similar pattern to European Bat Night history, ten events were held in the inaugural Australasian Bat Night 2012 in four states, NSW, ACT, Victoria and Queensland, with a greater number in this second year.

In 2013, thirty events were held in Tasmania (3), Queensland (6), NSW (7), ACT (2), Victoria (7), South Australia (1) Western Australia (1) and New Zealand (3) with most events booked out, some attracting 50, 100 and even 200 participants (Blue Mountains). This year a number of bat events were held in regional areas as well as cities and interest was very high despite an atmosphere of adverse media attention from late February especially in Queensland

As in 2012, activities included bat surveys, a Batty boat cruise on Brisbane River, visits to see flyouts, and a range of bat talks and bat walks. Additionally this year a number of bat box workshops were held in Queensland, Tasmania, regional Victoria and Western Australia and a bat rescue and care training course in Brisbane. Following the example of Blue Mountains 2012 Bat Night, which could be likened more to a Bat festival than just a Bat Information evening, a range of children's activities were held in Bat Nights in Adelaide, Horsham (Vic), Geebung Qld, Hamilton New Zealand and of course the Blue Mountains which attracted over 200 people!

Australasian Bat Night was promoted by a wide range of organisations, including NRM, local council and other landcare, community group and bat networks, even Scouts Australia, and Wildlife Tourism Australia and Interpretation Australia.

The interest among local councils, land care groups was very high- that more events were not held is because of limitations in supplying bat experts especially to regional towns. This is a challenge to be addressed for 2014.

It is to be hoped that Australasian Bat Night will continue to grow in popularity and that we will begin to see a change in people's attitudes which will result in a more positive public image, better management of bat-human conflicts and better conservation outcomes.

It is likely that a budget will be needed for Australasian Bat Night in future and I may need a team to assist me. I would also like to create a "brand" for Australasian Bat Night which immediately associates all events as part of Bat Night and officially endorsed by the society.

Finally, I would like to acknowledge the work of all the local event organisers without which the event could not have happened. In particular I would like to thank these organisers who ran a number of events or particularly successful events: Louise Saunders in Queensland, Tim Pearson in Sydney, Marg Turton who ran the marvellous Blue Mountains event, Robert Bender in Victoria, Lisa Cawthen in Tasmania, the fantastic people of Project Echo in New Zealand, carer Mary Crighton in Adelaide, and, brand new to bats, Wendy McInnes who hosted a very well attended event in Horsham.

Thanks to Maree for the successful nights was recorded.

5. Conference update

Given the 2012 conference was in Melbourne a more 'exotic' location is proposed for 2014. Simon Robson has offered to run a conference at Townsville to be located in centre of town. The standard time would be to hold it 22-25 April 2014 or alternatively it could be held in conjunction with the Bat Blitz in June. People need to volunteer to help organise the conference (e.g. registration, collect money, odd jobs, sponsorship). The possibility of holding a Public forum on flying-foxes involving local councils, similar to the Melbourne Public Forum, was discussed. Helpers to contact Lindy.

6. Other business arising

6.1. Officially recognise two new non-executive positions – media officer and communications officer. Moved by Maree Kerr. Seconded by Greg Ford. Carried unanimously.

6.2. Payment to media officer – requires job definition, how much time required for the position? Nancy move for exec to pay a media officer. Seconded Dianne Vavryn. Action: exec to define the role and the amount of paid time for the position.

6.3. Flying fox sub-committee exists, but other helpers required. BLOGS, videos (Youtube), Standards, Windfarms, Mammal Action Plan stuff. Action: a list of jobs to be circulated to the discussion list with a call for help from members.

7. Next executive meeting

Planned for: September 2013.

8. Close

By the Secretary at 5:00pm. Official thanks to Kyle for organising a great 3 day meeting.

Kyle presenting at the ABS FAGM – my old athletics coach would call this 'a small, but elite' turn out ☺

Cheers Terry! With a couple of brave exceptions, there seems to be a high degree of sexual segregation occurring at the FAGM dinner, photos above and below thanks to Robert Bender.

AUSTRALASIAN BAT SOCIETY, INC.

ABN 75 120 155 626
http://ausbats.org.au
ABS President: Dr Kyle Armstrong
Email: president@ausbats.org.au

ABS Position Statement

Flying-fox camp dispersal

Background to flying-fox dispersal

Flying-fox camps provide bats with places to rest, court, breed, raise young and exchange information. They also provide night refuge for flightless young. Some of these sites have been used by flying-foxes for more than a century[1,2]. Since the 1990s there has been a noticeable increase in the number of camps near human settlements[3,4,5,6]. This has led to the misconception that flying-foxes have increased in numbers in recent times. However, in fact, previously larger historical camps are being replaced by a greater number of smaller camps, often located in urban areas[7].

The increase in number of camps near human settlements is due to the encroachment of human development on historical camps[3,4] and to a shift of flying-fox populations into built environments, possibly because they provide protection from lethal control and harassment, or because they provide access to feeding and roosting habitat[3,4,8,9,10]. 'Urban' camps are important to flying-foxes as they are part of an extensive network of roost sites linking different parts of each species' range. However, urban camps often generate conflict with people who are concerned about loss of amenity, noise and smell[7,2]. In recent years, additional concerns have been raised over disease transmission from bats to livestock and to humans, although government health authorities have been consistent in their message that public health risks associated with flying-fox camps are low (www.health.nsw.gov.au/factsheets/environmental/flying_foxes.html; www.health.qld.gov.au/communicablediseases/hendra.asp).

In Australia, the typical response to unwelcome flying-fox camps is dispersal. Techniques used to harass flying-foxes to encourage them to move elsewhere have included continuous loud noise, bird-scare guns, helicopters and light aircraft, spraying with water, smoke and camp destruction[11,12,13]. However, few dispersal activities have been systematically monitored and the 'success' of such projects continues to be debated[4,12,13].

The results of 17 recent camp dispersal attempts are summarised in Table 1. Sources of information are provided. In summary, the information in this table demonstrate that:

1. Although dispersals sometimes caused animals to move from the original camp, in all cases, **dispersed animals did not abandon the local area**[1].
2. In 16 of the 17 cases (94%), **dispersals did not reduce the number of flying-foxes in the local area**.

[1] Local area is defined as the area within a 20 km radius of the original site = typical feeding area of a flying-fox.

3. **Dispersed animals generally formed new camps located close to the original site** (64% within 600 m; 91% within 2 km) and the close proximity of new camps typically resulted in ongoing conflict within the local community.

4. It was **not possible to predict or pre-determine where new replacement camps would form**. Often new sites proved to be as – or more – controversial than the initial location.

5. **Conflict was usually not resolved**. In 12 of the 17 cases (71%), conflict persisted either at the original site or at replacement camps within the local area after the initial dispersal actions.

6. **Repeat actions were required to keep animals from returning to the original site**. Often dispersal actions were repeated over months or years to keep animals from returning.

7. The **financial costs of dispersal attempts were high,** ranging from tens of thousands of dollars for vegetation removal to hundreds of thousands for active dispersals (e.g. using noise, smoke etc).

The few exceptions to these patterns, occurred when (1) abundant financial and human resources allowed ongoing, daily actions to take place over months to years (e.g. Melbourne and Sydney Royal Botanic Gardens), (2) when the animals moved to favourable habitat nearby (e.g. Batchelor, NT) and/or (3) when habitat links allowed animals to be directed to an acceptable location (e.g. RBG Melbourne).

ABS position on dispersing flying-fox camps

The Australasian Bat Society understands that flying-fox camps in urban areas can compromise the amenity of some members of the community. However, the ABS does not generally support the dispersal of flying-fox camps because, in most cases, regardless of the methods used dispersals have not proven successful in resolving conflict in local communities and the impacts of dispersals on the animals are unknown.

The ABS also recognises the migratory behaviour and other long distance movements of flying-fox species, and supports legislation and management actions that maintain population connectedness and consistent protection across state boundaries.

***If* relocations are considered, the ABS recommends the following:**

- Where conflict arises, the local authority undertakes a community education program which enables all residents and landowners to understand the environmental significance of flying-foxes, the actual level of risk they pose and discussion of alternative management options, risks and costs.
- All dispersal actions should be preceded by the development of a management plan that explores all management options, risks and costs.
- A steering committee with representatives of all stakeholder interests, including a person with adequate specialist experience with bats, should be established to oversee the proposed dispersal. Members of the steering committee should have long-term involvement with the site, including a post-dispersal monitoring period.
- There is transparency in decision-making. All documentation relating to dispersals should be made publicly available. Applications for dispersals should be exposed to a public comment period.

- With guidance from bat experts, the steering committee should develop and undertake an adequate monitoring program, to record the actions taken, their costs, and short- and long-term outcomes.
    - Each dispersal requires a clear definition of success. The definition of successful dispersals should include the following: (1) that conflict is reduced within the broader community (not just around the original site); and (2) there is minimal impact on the flying-foxes, in terms of injury, survival and reproduction of individuals.
    - The success or otherwise, both in terms of achieving reduced human-bat conflict at the original *and* alternative camp sites and appropriate management of animal welfare considerations, should be reported and made publicly available.
- Dispersal actions should not be conducted during times that are likely to impact on the welfare of flying-foxes. This includes periods of detrimental environmental conditions (including food shortages, extended periods of rain and extreme temperatures), during the day when animals are resting and during mating, late pregnancy and when young are nutritionally dependent on their mothers (i.e., Grey-headed, Black and Spectacled Flying-foxes, August – April; Little Red Flying-foxes February - September). It is important to note that young flying-foxes remain dependent on their mothers for a period up to 6 months.
- The ABS strongly opposes the use of techniques lethal or harmful to flying-foxes such as bird-scare guns and other projectiles. Habitat removal or alteration sufficient to reduce the number of animals using a camp site is also opposed.
- A research program examining the impacts of dispersal on flying-foxes should be undertaken by suitably qualified scientists.

Background Information:

- Flying-foxes are mobile, but show a high degree of fidelity to camps sites. This helps explain why attempts to destroy or relocate roosts often have only temporary effects.
- Food is an important driver for flying-fox movements and camp locations. Flying-foxes are unlikely to leave a local area when a camp is dispersed as long as food remains available. This helps explain why camp dispersals do not alter the presence or number of flying foxes in a local area.
- Flying-fox movements vary considerably between seasons and between years, hence the outcomes of camp dispersals are often not known for several months or sometimes years after the actions cease. In addition, the social and economic costs to communities are high when camps are shifted from one 'backyard' to another.
- Camp dispersals can result in mortality, particularly if conducted during the breeding season when dependent juveniles are affected[14].
- Management strategies for urban camps need to be developed at a range of spatial scales including local, state, range-wide and national as individual flying-foxes visit a number of roosts sites which may come under the jurisdiction and responsibility of various governments, conservation agencies and landholders.

Flying-foxes and the Australian Environment

The ecosystem values that flying-foxes provide to the Australian environment are an important consideration in the public debate on flying-fox management. Flying-foxes play a keystone role in maintaining biodiversity and structure in natural vegetation communities across Australia. Many vegetation communities rely on their blossom and fruit feeding behaviours to assist with pollination and seed dispersal.

The loss of natural habitats due to human population expansion and development activities is a key driver of native species decline and can lead to increased contact and conflict between humans and native fauna including flying-foxes.

What is the ABS?

The Australasian Bat Society (ABS) is a not-for-profit organisation, registered under the NSW Associations Incorporation Act 1984 through the NSW Department of Fair Trading. Our aim is to promote the conservation and study of bats in Australasia. ABS membership is wide-ranging and includes research scientists, natural resource managers, students, wildlife carers and members of the general public. Anyone with an interest in bats or conservation is welcome to join the Society. For more information on the ABS and membership, go to our web site at http://ausbats.org.au/.

References

1. Lunney D. and Moon C. (1997) Flying-foxes and their camps in the rainforest remnants of north-east NSW, pp 247-277 in *Australia's Ever-Changing Forests III.* edited by J. Dargavel. Centre for Resource and Environmental Studies, ANU, Canberra.
2. Roberts B.J., Eby P., Catterall C.C., Kanowski J.K. and Bennett G. (2011) The outcomes and costs of relocating flying-fox camps: insights from the case of Maclean, Australia, pp. 277-287 in *The Biology and Conservation of Australasian Bats*, edited by B. Law, P. Eby, D. Lunney and L. Lumsden. Royal Zoological Society of NSW, Mosman.
3. Birt P., Markus N., Collins L. and Hall L.S. (1998) Urban flying-foxes. *Nature Australia*, **26**: 54–59.
4. Hall L.S. (2002) Management of flying-fox camps: what have we learnt in the last twenty five years? pp. 215–224 in *Managing the Grey-headed Flying-fox as a Threatened Species in NSW*, edited by P. Eby and D. Lunney. Royal Zoological Society of NSW, Mosman.
5. Markus N. and Hall L. (2004) Foraging behaviour of the black flying-fox (*Pteropus alecto*) in the urban landscape of Brisbane, Queensland. *Wildlife Research,* **31**: 345–355.
6. Roberts B.J. (2005) *Habitat characteristics of flying-fox roosts in south-east Queensland.* B.Sc. (Hons) thesis, Griffith University, Brisbane.
7. Hall L.S. and Richards G.C. (2000) *Flying-foxes, fruit and blossom bats of Australia*. University of New South Wales Press, Sydney, 135 pp.
8. Parris K.M. and Hazell D.L. (2005) Biotic effects of climate change in urban environments: the case of the Grey-headed Flying-fox (*Pteropus poliocephalus*) in Melbourne. *Biological Conservation,* **124:** 267–276.
9. van der Ree R., McDonnell M.J., Temby I.D., Nelson J. and Whittingham E. (2006) The establishment and dynamics of a recently established urban camp of *Pteropus poliocephalus* outside their geographic range. *Journal of Zoology,* **268**: 177–185.
10. Williams N.S., McDonnell M.J., Phelan G.K., Keim L.D. and van dee Ree R. (2006) Range expansion due to urbanization: Increased food resources attract Grey-headed Flying-foxes (*Pteropus poliocephalus*) to Melbourne. *Austral Ecology,* **31**: 190–198.
11. Vardon M.J., Simpson B.K., Sherwel1 D. and Tidemann C.R. (1997) Flying-foxes and tourists: a conservation dilemma in the Northern Territory. *Australian Zoologist*, **30**: 310.
12. Tidemann C.R. (2002) Sustainable management of the Grey-headed Flying-fox *Pteropus poliocephalus*, pp 122–127 in *Managing the Grey-headed Flying-fox as a Threatened Species in NSW*, edited by P.Eby and D. Lunney. Royal Zoological Society of NSW, Mosman.
13. Roberts B.J., Catterall C.C., Eby P. and Kanowski J.K. (2012) Long-distance and frequent movements of the flying-fox *Pteropus poliocephalus*: implications for management. *PloS ONE,* **7**(8): e42532. doi:10.1371/journal.pone.0042532.

Table 1 Summary of known documented attempts to disperse Australian flying-fox camps using non-lethal methods, during 1990 to 2013.

Location	Species	FF population estimate at time of dispersal	Method	Did the animals leave the local area?	Did the local population reduce in size?	How far did they move?	Were new camps formed (number of new camps if known)?	Number of separate actions	Cost (if known)	Was conflict resolved at the original site?	Was conflict resolved for the community?	Source+
Barcaldine, Qld	R	>50,000	VN	no	no	≈2 km	yes (1)	trees in township felled		yes	no	a,b
Batchelor, NT	B	200	BNS	no	no	<400 m	yes (1)	2		yes	yes	c,d
Boyne Island, Qld	BR	25,000	LNS	no	no	<500 m	yes (2)	3		yes	no	e,f,g
Bundall, Qld	GB	<1600	V	no	no	uk, but 6 camps were within 5 km	yes (2)	1 action over 21 days		yes	yes	h,i,j, k
Charters Towers, Qld	RB	variable	HLNPOW	no	no	200 m	no (returned to original site)	repeated since 2000	>$500,000	no	no	l,m
Dallis Park, NSW	BG	28,000	V	no	yes	300 m	yes (1)	2		yes	no	n
Duaringa, Qld	R	>30,000	VNFO	no	no	400 m	yes	1	$150,000	yes	uk	o
Gayndah, Qld	RB	200,000	VN	no	no	600 m	yes	3 actions, repeated		yes	no	i
Maclean, NSW	BGR	20,000	NS	no	no	350 m	yes (7)	>23	>$400,000 and ongoing	no	no	n
Mataranka, NT	BR	>200,000	BHLNOSW	no	no	<300 m	uk	>9		no	no	n
North Eton, Qld	B	4800	VNFB	uk	no	<1.5 km initially	yes (≈4 majority temporary)	2	$45,000	yes	yes (conflict at one site)	j,p,q,r

Location	Species	FF population estimate at time of dispersal	Method	Did the animals leave the local area?	Did the local population reduce in size?	How far did they move?	Were new camps formed (number of new camps if known)?	Number of separate actions	Cost (if known)	Was conflict resolved at the original site?	Was conflict resolved for the community?	Source+
Royal Botanic Gardens, Melbourne, Vic	G	30,000	NS	no	no	6.5 km	yes (2)	approx daily for 6 mths	$3 million	yes	yes, ongoing management required	m
Royal Botanic Gardens, Sydney, NSW	G	3,000	LNPOW	no	no	4 km	no	ongoing daily actions for 12 mths	>$1 million and ongoing	yes	yes	m,s,t
Singleton, NSW	GR	500	LNUW	no	no	<900 m	no (returned to original site	>3	$117,000 and ongoing	no	no	n,u
Townsville, Qld	BR	35,000	BNS	no	no	400 m	no (returned to original site)	5		no	no	n
Warwick, Qld	GRB (dispersal targeted R)	200,000	NLBP	no	no	≈1 km	no (site known to be previously occupied by GB)	5 days	$28,000	yes	no (complaints persisted until migration)	h,v,w
Young, NSW	L	<5000	VN	no	no	<600 m	yes (1)	uk		yes	no	x

* G = grey-headed flying-fox; B = black flying-fox; R = little red flying-fox
# B = "birdfrite"; F = fog; H = helicopter; L = lights; N = noise; P = physical deterrent; O = odour; S = smoke; U = ultrasonic sound; V = extensive vegetation removal; W = water.
[a] Storm Stanford (Wildlife carer, pers. comm. 2013); [b] Louise Saunders (BCRQ, pers. comm. 2013); [c] Phillips *et al.* (2007) Displacement of Black flying-foxes *Pteropus alecto* at Batchelor, Northern Territory *Australian Zoologist* 34: 119-124; [d] John McCarthy (Northern Territory Government, pers. comm. 2010); [e] Roberts (2006) *Management of Urban Flying-fox Camps: Issues of Relevance to Camps in the Lower Clarence, NSW*. Valley Watch Inc., Maclean; [f] Information from Gladstone Regional Council in 2010 and 2013; [g] Joe Adair (formerly DEHP, pers. comm. 2010); [h] Trish Wimberly (Australia Bat Clinic pers. comm. 2013); [i] Information obtained from Department of Environment and Heritage Protection (DEHP) in 2013; [j] Billie Roberts unpublished data; [k] Information from Ecosure !Scott Sullivan (DEHP, pers. comm. 2010); [m] Information from Charters Towers Regional Council in 2010 and 2013; [n] Roberts *et al.* (2012b) and additional references within; [o] Perry Deeds (Central Highlands Regional Council, pers. comm. 2013); [p] Jarmaine (2010) *Species Management Plan*, Mackay Regional Council; [q] Heidi Jarmaine (Mackay Regional Council, pers. comm. 2013); [r] Daryl Barnes (Walkerston resident, pers. comm. 2013) [s] Peggy Eby (Ecologist, pers. comm. 2013) [t] John Martin (Sydney RBG, pers. comm. 2013); [u] Singleton Council Meeting Minutes; [v] Information from the Southern Downs Regional Council in 2013; [w] Tim Low (pers. comm. 2013); [x] Young Shire Council.

ABS is seeking charity status

The ABS has decided to seek registration as a charity with the ***Australian Charities and Not-for Profit Commission (ACNC)***, and Tax Deductible Gift Recipient status with the ***Australian Taxation Office (ATO)***. The purpose is to enable ABS to receive grant funding and donations such as those to fund large-scale projects (e.g. the proposed Bat Blitz in Cape York). Unless the ABS is able to offer donors tax deductibility for their gifts, fund-raising is most likely to be unsuccessful.

To be eligible, we are required to have a new clause in our constitution ('rules'), stating that a separate account for tax deductible donations to keep them separate from other ABS money. It also needs to state that, in the event of ABS closing down, any money in this account will be transferred to another similar organisation also registered as a charity and also with tax deductibility status.

To change the ABS constitution, a special resolution needs to be voted on by members, with a majority (more than three quarters) to agree to the proposal for it to pass. Although the constitution already has a clause on the Gift Fund it requires the following additions, which are standard words for this process. The proposed resolution is:

The ABS resolves to alter its constitution by inserting a new clause, 47A, as follows:

1. The objective of the fund is to support the organisation's environmental purposes.
2. Members of the public are to be invited to make gifts of money or property to the fund for the environmental purposes of the organisation.
3. Money from interest on donations, income derived from donated property, and money from the realisation of such property is to be deposited into the fund.
4. A separate bank account is to be opened to deposit money donated to the fund, including interest accruing thereon, and gifts to it are to be kept separate from other funds of the organisation.
5. Receipts are to be issued in the name of the fund and proper accounting records and procedures are to be kept and used for the fund.
6. The fund will be operated on a not-for-profit basis.
7. A committee of management of no fewer than three persons will administer the fund. The committee will be appointed by the organisation. A majority of the members of the committee are required to be 'responsible persons' as defined by the Guidelines to the Register of Environmental Organisations.
8. If the organisation is wound up or its endorsement as a deductible gift recipient is revoked (whichever occurs first), any surplus of the following assets shall be transferred to another organisation to which income tax deductible gifts can be made:
    - gifts of money or property for the principal purpose of the organisation
    - contributions made in relation to an eligible fundraising event held for the principal purpose of the organisation
    - money received by the organisation because of such gifts and contributions.

We hope to have this resolved by the end of 2013, and will send an email to all members with instructions for voting.

– Research Notes –

A survey of microbat habitat use within the urban landscape of Lismore, New South Wales

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Introduction

The global demands for urbanisation are increasing as rapidly as our population (Rockström *et al.* 2009; van der Ree *et al.* 2005). Urbanisation modifies natural habitats, often in extreme and irreversible ways. These changes are viewed as a leading cause of biodiversity loss (Puppim de Oliveira *et al.* 2011). The retention of natural ecosystems within the urban landscape may support a large array of biodiversity (Threlfall *et al.* 2011; Threlfall *et al.* 2012a, 2012b).

Microchiropteran bats, called microbats are one of the most diverse and geographically dispersed groups of mammals. Only the order Rodentia (rodents) exceeds bats in the number of species known globally; over 1116 species of bats are described internationally, with 90 bat taxa recognised in Australia (Environment Australia, 1999; Simmons, 2005). Thus, microbats are often a major contributor to regional mammal diversity (Basham *et al.* 2011; Schulz and de Oliveira 1995).

This study aims to i) identify which species of Microchiropteran bats are present at Southern Cross University's Lismore campus and within the wider Lismore local governance area and ii) identify which habitats they are utilising more frequently. The results of this study may be used by SCU Sustainability Policy Advisory Committee during the formation of a Fauna and Flora Management Plan.

Methods

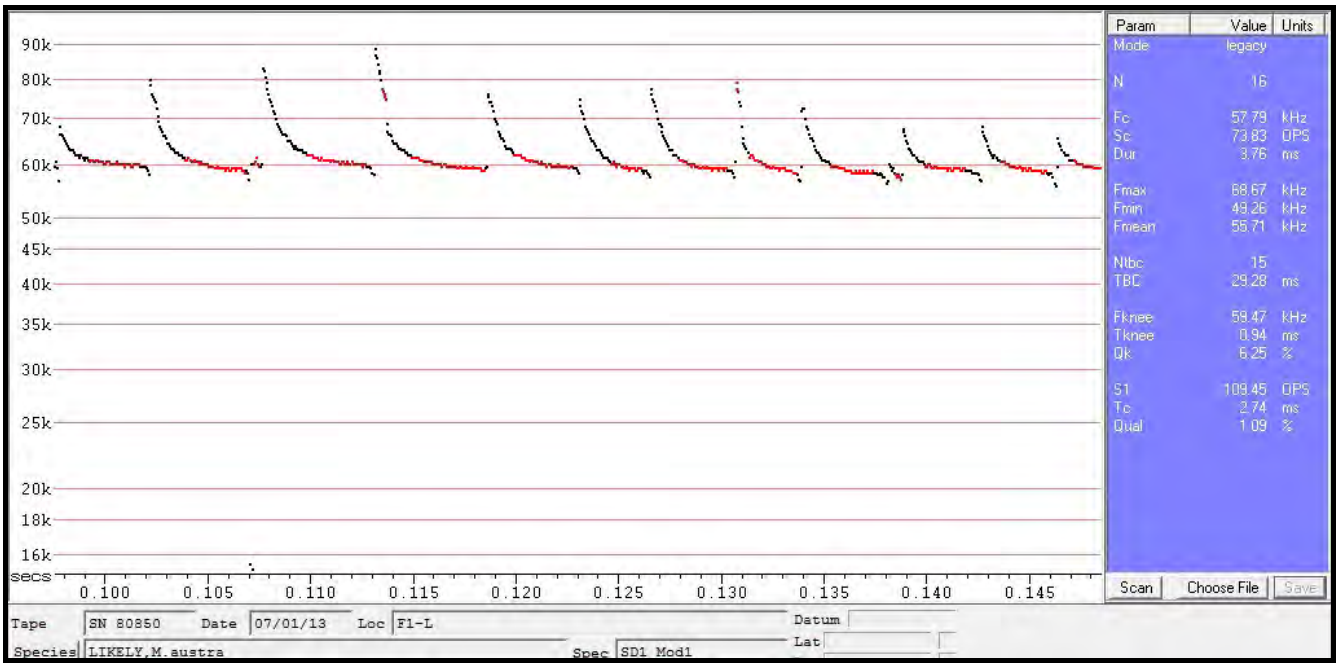
Southern Cross University owns approximately 158 ha of land in Lismore. Nine transects were surveyed within the active areas of the campus; three of each habitat category (see below). Nine transects were surveyed within the wider Lismore community. Almost all of the sites were reported as being areas of known bat activity and were typical of the habitat categories they represent.

The survey contains three broad habitat categories, representing typical landscape elements and land use. The categories are: i) vegetated (>40% canopy cover), ii) near water (≤ 40m of a water body) and iii) urban (2 - 5 building ha^{-1} including areas artificial lit with lights at night). For each habitat category, six replicates were sampled for analysis – three for each location source.

Each transect (18) measured 200m in length and was sampled on two separate occasions. Surveys commenced at sunset or when bat activity was first noted and continued for up to three hours. Bat echolocations were recorded using an Anabat II Bat Detector (Titley Scientific, Brisbane) (Corben 2011). Active sampling at was undertaken for 15 minutes on each transect (Ford *et al.* 2005; Brooks 2009) and involved walking along cleared walkways and paths that may be used as fly ways (Law & Dickman 1998; Threlfall *et al.* 2011).

The recorded bat calls were downloaded from the Anabat and were inspected using the Analook software (Corben 2011). Only entire call sequences (often called a pass or call) (Figure 1) containing at least three pulses of similar frequency were used for identification. Species identification was based on pulse characteristics observed using the identification guide "Bat Calls of New South Wales: Region based guide to the echolocation calls of microchiropteran bats" (Pennay *et al.* 2004).

Figure 1 (over page): When a call is analysed, many characteristics are looked at. Only a full call sequence of more than three pulses can be analysed. This call of a Little Bentwing Bat (*Miniopterus australis*) is a long sequence and identification is highly likely.



Results

The survey resulted in more than 125 files containing bat calls. Seventy-six (56%) were adequate for purposes of species identification. A total of nine species was positively identified, including four species listed as Vulnerable in New South Wales (Table 1).

Records from the broader Lismore LGA accounted for 86% (n = 65) of all records obtained during this survey. Vegetated transects accounted 65% (n = 49) of the data while 32% (n = 24) and 3% (n = 3) were attributed to the near water transects and urban transects respectively.

Only eleven records representing six species were positively identified at SCU. They were *C. gouldii, F. tasmaniensis*, *Mormopterus* sp 2*, N. geoffroyi*, *S. rueppellii and S. orion*. With the exception of *F. tasmaniensis* and *S. orion*, all records were from vegetated transects representing 72% (n = 8) of the data from SCU. The *F. tasmaniensis* and *S. orion* records (n = 3) was sourced from a near water transect. No records were confirmed on any urban transects at SCU.

Six individual species were confirmed in the Lismore LGA. They were *C. gouldii*, *F. tasmaniensis*, *M. australis*, *M. norfolkensis, V. vulturnus* and the yet to be described *Scotorepens* species. Vegetated transects accounted for 63% (n = 41) of data, 32% (n = 21) to near water and 5% (n = 3) urban transects.

Only one species, *M. australis* was identified in all three habitat categories. Four species, (*C. gouldii*, *Mormopterus* sp 2*, N. geoffroyi* and *S. rueppellii*) were identified on only one habitat type while three species (*F. tasmaniensis*, *Mo. norfolkensis*, *Scotorepens* species (undescribed taxa) were identified on two. Two species, *F. tasmaniensis* and *Scotorepens* species (undescribed taxa) were identified both at SCU and the broader Lismore LGA. All other records pertained to only one survey location.

Discussion

The study illustrated that increases in urban density resulted in a decrease in species richness and abundance. Fewer microbats were detected on urban transects. In contrast, bats were more abundant on vegetated and near water transects that contained vegetation. This suggests the retention of vegetated areas (both of natural forests and replanted “green” areas) within the urban landscape may be important for this bat assemblage. This finding is consistent with other studies (Basham *et al.* 2011; Hourigan *et al.* 2010; Threlfall *et al.* 2011).

Species richness was equivalent at SCU to that in the broader Lismore LGA (6 spp), however, abundance was notably lower at SCU. Species richness and abundance were lower on urban transects compared to the other two habitat categories at SCU and Lismore LGA. This contrast between urban and other forested

habitats is consistent with other studies (Avila-Flores 2003; Hourigan 2001), and should be noted during management planning.

There was a noticeable difference in identified records among the near water transects; 22 records were identified within the Lismore LGA compared to just one at SCU. While it is possible that site selection may be responsible for some of this disparity, it is unlikely to be the only cause. Further investigations of the water requirements for microbats and their prey would be needed to put this result into context.

Four species with state conservation status were identified throughout the current study. *Falsistrellus tasmaniensis*, *M. australis*, *M. norfolkensis*, and *S. rueppellii* are all listed as Vulnerable in the state of New South Wales (New South Wales Government, 2013). *Scoteanax rueppellii* has also been identified nationally as Near Threatened. These species represent 44% of the data. The identification of these threatened species is important for both policy makers and environmental managers. The protection of the key environmental factors essential for their survival should be considered in any conservation policies.

Table 1: Active acoustic survey of microbats was conducted from November 2012 to January 2013 in Lismore, NSW, at sites within Southern Cross University campus (SCU) and within the wider Lismore community (LIS). The study focused on three broad habitat types; vegetated (>40% canopy), urban (2 - 5 building ha^{-1}) and near water (≤ 40m of a water body). Nine species were identified, including four Vulnerable species in NSW.

Species	**Vegetated**		**Urban**		**Near Water**		**Total**
	LIS	SCU	LIS	SCU	LIS	SCU	
Gould's Wattled Bat *Chalinolobus gouldii*	2	1					**3**
Eastern False Pipistrelle *Falsistrellus tasmaniensis (*)*	1					1	**2**
Little Bentwing Bat *Miniopterus australis (*)*	35		1		10		**46**
Eastern Freetail Bat *Mormopterus norfolkensis (*)*	2		1				**3**
Mormopterus sp 2	1	1					**2**
Lesser Longeared Bat *Nyctophilus geoffroyi*		2					**2**
Nyctophilus species						1	**1**
Greater Broad-nosed Bat *Scoteanax rueppellii(*)*		3					**3**
Eastern Broad-nosed Bat *Scotorepens orion*						1	**1**
Scotorepens species		1			11		**12**
Little Forest Bat *Vespadelus vulturnus*			1				**1**
Total	**41**	**8**	**3**	**0**	**21**	**3**	**76**

Conclusion

Microbats are important indicators for biodiversity heath within all ecosystems, including highly urbanised and fragmented habitats. This results in their internationally high conservation value (Jones *et al.*, 2009). Conservation and management decisions are driven in part by census results of the targeted fauna. Data regarding populations and distribution of microbats is still lacking at Southern Cross University, making management decisions difficult. Timely conservation efforts are required from all levels of government, private organisations and the general public.

The present study listed two objectives; to i) identify which species are present at Southern Cross University's Lismore campus and within the wider Lismore local governance area and ii)

identify which habitats they are utilising more frequently. The results of this study fulfilled both objectives.

The results indicate that the retention of vegetated areas within the urban landscape is important to bat communities. Additionally, tree hollows could be a limiting environmental factor at SCU which accounts for the disparity of abundance data between the two locations. The value and importance of these findings can only be realised through repeated and expanded habitat searches.

References

Avila-Flores, R. (2003). *Habitat use by foraging insectivorous bats in a large urban mosaic.* Masters Thesis, York University, Toronto.

Basham, R., Law, B., & Banks, P. (2011). Microbats in a 'leafy' urban landscape: are they persisting, and what factors influence their presence? *Austral Ecology* **36**(6), 663-678.

Brooks, R. (2009). Habitat-associated and temporal patterns of bat activity in a diverse forest landscape of southern New England, USA. *Biodiversity & Conservation* **18**(3), 529-545.

Corben, C. (2011). Analook bat call analysis software (Version 3.8a).

Environment Australia. (1999). *Action Plan for Australian Bats* Commonwealth of Australia. From http://www.environment.gov.au/biodiversity/threatened/publications/action/bats/index.html.

Ford, M., Menzel, M., Rodrigue, J., Menzel, J., & Johnson, J. (2005). Relating bat species presence to simple habitat measures in a central Appalachian forest. *Biological Conservation* **126**(4), 528-539.

Hourigan, C. (2001). *Microchiropteran community structure in the troipcal urban enviornment of Townsville, North Queensland.* Honours Thesis, James Cook University, Townsville.

Hourigan, C., Catterall, C., & Jones, D. (2010). The diversity of insectivorous bat assemblages among habitats within a subtropical urban landscape. *Austral Ecology* **35**, 849-857.

Jones, G., Jacobs, D., Kunz, T., Willig, M., & Racey, P. (2009). Carpe noctem: the importance of bats as bioindicators. *Endangered Species Research* **8**, 93-115.

Law, B., & Dickman, C. (1998). The use of habitat mosaics by terrestrial vertebrate fauna: implications for conservation and management. *Biodiversity & Conservation* **7**(3), 323-333.

Pennay, M., Law, B., & Reinhold, L. (2004). Bat Calls of New South Wales: Region based guide to the echolocation calls of microchiropteran bats: Department of Environment and Conservation (NSW).

Puppim de Oliveira, J., Balaban, O., Doll, C., Moreno-Peñaranda, R., Gasparatos, A., Iossifova, D., & Suwa, A. (2011). Cities and biodiversity: Perspectives and governance challenges for implementing the convention on biological diversity (CBD) at the city level. *Biological Conservation* **144**(5), 1302-1313.

Rockström, J., Steffen, W., Noone, K., Persson, A., Chapin, F., Lambin, E., Foley, J. (2009). Planetary boundaries: exploring the safe operating space for humanity. *Ecology and Society* **14**(2), 32.

Schulz, M., & de Oliveira, M. (1995). Microchiropteran fauna of Kroombit Tops, central Queensland, including a discussion on survey techniques. *Australian Zoologist* **30**, 70-77.

Simmons, N. (2005). Order Chiroptera. In D. Wilson & D. Reeder (Eds.), *Mammal species of the world* (3rd ed., Vol. 1, pp. 312-529). Baltimore, USA: Johns Hopkins University Press.

Threlfall, C., Law, B., & Banks, P. (2012a). Influence of landscape structure and human modifications on insect biomass and bat foraging activity in an urban landscape. *PLoS ONE* **7**(6), 1-10.

Threlfall, C., Law, B., & Banks, P. (2012b). Sensitivity of insectivorous bats to urbanization: Implications for suburban conservation planning. *Biological Conservation* **146**(1), 41-52.

Threlfall, C., Law, B., Penman, T., & Banks, P. (2011). Ecological processes in urban landscapes: mechanisms influencing the distribution and activity of insectivorous bats. *Ecography* **34**(5), 814-826.

van der Ree, R., & McCarthy, M. A. (2005). Inferring persistence of indigenous mammals in response to urbanisation. *Animal Conservation* **8**(3), 309-319.

Do Aussie bats speak Autobat?

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I recently made a short visit to Australia with the aim of testing a device we call the Autobat. Colleagues and I have been using Autobats for several years to improve capture rates of forest bats in the UK and Japan. More recently we have done successful trials in rainforests in Malaysia and Thailand and I wanted to see whether any of Australia's great diversity of microbat species would also respond.

Bats use a suite of vocalisations to communicate with each other, but these "social calls" have been studied much less than echolocation. The Autobat is an ultrasound synthesiser that broadcasts simulations of bat social calls through ultrasonic transducers. When it is working well, bats respond by rapidly approaching the stimulus,

which allows us to catch them in harp traps or mist nets. We use synthesised calls rather than direct playback because it is difficult to get good quality recordings of social calls given by bats as they fly in forests. Autobat output is clean of background noise and seems to attract bats more effectively than the playback of ultrasonic recordings.

Lisa Cawthen (University of Tasmania) kindly provided me with a few examples of social calls of *Nyctophilus* and *Vespadelus*, and I used these as models to make new Autobat stimuli. The Autobat can play a sequence of eight different calls and so most of those I used were from Japan and UK. The big question was whether Australian bats could be attracted by this mix of familiar and exotic calls. If so, then it would suggest that future work, including the development of calls designed specifically for Australian species, would be worthwhile.

Over nine nights of field surveys in Queensland and South Australia, together with Kyle Armstrong and other bat workers, I have used six to eight harp traps in forest interiors and on trails, two of them fitted with Autobats, to see whether the acoustic lures improved capture rates. The data are too few for statistical analysis, but species that were capture exclusively or in greater numbers in traps with Autobat than in control traps included *Nyctophilus bifax*, *N. geoffroyi*, *N. gouldi*, *Myotis macropus*, and *Falsistrellus tasmaniensis*. In addition, one *Saccolaimus saccolaimus* was caught in a 15 m mist net in the Cairns Botanical Gardens within 50 cm of the Autobat transducers.

Although the results are few, preliminary indications are that the Autobat was having a positive effect on capture rate, and that at least some species of Aussie bats do speak Autobat, or at least respond to it! The next step will be to be to produce more stimulus calls specifically designed for particular groups of Australian bat species (forest bats such as *Nyctophilus* spp. seem like a promising place to start). Once we have developed the stimuli, we can do a longer, more systematic evaluation of the effectiveness of using acoustic lures vs. standard trapping methods.

Acoustic lures have tremendous potential for increasing bat survey efficiency. Their use as a tool for behavioural research may also help us to understand the functions of vocal communication in bats. I hope to make progress with both of these aims through further collaboration with Australian researchers and bat workers.

Top: The Autobat (photo: D. Hill)

Middle: The Autobat mounted against a harp trap (photo F. Greenaway).

Bottom: A *Falsistrellus* captured near Penola, South Australia (photo: D. Hill).

– Reports, Viewpoints –

Above: Mother and pup tent-making bat *Uroderma bilobatum*, Costa Rica. Photo: Rachel Blakey.

Below: Must be some fishing bat enthusiasts amongst this pool hugging crowd of bat biologists at the 16th International Bat Reserach Conference, Costa Rica. Photo: Mark Thompson.

Ed: It is with many fond memories that I recall what seems like a life-time ago when I provided a wrap-up on the 14th IBRC held in Mexico for edition 29 of the ABS Newsletter! *I remember gloating over my luscious photos of exotic places, people and bats. Many thanks to Anna McConville, pictured above with the devil at the welcome drinks to the 16th IBRC for sharing with us her amazing experiences and photos from Costa Rica. I'm sure you'll all be as jealous as me...!*

16th International Bat Research Conference, Costa Rica 2013

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With almost 650 attendees, IBRC 2013 San Jose, Costa Rica was the largest meeting of bat researchers to ever take place. This massive event was held from 11 - 15 August 2013, had 329 presentations spread over four concurrent sessions and 114 posters. Costa Rica is a well-known biologist's wonderland, located within the Meso-American biodiversity hotspot region. For bat biologists, it is absolute utopia. Costa Rica boasts 113 bat species, all jammed into a country smaller than Tasmania. A fantastic conference line-up located in such a beautiful country seemed too good to be true. My enthusiasm may have been fuelled by post-PhD euphoria (a recognised medical condition where the sufferer realises that they have a life again), but the fire was fanned by the walking travel agency that is fellow sufferer and ABS member, Lisa Cawthen.

The hysteria was quite contagious and I even managed to convince my other half to follow me across the world with the promise of great people and even better surf.

Despite the great distance, Australasia was well represented in Costa Rica (they heard Lisa and I were going), with at least 14 ABS members attending. El presidente ABS, Kyle Armstrong gave an overview of the current challenges faced by our society in responding to media and public enquiries with balanced information based on scientific literature. Micaela Jemison used media coverage of the 2011 Hendra virus outbreak as a case study to examine how the media depict human-wildlife conflicts involving zoonotic disease. Her research highlighted the need for wildlife managers to use comparative language when communicating risk and the positive outcomes for news coverage of conservation issues when personalisation is used to communicate science. Continuing the lessons, Ben Paris shared with us the tips to the success of the Auckland Council's bat awareness movement in New Zealand following the discovery of a long-tailed bat *Chalinolobus tuberculatus* population persisting close to the city.

Some fantastic long-term datasets from Australia and New Zealand were brought into the spotlight. Kristen Lear reported on the southern bent-wing bat *Miniopterus schreibersii bassanii* population monitoring from Naracoorte Caves, South Australia. In south-eastern Australia, Brad Law found that average longevity for hollow-roosting vespertilionids was quite low (1.9 years) during his 14 year study. While bat survival did not show strong variation over time, despite the study spanning extreme El Nino and La Nina weather events, recruitment was highly correlated with annual rainfall in the preceding 12 months. Colin O'Donnell presented data from an even longer mark-recapture study (19 years) and suggested that long-tailed bats *Chalinolobus tuberculatus* have a stable social structure. Moira Pryde delivered some good news with her study indicating that predator control measures implemented since 2003 have increased long-tailed bat survivorship. Those planning future bat population studies will benefit from the work of Pia Lentini who dazzled us with Bayesian population models that use prior knowledge to better estimate survival, meaning we need fewer years of data to get reliable estimates.

In line for take off? Proboscis bat, *Rhynchonycteris naso,* Costa Rica. Photo: Rachel Blakey

The Auzzie PhD student sessions were absolutely brilliant. Not that I am biased in any way! Rachel Blakey finally made it to Costa Rica after days stuck in Los Angeles airport and managed to still give us a taste of what to expect from her bat-wetland PhD in the Murray-Darling basin. Lisa Cawthen demonstrated that no single forest retention measure suited all bat species in Tasmania and suggested that forest management needs to occur at multiple spatial scales. I found that regional habitat models for east-coast free-tailed bat *Mormopterus norfolkensis* were broadly consistent with local-scale models, but not if you need a high level of accuracy, such as for land development planning. Julie Broken-Brow brought the mangrove bat communities of south-east Queensland into the international spotlight. Clare Stawski examined torpor use in *Nyctophilus bifax* in northern Australia and suggested that the flexible use of torpor will increase bat survival chances during climate change.

Fritz Geiser also presented in Costa Rica, discussing the results of his Australian bat aestivation studies (summer torpor). As always,

there were various exciting stalls with bat-related gadgets and wares on show. That was certainly the case with the stall from Speleobooks which had all manner of bat paraphernalia which were quickly snapped up. Chris Corben and Kim Livengood were on hand to answer all Anabat and Titley-related questions. Wildlife Acoustics launched their new microphone and app to convert your iOS device into a bat detector for real time viewing and recording.

There were some fantastic presentations from international researchers in the wind energy symposium. We were stunned by Erin Baerwald's estimates of between 650,000 and 1.3 million bat fatalities from wind turbines in the US and Canada from 2000 to 2011. Erin found that fatalities were generally highest on low wind speed nights, but there was no consistent relationship between fatalities and topographic position and no hotspot turbines overall. Robert Barclay implored us to stop counting bat fatalities per wind turbine and encouraged us to start setting quotas based on population management in his presentation. Sensibly, he argued that if bats per turbine is the standard measurement, then as turbines increase then so will fatalities and impacts at a population level. On a positive note, Martina Nagy presented a study where a 1:6 reduction in bat fatalities was obtained by using an algorithm to predict bat fatalities and stop turbines during high risk periods - all for a 0.55 % loss of revenue to the electricity provider. Fantastic.

Being a bit of a gadget geek myself, I particularly enjoyed presentations that made use of new technologies. A subject of much later discussion was the carrot dangled by Nathan Fuller in his presentation where he described an automated telemetry system to track bats using small unmanned aerial vehicles (UAVs). The idea is that small foam aeroplanes are programmed to search for the radio frequency of bats with transmitters along a set search route. Once a signal is detected the plane then flies in circles following the signal at a specified distance, logging GPS positions as it goes. So the plane would be able to follow moving bats or help locate roosts in difficult terrain. Using existing technology, Nathan estimated the cost at less than $500 USD. Why not radio-tracking animals, I recently read news articles announcing UAVs to be used for parcel delivery and to inform fire fighting efforts.

Yossi Yovel from Tel-Aviv University, Israel presented data on behalf of his student, Noam Cvikel, who used small GPS units with an ultrasonic microphone to track bats. All for a tracker weight of around 3 g. Noam's study yielded a fantastic dataset. Not only do you have GPS location data of bat movements throughout the night, but you have the echolocation calls of the bat and also the echolocation calls of other bats that fly nearby. The data can be used to investigate foraging effort (e.g. number of feeding buzzes per individual per night) and interactions with other individuals in a spatial context. As always, the main constraints are battery life and recovering transmitters to download data. Incorporated in the unit was a standard radio transmitter tag to assist with tag relocation and collection. But Noam's presentation gave us a small taste of the high quality data you can get on bat movements using microphones and GPS trackers together.

There were also a number of presentations on 3-D flight reconstruction studies using microphone arrays for social and echolocation studies. Also of interest to me, was the spatially explicit bat trapping data being collected by Tigga Kingston from grids set up in the lowland rainforests of Peninsula Malaysia. Keep watching for some interesting research papers to come out of that project.

When it came to socialising, the Costa Ricans put on a great show. The folkloric group Tiquicia welcomed us to the conference with loud drums, brass and mardi gras-style masked dancers. This was only outdone by the closing conference dinner, which was also done in true Latin American fanfare, being less of a sit down dinner and more of a big party. Bat biologists young and old got their groove on to the live band which was complete with singers that had synchronised dance moves.

After having exercised our brains all week at the conference, we were eager to stretch our legs and explore. Brad, Lisa, Rachel, Julie and I headed off on a post-conference field trip together, led by the laid-back but very knowledgeable guide, Jose, and accompanied by researchers from the UK and Europe. We learnt the Spanish word for bat ("Murcielagos") and questioned Costa Ricans everywhere about where to find local bats. We travelled to Tortuguero, on the Carribean, to watch green turtles lay eggs, investigated the Tirimbina biological reserve and survived white-water rafting on the Sarapiqui River and perilous suspension bridges. Of course we managed to find bats during each of these tours and almost every place we went. We even spotted some long-nosed bats *Rhynchonycteris naso* roosting on tree trunks while white-water rafting! We were

welcomed to the field trip by greater white-lined bats *Saccopteryx bilineata* roosting outside of our cabins on the first day and strawberry poison dart frogs *Oophaga pumilio* hopping around underneath. It was lucky that these particular cabins were raised up nice and high as a massive thunderstorm and torrential rain hammered us during the night.

Looks of concentration on (L-R) Brad Law, Anna McConville and Julie Broken-Brow. Photo: Lisa Cawthen.

We mist-netted for bats each night and happily sloshed around in rainforest mud and disentangled strange new bats from the nets. How long do you think it would take 20 enthusiastic and experienced bat biologists to locate the beautiful white tent bats *Ectophylla alba* in a patch where they are known to occur? Not long you say? Well more like a few hours, than 10 minutes. Our efforts were finally rewarded (and our pride restored) with two occupied tents under *Heliconia* leaves and lots of photographs. After seeing many different bats from the Phyllostomidae family, which includes both nectarivorous and frugivorous echolocating bats, I finally got past the culture-shock of assuming that every echolocating bat was insectivorous. We even managed to catch one of the larger fruit-eating bats (*Dermanura* sp.). During the day we would often find common tent-making bats *Uroderma bilobatum* sheltering under banana and *Heliconia* leaves in the gardens of our various accommodations. But unfortunately, we missed out on seeing the greater fishing bat *Noctilio leporinus* and vampire bats. But we had a fantastic time trying.

Oh and just to make you even more jealous there were tonnes of other cool critters to spot. We saw tonnes of hummingbirds, toucans, howler and spider monkeys, squirrels, northern Tamandua, white-faced capuchins, two- and three-toed sloths, coatis, kinkajous, opossums and a pit viper.

For another perspective of IBRC Costa Rica, see the fantastic blog written by Pia Lentini: http://pelentiniresearch.wordpress.com/2013/08/23/what-happens-at-a-bat-conference/

Aussie battos join other conference attendees preparing for rafting. Photo via Anna McConville.

Bat night in Horsham appears to be a winner with these children! Photo via Maree Kerr.

Raising awareness of bats

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There is a clear need for a higher public understanding of bats to achieve better conservation outcomes for bats. While microbats are largely ignored by the media, flying-foxes have been demonised in recent years. This lies on top of, in western societies, superstitions regarding bats as evil. To conserve our Australasian bats, we need to work together to change public and government attitudes to bats. The ABS has a number of new programs trying to do this.

Australasian Bat Night March and April 2014
Time to get re-inspired!

Australasian Bat Night is happening again in 2014.

Australasian Bat Night is a public awareness programme aiming to educate people about bats, to raise the profile of bats and debunk the myths and fears, to achieve better conservation outcomes and so people can live with bats.

In 2013, over 30 events were held in seven states and territories and New Zealand during March and April, some events attracting 100 - 200 people.

Help make 2014 even better!
We are asking ABS members to team up with local councils, land-care groups, Field Naturalists, eco and wildlife tourism operators, wildlife carers, zoos, sanctuaries and wildlife parks, museums and other community groups to run bat activities during March and April of next year, anything from a Bat walk looking for microbat activity or watching a fly-out to holding a Bat Festival.

ABS will be inviting community and local government organisations and individuals to register events and activities for 2014 but we need your help to make it even better and bigger. If you know of any regular events, eg daily bat talk at a wildlife park, happening during Bat Night

months, please badge it as part of Australasian Bat Night.

We will be promoting events on the ABS website, and our social media pages.

Check the ABS website http://ausbats.org.au/ to find out more and to register events. You can also register by sending details to Maree Kerr at cantcatchme@netspeed.com.au

Looking for ideas to celebrate Bat Night?

Into sports?! Why not organize a sporting event, like a “Bike for Bats” or a “Midnight Bat Run” right around the time bats fly?

If you live near a landscape where bat colonies are frequently spied in the twilight skies, a local Evening Bat Walk could be just the ticket. Expert bat conservationist advice and the right location may mean you have the makings for an exotic Eco-Bat Tour. You can give a presentation on any bat research or survey you have carried out. Or arrange a visit to a bat clinic or bat exhibit at a zoo or museum. You can also organize a bat shaped cookie baking session or bake sale at your kindergarten or school! Or try a fun hour of finger painting or other craft activity with a bat-tastic theme. What about bat masks or bat mobiles? Family or group activities such as planting trees to benefit both bats and forests, is a good opportunity to spend the day in a stimulating environment of informal learning. Or ask your local hardware store and or bat group, to sponsor a family bat box-building day at a nearby zoo or public park.

Have a look on the website at last year's events for more ideas.

What's your favourite bat?

An added feature we hope to introduce for Bat Night 2014 is a *Favourite Australasian Bat* poll. Watch out for details on the ABS website, facebook and twitter.

Holding a bat event outside of Bat Night months?

We can still promote it on the new Bat Diary page on the ABS website (coming soon) and on ABS facebook and twitter. Just send details to Maree Kerr at cantcatchme@netspeed.com.au

Image below: Happy bat night participants, Photo: Maree Kerr.

Bat tourism in Australia

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The Australasian Bat Society has begun a Bat Tourism project in Australia. Carol Booth and Maree Kerr presented this proposal at the ABS FAGM earlier this year. We are asking people to help us in developing this proposal.

What is the potential?

Bat watching in North America is enthusiastically promoted. *The Vacationer's Guide to Bat Watching* (BCI 1998) provides tourists with information about 125 bat watching sites in the US and Canada. There are websites promoting bat viewing opportunities in different states. One of the best known wildlife tourism sites worldwide is in Austin, Texas, where up to 1.5 million Mexican free-tail bats roost under the Congress Avenue Bridge in the middle of the city. The spectacle of their nightly emergence attracts nearly 140,000 visitors each year (figures from 1999, Pennisi *et al.* 2004). Bat viewing is facilitated by a grassy viewing area with educational kiosks, riverboat operators offering bat-watching excursions, and a bat hotline to provide up-to-date information. There is an annual bat festival, 'Free-Tail Free-For-All'.

Australia lags far behind this in understanding and facilitating the potential of bat tourism. According to a report by the CRC for Sustainable Tourism, there is much greater potential in Australia for wildlife viewing tourism (Higginbottom and Buckley 2003).

Wildlife viewing (principally terrestrial) is a significant motivation for 18.4% of international visitors to choose Australia as their destination, and 67.5% of such visitors wish to see Australian animals while they are here. For visitors from Japan, Korea, England and Germany, 'seeing wildlife in their natural surroundings' is ranked among the top six preferred activities for a visit to Australia. Seeing wild animals is a significant factor in choice of holiday destination for around a third of Australian domestic tourists.

There are several small scale tourism ventures (listed below, mostly involving flying-foxes) but no overall promotion of bat tourism. Large fly-outs at dusk offer one of Australia's most spectacular nature-viewing experiences. At the end of the proposal is a list of existing tourism ventures, flying-foxes and microbats, ranging from signs at observable flying-fox camps or bat caves to cruises or tours. There are also many other locations where tourists visit despite a lack of signage or promotion.

The ABS Proposal

In the first instance, we propose to:

- Develop a webpage to promote bat tourism in Australia on the ABS website;
- Include a map with all known sites, click to get more information;
- Include information and photographs to promote each site.

Other ideas we would like to consider include:

- Promote bat tourism via tourism centres & tourism publications (e.g. Lonely Planet);
- Propose tourism options for other sites;
- Do bat tourism advertising;
- Calculate economic value of tourism and potential economic value.

How you can help

- Join the bat tourism group;
- Provide information about bat tourism sites to Maree Kerr at cantcatchme@netspeed.com.au
- Propose other ideas.

Bat Tourism sites in Australia

We know this list isn't complete and look forward to your input.

Microbats

- Qld: Mt Etna Caves National Park – ranger guided tours, bent-wing bats.
- Qld: Undara Lava Tube – emergence of 250,000 microbats.
- Qld: Captain Billy's Landing, Cape York Peninsula – a headland sea-cave with a large bent-wing colony.
- Qld: Chillagoe Caves – guided and self guided cave tours.
- Qld: Ty Connell Mine – old mine with several species including Ghost Bats, horseshoe bats, leaf-nosed bats and bent-wing bats, and a B & B.
- Qld: Lucinda wharf – northern freetail bats under the wharf, a spectacular flyout.

- Qld: Natural Bridge, Springbrook National Park – colony of Little Bent-wing Bats in glow worm cave – some signage.
- NT: Territory Wildlife Park - ghost bats and other microbats on display in nocturnal house.
- SA: Naracoorte Bat Cave – Bat Observation Centre, Southern Bent-wing Bats via cameras and flyout.
- TAS: Pipeline track, Fern Tree.
- TAS: Hobart rivulet track above C3 church, Hobart.
- TAS: Waterworks reserve, South Hobart.
- TAS: Fortescue Bay Camp Ground, Fortescue Bay.
- TAS: Grants lagoon off Binalong Bat Rd, Binalong Bay.
- TAS: Liffey Falls Camp Ground, Liffey.
- TAS: Hastings Caves Visitor Centre car park, Hastings.
- TAS: Crayfish Creek, Crayfish Creek.
- TAS: Vale of Belvoir, Cradle Mountain.

Flying-foxes

- Qld: Tolga Bat Hospital Visitor Centre, Atherton – educational and bat viewing centre.
- Qld: Batty Boat Cruises, Brisbane (Wildlife Queensland) – fly-out from Indooroopilly.
- Qld: Bat Conservation and Rescue Qld – 'Information Trailer', visiting community events around Brisbane.
- Qld: Pteropus Conservation Park, Woodend Nature Centre, Ipswich – educational and bat viewing centre.
- Qld: Solar Whisper Wildlife Cruises, Wonga (Daintree) – riverside camp.
- Qld: Port Douglas – rainforest cruises & individual tourists.
- Qld: Laura, NQ - coach guided tours of Little Red Flying-fox colony.
- Qld: Kuranda BatReach - bat rescue and rehabilitation centre.
- Qld: Kuranda, Jumrum Conservation Park and walk.
- Qld: Mary Valley – a large Little Red Flying-fox colony. The Lotus Bird Lodge used to take tours to this colony and for fly-out viewing.
- Qld: Australian Bat Clinic, Gold Coast – educational visits and bat viewing.
- Qld: Cascade Gardens, Gold Coast – flying-fox colony.
- Qld: Redcliffe Botanic Gardens, Redcliffe – flying-fox colony.
- Qld: Boonah flying-fox colony at Tourist Information Centre, Boonah.
- Qld: Bat House, Cape Tribulation – environmental interpretation centre.
- Qld: Forest flying, Finch Hatton, near Mackay – a 'flying fox' for gliding past the colony.
- Qld: Broadbeach, Gold Coast – interpretive signage and viewing area.
- Qld: Tuan Tuan colony, Hervey Bay – interpretive signage for visitors.
- Qld: Ross Creek, Yeppoon – walkway.
- Qld: Cairns CBD – interpretive signage.
- Qld: Yorkeys Knob – Spectacled Flying-fox colony can be viewed from the veranda of the Yacht Club or from the Club Bar.
- Qld: Cleveland Black Swamp – interpretive signage.
- Qld: Sparkes Hill, Brisbane – interpretive signage.
- Qld: Innisfail, Warrina Lakes – Spectacled Flying-fox camp.
- Vic: Yarra Bend, Melbourne - viewing platforms, interpretation.
- NT: Darwin - Doctor's Gully- interpretive signage and board walk.
- NT: Katherine – Flying Fox Art & Cultural Festival.
- NT: Mataranka – interpretive signage.
- NT: Territory Wildlife Park - bat talks with live flying-foxes daily; colony free-living Black Flying-foxes in park - interpretive signage and board walk.
- NT: Wangi Falls - interpretive signage and board walk.
- NSW: Wingham Brush Nature Reserve – signage and board-walk.
- NSW: Australian Walkabout Wildlife Park – 'meet a bat' days (Ku-ring-gai BCS).
- NSW: Sea Acres Rainforest Reserve, Port Macquarie – interpretative signs and boardwalk.
- NSW: Bellingen – guided walks.
- NSW: Cabramatta Creek, Sydney – viewing platform, interpretive signs.
- NSW: Parramatta Park colony – interpretive signage.
- NSW: Ku-ring-gai Flying Fox Reserve, Gordon – interpretive signage (best views of flyout from Rosedale Rd Bridge).

References

Bat Conservation International (1998). The Vacationer's Guide to Bat Watching. University of Texas Press.

Pennisi, L., Holland, S. and Stein, T. (2004). Achieving bat conservation through tourism. *Journal of Ecotourism* **3**(3), 195-207.

Higginbottom, K. and Buckley, R. (2003). Terrestrial Wildlife Viewing in Australia. CRC for Sustainable Tourism, Gold Coast.

Bat Conservation International: Bats and Wind Energy Workshop

Mark Venosta
Biosis

mvenosta@biosis.com.au

From 18-20 June 2013, I attended a Bat Conservation International (BCI) workshop in Honolulu, Hawaii. The purpose of this inaugural workshop was to bring together interested parties/experts and combine science, education and conservation to provide participants with the latest in research and monitoring techniques. BCI continues to seek solutions to reduce risk to bats and support long-term, responsible wind energy development. As a consultant working with bats and wind energy, I have found BCI and the Bats and Wind Energy Cooperative to be a very useful source of information with many of the leaders in wind energy and bat research contributing to their programs. When this workshop came up I was very interested to attend and participate.

Topics included an overview of bats and wind energy issues, relevant guidelines and metrics documents, field methods, equipment, analysis of data and impact minimisation strategies. There was a strong focus on discussion of the challenges of detecting and preventing rare or endangered species fatalities, with specific focus on the Hawaiian Hoary Bat, *Lasiurus cinereus semotus*.

The U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines have a 5-tier approach for assessing potential adverse effects to species of concern and their habitats.

- Tier 1 – Preliminary site evaluation (landscape-scale screening of possible project sites)
- Tier 2 – Site characterization (broad characterization of one or more potential project sites)
- Tier 3 – Field studies to document site wildlife and habitat and predict project impacts
- Tier 4 – Post-construction studies to estimate impacts
- Tier 5 – Other post construction studies and research

The workshop format followed the 5-tiers of these guidelines.

Day 1 consisted of sessions covering an introduction to bat and wind energy issues led by Cris Hein (BCI), regulation/legislation (mostly US specific, led by Dawn Bruns U.S. Fish & Wildlife Service) and pre-construction monitoring / equipment and analysis (led by Cris Hein & Michael Schirmacher BCI, and Corrina Pinzarri U.S. Geological Survey).

There was also a long session on the Hawaiian Hoary Bat presented by Frank Bonaccorso (U.S. Geological Survey) and Marcos Gorresen (University of Hawaii). This focused on recent research and concerns regarding wind energy impacts on this species which is the only endemic land mammal in Hawaii.

I was relieved that much of the equipment and methods being used for acoustic survey in the US are very similar to what has been developed for long term field deployment in Australia. The overview of methods and analysis covered much of the equipment that ABS bat workers would be familiar with, including the benefits and limitations of zero cross and full spectrum recordings and where the bat community is heading with these technologies and call analysis. Only having the one bat species on Hawaii makes their call analysis relatively easy!

Day 2 focused on post-construction fatality monitoring led by Michael Schirmacher (BCI). This included a demonstration in the nearby waterfront park from one of the local carcass search dogs. Both the workshop participants and the dog searched a grid for previously placed rat carcasses. This demonstrated the methods used to setup a search grid and the increased efficiency dogs have over humans. We discussed data collection and management and went through some standard analyses.

Marcos Gorresen (University of Hawaii) presented some interesting collaborative work he has completed using high resolution near infra-red cameras to attempt to record bat interactions with turbines. They attempted to correlate the video recordings with acoustic recordings, but had low correlation. They had plans to further correlate these two methods with radar, however this is still in progress. A paper will be published from the work.

Day 3 was all about estimating fatalities and minimisation strategies. Manuela Huso (U.S.

Geological Survey) presented an in depth discussion of fatality estimation, highlighting different estimators, software, purpose and history. I was pleased that Manuela highlighted some bird and bat ballistics work that colleagues of mine had published in Australia. We ran through fatality estimation exercises using estimators that she has developed specifically for wind energy fatality estimation.

Michael Schirmacher and Cris Hein (BCI) concluded the workshop by highlighting emerging issues, such as turbines increasing in size, a lack of studies from many countries where wind energy is increasing and the many further questions that require answers about risks to bats from wind energy facilities. They also discussed the success and ongoing investigations around operational mitigation. The main point was that based on research results some facilities are reducing fatalities by increasing cut in speeds of turbines and by curtailing turbines at low wind speeds. Testing of acoustic deterrents was discussed and the results so far have been inconclusive.

From BCI, '*The expansion of wind energy development has raised concerns over the potential cumulative impact on bat populations. Turbine-related bat fatalities have consistently occurred among the over 1,000 wind facilities across the U.S. and have resulted in an estimated 650,000 to 1.3 million bat fatalities. Despite nearly a decade of research, the impacts of wind energy development on bats remains inadequately investigated and poorly understood.*'

I'd like to thank the organisers of the workshop and Bat Conservation International for providing an informative and thought provoking forum. I was also shown great hospitality from the local bat folks (thanks Frank Bonaccorso!). I can highly recommend that ABS members interested in bats and wind energy attend workshops and meetings convened by BCI as the Bats and Wind Energy Co-operative currently fund and oversee the vast majority of research in this field. BCI is interested in extending their experience into bats and wind energy research in Australia and other countries.

Participants at BCI's Bats and Wind Energy Workshop, Honolulu, 2013.
Photo credit: Mark Venosta (back row 4th from left!).

– Gadgets, Techniques and Photos –

Ed: Thank you to Trish Wimberley for sharing these photos and Patrick's story.

Patrick Swayze the Ghost Bat was sent to me for treatment in May 2013. He was injured in a mist net capture, was severly emmaciated, deydrated (top left), had a fractured second finger (top right), suffered from serious friction burns caused by the fabric of the capture bag and was also suffering myopathy.

Patrick was with me for three months. I didn't know if we could save him but all went well in the end and I flew him back to Mackay after twelve weeks and climbed the mountain up to his cave where his six little buddies were still occupying.

All worked out well in the end. Patrick ate five to six full grown mice each night (image at left) and trained me really well to feed him when he called!

Ed: Got an image you'd like to see published in the Newsletter? *Please send it through to editor@ausbats.org.au*

Locating roosts of Titania's Woolly Bat *Kerivoula titania* in unfurled leaves in Taiwan

Chou Cheng-Han

Endemic Species Research Institute, Jiji, Nantou, Taiwan

Email shockchouau@gmail.com

In September this year we located two roosts of Titania's Woolly Bat *Kerivoula titania* in unfurled leaves. At the first site there were four individuals (1 male and 3 females) and in the second there were nine individuals (3 males and 6 females).

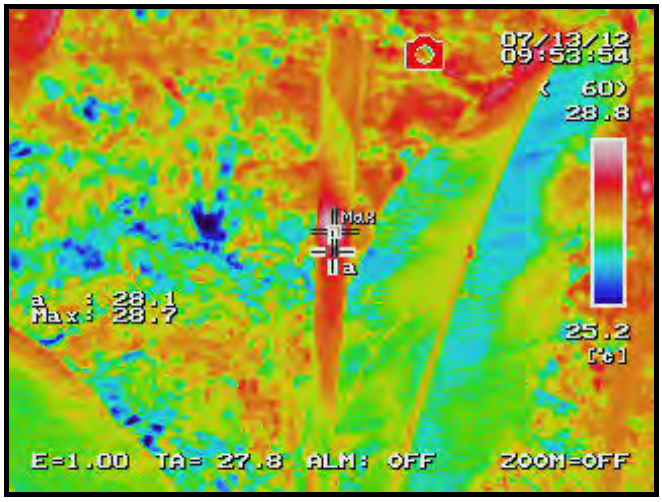
Above: Location of one of the roosts (next to the Austbat harp traps).

Above: Can you see the bat's foot sticking out the top of the leaf?.

Below: Bats within the unfurled leaf.

Above: The leaf in which these bats were roosting was approximately 6 cm in diameter with the length of the conical section approximately 110 cm long.

Below: Searches were made using a thermal camera. The cross-hairs on the thermal camera image show the location of the bats in the unfurled leaf.



– News and Announcements / Classifieds –

2014 ABS Conference and Annual General Meeting

The 16th biennial Australasian Bat Society conference and Annual General Meeting will be held in Townsville, tropical north Queensland, the week after Easter next year (**22-25 April, 2014**). The welcoming function will be on Tuesday 22nd April, the conference Wednesday 23rd - Friday 25th, followed by a post conference field trip on the weekend.

As usual, we anticipate a great program of spoken and poster papers. The conference will have a tropical theme, but papers on all bat-related topics including biology, management and conservation, rehabilitation and bat technology are welcome. We invite everyone to attend, including students, bat carers, scientists, land managers and anyone with an interest in bats – so set aside the date now! If you know of non-members who would be interested to join us please pass this message on.

The venue for the conference will be the **Rydges Hotel in the middle of Townsville**, rather than at James Cook University, as access is much easier and there are lots of accommodation and food options nearby.

The organising committee is Jen Parsons, Simon Robson, Robert Bender, Greg Ford, Leroy Consalves, Simone Harvey, Micaela Jemison, Eridani Mulder, April Reside, Marg Turton, Elizabeth Williams and Lindy Lumsden.

Thanks to Megan Turton (Marg's daughter-in-law) for the great conference design.

We will progressively place information on the ABS website and hope to send out registration details and forms to all members very soon. Start planning, including getting your abstracts prepared as these will be due in February.

Townsville is a great place to visit, so come and enjoy the wonderful tropics. Looking forward to seeing you all in Townsville.

Coming soon – New ABS Membership Website

A new ABS membership website is currently being developed. Some of the features will include:

- A new stream-lined, user friendly interface for ABS members to manage their membership details and preferences, check their membership status, and renew their membership.
- A new discussion list web page for members to opt in or out of the email discussion list or to select a 'digest' version of the email discussion list.
- A 'resources' page where members can access the latest ABS *Newsletters*, check latest announcements on the ABS notice board, as well as view and download other membership related information and resources.
- The website will replace the current membership payment website and 'members' area of the main ABS web site, which means one less password to remember.
- No more user-ids, you will login using your first and last name (and password).

For those members who prefer to receive their correspondence via mail, we will continue send your *Newsletters* and/or renewal notices through the post.

The new membership website is hopefully expected to be up and running in early 2014. Stay tuned…

Damian Milne, Membership Officer

Introducing our new ABS Communication Officer

Micaela Jemison

ABS Communications Officer

ausbatscoms@gmail.com

Hello to all my fellow ABS members!

This year has been a busy year for the ABS with many new developments. I wanted to take this opportunity to introduce myself as your Communication Officer and recap on some of the things we have accomplished in 2013 as well as outline those that we hope to accomplish in the future!

Many of you may be wondering – what does a communication officer do? The answer – a multitude of things! I am now your contact for our online presence, administering our website, Facebook page and Twitter account, as well as the coordinator for our efforts to develop strategic organizational and communication plans.

Our website redevelopment has been a massive achievement over the last two years, largely due to the efforts of our previous website administrator Michael Pennay. The role now has been passed onto myself, with Michael seeking bigger and better things off in the Solomon Islands. I would like to wish him well and thank him for all his online efforts. The improvements however will not cease, with a new membership area to come online very soon (see the report by Damian Milne) and plans to enhance the website so that it will become the hub of all public and membership information. Details on these plans will come soon, and I encourage anyone with ideas or queries to not be shy in sharing them!

The ABS has embraced social media this year with the creation of the ABS twitter account and a focused effort on our Facebook page. Our public engagement has increased substantially this year with over 830 people subscribed to our Facebook page and even more reading our posts daily! Our new twitter account @AusBats is also growing with 251 followers – many of these politicians, journalists and other environmental NGOs. We hope to see these channels grow in the coming year and to capitalise on them when we address important bat issues in the Australasian region. I am always looking for great new research, bat events or interesting bat stories to highlight on our social media channels. I am particularly interested in promoting new research by our members. So please – if you know of something interesting happening in the bat world please let me know!

Strategic organizational and communication planning is another task I will be tackling in the coming year. The ball started to roll on this project earlier this year at our FAGM. I received some great feedback and ideas from members on a draft communication plan presented at that meeting. The FAGM discussions highlighted the need for a member-wide survey to really canvass the range of ideas members have; not only on ABS communication efforts but also on the direction of the organisation into the future. It is here where members can play a pivotal role in the planning process and I hope you will all take up this opportunity later this year when I will be sending out an email survey. The results from this short electronic survey will then be presented to the executive and will form the basis of discussions regarding strategic direction of both the ABS as an organisation and its communication efforts.

So much to do and so little time! I hope everyone has had a bat-tastic year and I look forward to working with you all in the coming year!

Yours
Micaela Jemison

July 2013 ABS Bat Conservation Fund awarded

Congratulations go to **Lisa Cawthen** and her project "King Island Bat Survey" upon receiving $500 from the July 2013 round of the ABS Conservation Fund.

Lisa will use this money to contribute towards the transport costs associated with a bat survey on King Island, one of the largest and most isolated islands in Bass Strait.

Lisa's objectives are to visit King Island in late November and mid-December 2013 to:

1) Gain an understanding of the bat species assemblages, baseline activity levels and key habitat of King Island's bat community.
2) Educate the King Island community on the value of conserving bats and their habitat.
3) Provide scientific data to assist in developing better approaches for biodiversity conservation within existing and future land use practices to the King Island community.

Lisa has already secured complementary funding for her project from BirdLife Tasmania, Inspiring Australia, plus the loan of detector equipment from a consulting company. In-kind assistance will also be provided by BirdLife Tasmania, NRM King Island and the King Island Field Naturalists.

Good luck with your survey Lisa, we look forward to hearing all about it in the next ABS *Newsletter.*

batcon.org
BAT CONSERVATION
INTERNATIONAL

Apply now for a

BCI Student Research Scholarship for 2014

More than 1,260 species of bats account for about 20 percent of the world's mammal species. Bats play critical roles in maintaining healthy ecosystems and many human economies. They are primary predators of night-flying insects, including many agricultural pests. Bats pollinate countless plants and disperse seeds that help restore cleared rainforests. Yet bats are also among the least studied and most misunderstood of creatures. Victims of centuries of myths and misinformation, they are in decline almost everywhere. Protecting bats requires understanding and explaining their benefits and needs. Knowledge is the key to conservation.

Since 1990, Bat Conservation International has addressed this lack of knowledge by supporting student research projects around the world through its Student Research Scholarships. We have awarded a total of $929,841 to help 353 students conduct research relevant to bat conservation in 62 countries.

Each year, BCI awards 12 to 20 scholarships of up to $5,000 each. Projects should be focused on the roles bats play in providing ecosystem services (pollination, seed dispersal, pest control, maintenance of biodiversity) and/or on habitat requirements, including impacts of climate change, that are critical to conservation.

BCI scholarships are competitive and proposals will be evaluated by a distinguished international panel of reviewers. The deadline for applications is December 15, 2013. For more information or to apply, visit BCI's website at: *www.batcon.org/scholarships*.

Examples of Recent BCI Scholarships

David Wechuli, Chepkoilel University College (Kenya): Bat diversity and distribution along a gradient of disturbance at the Lake Baringo National Reserve.

Jessie Bunkley, Boise State University (U.S.): Predator-prey interactions in a louder world: Does anthropogenic noise alter bat assemblages and arthropod prey?

Adria Lopez Baucells, Universidade de Lisboa (Spain): Quantifying edge effects on aerial insectivorous bats in the Central Amazon, Brazil.

Liz Huamani, Universidad Nacional de Piura (Peru): Economic value of bats as primary predators of agricultural pests in organic & conventional banana crops.

Jennifer Krauel, University of Tennessee (U.S.): Identifying insect communities fueling bat migration in an agriculturally important area.

Yara Azofeifa, Instituto Venezolano de Investigaciones Científicas (Venezuela): Intake of pesticides by insectivorous bats in two agricultural systems.

Guideline for microbats in road structures

Vanessa Gorecki

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An ABS working group has commenced developing a guideline on managing microbats in road structures. Such guidelines exist in many parts of the world however there is no comprehensive guideline in Australia. The intent of the guideline is to provide a comprehensive review of the ecology and biology of species commonly identified in road structures, and to provide roost disturbance and relocation guidelines for Australian bats. It is anticipated that a draft version of the guideline will be circulated at the ABS conference in April 2014. Any questions regarding the development of this guideline can be directed to the following working group members;

Vanessa Gorecki vgorecki@globalskm.com

Rachel Lyons rachell4@hotmail.com

Greg Ford greg@balance-environmental.com.au

Alison MartinAlison.Martin@greenloaning.com.au

Mark Chidel mchidel@thehills.nsw.gov.au

Chad Browning cbrowning@ehpartners.com.au

Grey-headed Flying-fox stretching its wings in Mallacoota.

Photo thanks to Ian Kitchen.

– Book reviews –

Flying-foxes – Australian Night Foresters

Vivien Jones

Rosenberg Publishing

Reviewed by Billie Roberts

billie.roberts@bigpond.com

It was an absolute pleasure reviewing this recently released photographic essay about the Grey-headed flying-fox by Vivien Jones. The book intimately examines the flying-fox colony at Bellingen Island in northern NSW and is based on Vivien's two decades of observations of individual flying-foxes at this site. The book is divided into seven chapters with over 200 stunning photos of flying-foxes from birth to adulthood, including their mating, feeding and roosting habits, and depicts their individual and amusing behaviours. All of the photos are accompanied by interesting and very readable text; suitable for amateurs to those very familiar with the species.

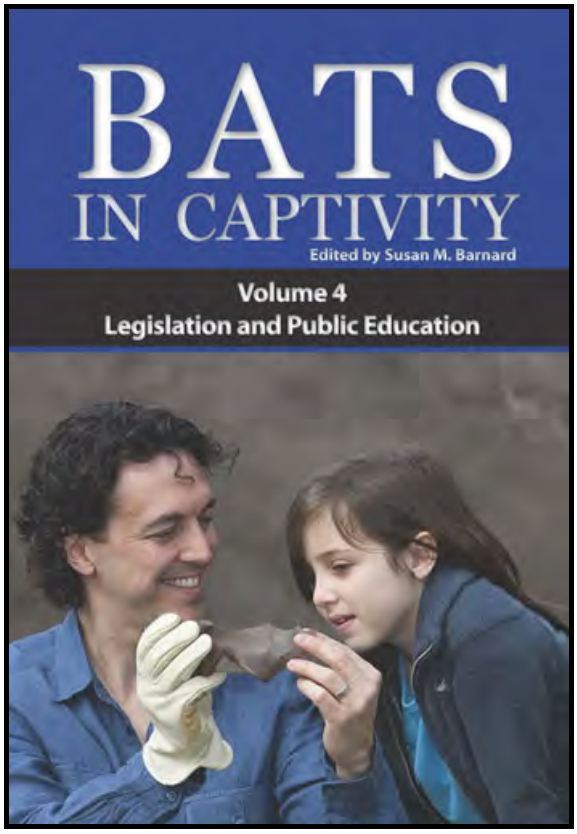
Many of the photographs within the book are unconventional wildlife shots, that is, not the classic cute and perfectly positioned animal photos seen in other books. The unconventional photographs combined with witty text make the book delightfully entertaining and often humorous. However, there are many very professional and cute photos for those interested as well, including the odd picture of other fauna that frequent the Bellingen flying-fox colony. Oh yes, contrary to what is often stated other species such as birds share the island and live alongside the flying-foxes. By using photographs this and many other typical flying-fox myths and misconceptions are politely dispelled throughout the book.

All of the key, as well as the quirky, habits of flying-foxes are showcased within this book. The interpretations and descriptions of each of these behaviours clearly come from someone who has spent many hours observing and living with the animals. I am sure that even people, like me, that consider themselves familiar with Grey-headed flying-foxes will learn something new. For example, the new (or at least unpublished) information on the behaviour of one flying-fox known as 'Badge' was fascinating. This 'resident' flying-fox was observed by the author primarily in the same tree for over 10 years. Not only was his extremely sedentary behaviour interesting, but also the observation that his position within the tree was correlated to the number of mating partners. The author has not tried to be overambitious in her interpretations of the individual behaviours, clearly highlighting the knowledge gaps and where more information is needed.

The book also touches on broader issues like the role that flying-foxes play in the environment, what declining numbers could mean for our forests and controversial subjects such as human health. The text is simplified to be readable for secondary school students upward, but is still very informative and interesting to those at a professional level.

The best news is you get all this for a measly $39 thanks to generous sponsors, including the ABS. Despite the low cost, you will be pleasantly surprised by the quality of the printing. The book is an A4 hard cover and each of the 200+ photos is printed on glossy colourful pages, giving a very professional finish. I particularly liked the inside and back cover that showed the facial pictures of the individual bats studied by Vivien.

I highly recommend this book to anyone interested in bats or Australian wildlife in general – a perfect book for the coffee table or as a present for a naturalist friend. The books can be ordered in most book shops, or ordered directly from Rosenberg Publishing. Grab a copy!



Bats in captivity: Volume 4. Legislation and Public Education

Ed. Sue Barnard

Logos Press, Washington

318 pp, 2012.

Reviewed by Robert Bender

redneb.trebor@gmail.com

The book is in two sections, on bats and the law, then public education. Thorough analyses of the complex legislative arrangements in federal countries – Australia, Canada, European Union and USA, make for interesting comparisons. They all deal with similar issues of establishing protected conservation status, private ownership of protected species, managing research proposals, use of bats for education and public exhibition, and international trade in wildlife. Australia and Canada are relatively simple with far fewer member states in their federal union than the USA with 50 states, and Europe is far more complicated as there is incomplete federal union, so much more variability.

Jenny McLean has a chapter on issues of shipping bats by plane or boat, packaging to avoid harm, insurance, having qualified accompanying persons to deal with stress or other emergencies, and long travel times with feeding and watering needs and temperature control. There is a short chapter on two species that are exceptionally sensitive to travel stress. Then there are issues of international transport, port of entry inspections, permits and container construction and the special issues involving specimens of bodies, body parts and fecal samples, blood samples etc. with many examples and photos of packaging materials and cages.

The long section (100 pages) on public education includes a good list of books for kids, advice on displays, transport of bats and skeletons, aids, use of ultrasonic detectors as educational devices, and issues on conditioning bats for use in education programs. There is a little chapter on displaying crevice-dwelling bats and practices to avoid and the special problems of displaying flying-foxes. There is a chapter on vampire bats and enclosure designs for zoos. There are several wonderful examples of creative design of bat displays at Memphis, Montreal, Atlanta,

Panola Mountain in Georgia (USA) and the Northern Territory Wildlife Park

Chapter 8 is on excluding bats from man-made structures. The importance of timing for exclusions, signs for detecting bat presence and materials and procedures for excluding bats from buildings while protecting their welfare and preventing re-entry, and techniques to avoid as they kill bats.

Chapter 9 is on bat houses, which vary amazingly in size and design, from small single-chamber boxes for little bat groups, to big multi-chambers, artificial trees, big pitched-roof sheds to house large colonies, and even artificial caves. There is much advice on methods of attaching bat houses to trees or buildings, some remarks on experience of their use by bats and issues relating to the impact of artificial structures on bat populations and species mix. A list is provided of 88 species that are known to have roosted in these structures, spread over 10 countries plus Europe, and there are design drawings to support bat house projects including a long section on Schwegler boxes and the species using them.

Each chapter lists products mentioned in the text, and has an excellent bibliography. Editor Sue Barnard managed 43 writers and researched where good experience could be obtained. Several of the writers are Australian – Dan Lunney's team on Australian law, Jenny McLean on transport, and Steve Templeton and Fiona Colquhoun on exhibiting Ghost Bats. There is a good conversion table to help people understand metric and non-metric countries, and an index. The book is lavishly illustrated with hundreds of photos and drawings and compiles a huge volume of information on a wide variety of issues that anyone involved in this field needs to consider.

The always photogenic Ghost Bat *Macroderma gigas*. Thanks to Eric Vanderduys for this photo taken at Pungalina Sanctuary, Northern Territory in June 2012.

– Recent Literature –

Compiled by Lisa Cawthen using Web of Science
(April 2013 – early November 2013)

Bats and bugs

Adelman, Z. N., D. M. Miller and K. M. Myles (2013). "Bed Bugs and Infectious Disease: A Case for the Arboviruses." Plos Pathogens **9**(8): 4.

Balvin, O., J. Vilimova and L. Kratochvil (2013). "Batbugs (*Cimex pipistrelli* group, Heteroptera: Cimicidae) are morphologically, but not genetically differentiated among bat hosts." Journal of Zoological Systematics and Evolutionary Research **51**(4): 287-295.

Barlow, A., D. Wills and E. Harris (2013). "WILD ANIMALS Enteric nematodes and Sarcina-like bacteria in a brown long-eared bat." Veterinary Record **172**(19): 508-508.

Cicuttin, G. L., E. J. Boeri, F. J. Beltran and F. E. G. Dohmen (2013). "Molecular detection of *Neorickettsia risticii* in Brazilian free-tailed bats (*Tadarida brasiliensis*) from Buenos Aires, Argentina." Pesquisa Veterinaria Brasileira **33**(5): 648-650.

Hemmati, F., E. Rezazadeh, B. H. Kiabi, L. Hemmati, G. Molavi, E. K. Radd and C. R. Bursey (2013). "Parasites of the Lesser Mouse-Eared Myotis, *Myotis blythii* (Chiroptera, Vespertilionidae), from Zanjan Province, Northwest Iran." Comparative Parasitology **80**(2): 312-313.

Lourenco, E. C., M. D. Pinheiro, J. L. H. Faccini and K. M. Famadas (2013). "New record, host and localities of bat mite of genus Chirnyssoides (Acari, Sarcoptiformes, Sarcoptidae)." Revista Brasileira De Parasitologia Veterinaria **22**(2): 260-264.

Makarikova, T. A. and A. A. Makarikov (2013). "*Sawadalepis prima* n. g., n. sp (Cestoda: Cyclophyllidea) from the Schreiber's bent-winged bat *Miniopterus schreibersii* Kuhl (Chiroptera: Vespertilionidae) from China." Systematic Parasitology **86**(1): 59-68.

Reeves, W. K., A. D. Loftis and J. Beck (2013). "A New Species of Nycterophilia (Diptera: Streblidae) from the Antillean Fruit-eating Bat, *Brachyphylla cavernarum* (Chiroptera: Phyllostomidae)." Journal of Entomological Science **48**(2): 114-117.

Saldana-Vazquez, R. A., A. A. Castro-Luna, C. A. Sandoval-Ruiz, J. R. Hernandez-Montero and K. E. Stoner (2013). "Population Composition and Ectoparasite Prevalence on Bats (*Sturnira ludovici*; Phyllostomidae) in Forest Fragments and Coffee Plantations of Central Veracruz, Mexico." Biotropica **45**(3): 351-356.

Simpson, V. (2013). "Nematodes in brown long-eared bats." Veterinary Record **172**(20): 535-535.

Soares, F. A. M., G. Graciolli, D. M. C. Alcantara, C. Ribeiro, G. C. Valenca and S. F. Ferrari (2013). "Bat flies (Diptera: Streblidae) ectoparasites of bats at an Atlantic Rainforest site in northeastern Brazil." Biota Neotropica **13**(2): 242-246.

Bats, diseases and humans

Anthony, S. J., R. Ojeda-Flores, O. Rico-Chavez, I. Navarrete-Macias, C. M. Zambrana-Torrelio, M. K. Rostal, J. H. Epstein, T. Tipps, E. Liang, M. Sanchez-Leon, J. Sotomayor-Bonilla, A. A. Aguirre, R. Avila-Flores, R. A. Medellin, T. Goldstein, G. Suzan, P. Daszak and W. I. Lipkin (2013). "Coronaviruses in bats from Mexico." Journal of General Virology **94**: 1028-1038.

Baker, K. S., R. M. Leggett, N. H. Bexfield, M. Alston, G. Daly, S. Todd, M. Tachedjian, C. E. G. Holmes, S. Crameri, L. F. Wang, J. L. Heeney, R. Suu-Ire, P. Kellam, A. A. Cunningham, J. L. N. Wood, M. Caccamo and P. R. Murcia (2013). "Metagenomic study of the viruses of African straw-coloured fruit bats: Detection of a chiropteran poxvirus and isolation of a novel adenovirus." Virology **441**(2): 95-106.

Berger, F., N. Desplanches, S. Baillargeaux, M. Joubert, M. Miller, F. Ribadeau-Dumas, A. Spiegel and H. Bourhy (2013). "Rabies Risk: Difficulties Encountered during Management of Grouped Cases of Bat Bites in 2 Isolated Villages in French Guiana." Plos Neglected Tropical Diseases **7**(6): 9.

Bowen, R. A., T. J. O'Shea, V. Shankar, M. A. Neubaum, D. J. Neubaum and C. E. Rupprecht (2013). "Prevalence of neutralizing antibodies to rabies virus in serum of seven species of insectivorous bats from colorado and new mexico, united states." Journal of Wildlife Diseases **49**(2): 367-374.

Brock, A. P., G. Cortes-Hinojosa, C. E. Plummer, J. A. Conway, S. R. Roff, A. L. Childress and J. F. X. Wellehan (2013). "A novel gammaherpesvirus in a large flying fox (*Pteropus vampyrus*) with blepharitis." Journal of Veterinary Diagnostic Investigation **25**(3): 433-437.

Chan, J. F. W., K. K. W. To, H. Tse, D. Y. Jin and K. Y. Yuen (2013). "Interspecies transmission and emergence of novel viruses: lessons from bats and birds." Trends in Microbiology **21**(10): 544-555.

Chan, P. K. S. and M. C. W. Chan (2013). "Tracing the SARS-coronavirus." Journal of Thoracic Disease **5**: S118 S121.

Chen, Q., T. T. Zhu, G. Jones, J. P. Zhang and Y. Sun (2013). "First Knockdown Gene Expression in Bat (*Hipposideros armiger*) Brain Mediated by Lentivirus." Molecular Biotechnology **54**(2): 564-571.

Davis, A. D., P. A. Gordy and R. A. Bowen (2013). "Unique characteristics of bat rabies viruses in big brown bats (*Eptesicus fuscus*)." Archives of Virology **158**(4): 809-820.

Davis, A. D., J. A. Jarvis, C. Pouliott and R. J. Rudd (2013). "Rabies Virus Infection in *Eptesicus fuscus* Bats Born in Captivity (Naive Bats)." Plos One **8**(5): 6.

Davis, A. D., J. A. Jarvis, C. E. Pouliott, M. D. M. Shannon and R. J. Rudd (2013). "Susceptibility and Pathogenesis of Little Brown Bats (*Myotis lucifugus*) to Heterologous and Homologous Rabies Viruses." Journal of Virology **87**(16): 9008-9015.

Drexler, J. F., A. Geipel, A. Konig, V. M. Corman, D. van Riel, L. M. Leijten, C. M. Bremer, A. Rasche, V. M. Cottontail, G. D. Maganga, M. Schlegel, M. A. Muller, A. Adam, S. M. Klose, A. J. B. Carneiro, A. Stocker, C. R. Franke, F. Gloza-Rausch, J. Geyer, A. Annan, Y. Adu-Sarkodie, S. Oppong, T. Binger, P. Vallo, M. Tschapka, R. G. Ulrich, W. H. Gerlich, E. Leroy, T. Kuiken, D. Glebe and C. Drosten (2013). "Bats carry pathogenic hepadnaviruses antigenically related to hepatitis B virus and capable of infecting human hepatocytes." Proceedings of the National Academy of Sciences of the United States of America **110**(40): 16151-16156.

Epstein, J. H., M. L. Baker, C. Zambrana-Torrelio, D. Middleton, J. A. Barr, E. DuBovi, V. Boyd, B. Pope, S. Todd, G. Crameri, A. Walsh, K. Pelican, M. D. Fielder, A. J. Davies, L. F. Wang and P. Daszak (2013). "Duration of Maternal Antibodies against Canine Distemper Virus and Hendra Virus in Pteropid Bats." Plos One **8**(6): 8.

Escaffre, O., V. Borisevich and B. Rockx (2013). "Pathogenesis of Hendra and Nipah virus infection in humans." Journal of Infection in Developing Countries **7**(4): 308-311.

Favoretto, S. R., C. C. de Mattos, C. A. de Mattos, A. C. A. Campos, D. R. V. Sacramento and E. L. Durigon (2013). "The emergence of wildlife species as a source of human rabies infection in Brazil." Epidemiology and Infection **141**(7): 1552-1561.

Francischetti, I. M. B., T. C. F. Assumpcao, D. Y. Ma, Y. Li, E. C. Vicente, W. Uieda and J. M. C. Ribeiro (2013). "The "Vampirome": Transcriptome and proteome analysis of the principal and accessory submaxillary glands of the vampire bat *Desmodus rotundus*, a vector of human rabies." Journal of Proteomics **82**: 288-319.

Garcia-Perez, R., M. Gottschling, G. Wibbelt and I. G. Bravo (2013). "Multiple evolutionary origins of bat papillomaviruses." Veterinary Microbiology **165**(1-2): 51-60.

Geldenhuys, M., J. Weyer, L. H. Nel and W. Markotter (2013). "Coronaviruses in South African Bats." Vector Borne and Zoonotic Diseases **13**(7): 516-519.

Goller, K. V., J. Fickel, H. Hofer, S. Beier and M. L. East (2013). "Coronavirus genotype diversity and prevalence of infection in wild carnivores in the Serengeti National Park, Tanzania." Archives of Virology **158**(4): 729-734.

Hazelton, B., F. B. Alawi, J. Kok and D. E. Dwyer (2013). "Hendra virus: a one health tale of flying foxes, horses and humans." Future Microbiology **8**(4): 461-474.

He, B., Z. S. Li, F. L. Yang, J. F. Zheng, Y. Feng, H. C. Guo, Y. Y. Li, Y. Y. Wang, N. Su, F. Q. Zhang, Q. S. Fan and C. C. Tu (2013). "Virome Profiling of Bats from Myanmar by Metagenomic Analysis of Tissue Samples Reveals More Novel Mammalian Viruses." Plos One **8**(4): 14.

Hoffmann, M., M. A. Mueller, J. F. Drexler, J. Glende, M. Erdt, T. Gutzkow, C. Losemann, T. Binger, H. K. Deng, C. Schwegmann-Wessels, K. H. Esser, C. Drosten and G. Herrler (2013). "Differential Sensitivity of Bat Cells to Infection by Enveloped RNA Viruses: Coronaviruses, Paramyxoviruses, Filoviruses, and Influenza Viruses." Plos One **8**(8): 11.

Kupferschmidt, K. (2013). "EMERGING INFECTIOUS DISEASES Link to MERS Virus Underscores Bats' Puzzling Threat." Science **341**(6149): 948-949.

Kuzmina, N. A., I. V. Kuzmin, J. A. Ellison, S. T. Taylor, D. L. Bergman, B. Dew and C. E. Rupprecht (2013). "A reassessment of the evolutionary timescale of bat rabies viruses based upon glycoprotein gene sequences." Virus Genes **47**(2): 305-310.

Lima, F. E. D., F. S. Campos, H. C. Kunert, H. Batista, P. Carnielli, S. P. Cibulski, F. R. Spilki, P. M. Roehe and A. C. Franco (2013). "Detection of Alphacoronavirus in velvety free-tailed bats (*Molossus molossus*) and Brazilian free-tailed bats (*Tadarida brasiliensis*) from urban area of Southern Brazil." Virus Genes **47**(1): 164-167.

Lima, F. E. D., S. P. Cibulski, F. Elesbao, P. Carnieli, H. Batista, P. M. Roehe and A. C. Franco (2013). "First detection of adenovirus in the vampire bat (*Desmodus rotundus*) in Brazil." Virus Genes **47**(2): 378-381.

Luis, A. D., D. T. S. Hayman, T. J. O'Shea, P. M. Cryan, A. T. Gilbert, J. R. C. Pulliam, J. N. Mills, M. E. Timonin, C. K. R. Willis, A. A. Cunningham, A. R. Fooks, C. E. Rupprecht, J. L. N. Wood and C. T. Webb (2013). "A comparison of bats and rodents as reservoirs of zoonotic viruses: are bats special?" Proceedings of the Royal Society B-Biological Sciences **280**(1756): 9.

Nakamura, S., S. Settai, H. Hayashidani, T. Urabe, S. Namai and Y. Une (2013). "Outbreak of Yersiniosis in Egyptian Rousette Bats (*Rousettus aegyptiacus*) Caused by Yersinia pseudotuberculosis Serotype 4b." Journal of Comparative Pathology **148**(4): 410-413.

Ndaluka, C. and R. Bowen (2013). "Responses of mice to inoculation with low doses of a bat rabies virus variant." Archives of Virology **158**(6): 1355-1359.

Nokireki, T., A. Huovilainen, T. Lilley, E. M. Kyheroinen, C. Ek-Kommonen, L. Sihvonen and M. Jakava-Viljanen (2013). "Bat rabies surveillance in Finland." Bmc Veterinary Research **9**: 8.

Peel, A. J., T. J. McKinley, K. S. Baker, J. A. Barr, G. Crameri, D. T. S. Hayman, Y. R. Feng, C. C. Broder, L. F. Wang, A. A. Cunningham and J. L. N. Wood (2013). "Use of cross-reactive serological assays for detecting novel pathogens in wildlife: Assessing an appropriate cutoff for henipavirus assays in African bats." Journal of Virological Methods **193**(2): 295-303.

Rockx, B. and L. F. Wang (2013). "Zoonotic henipavirus transmission." Journal of Clinical Virology **58**(2): 354-356.

Sandekian, V., D. Lim, P. Prud'homme and G. Lemay (2013). "Transient high level mammalian reovirus replication in a bat epithelial cell line occurs without cytopathic effect." Virus Research **173**(2): 327-335.

Seetahal, J. F. R., A. Velasco-Villa, O. M. Allicock, A. A. Adesiyun, J. Bissessar, K. Amour, A. Phillip-Hosein, D. A. Marston, L. M. McElhinney, M. Shi, C. A. Wharwood, A. R. Fooks and C. V. F. Carrington (2013). "Evolutionary History and Phylogeography of Rabies Viruses Associated with Outbreaks in Trinidad." Plos Neglected Tropical Diseases **7**(8): 9.

Sendow, I., A. Ratnawati, T. Taylor, R. M. A. Adjid, M. Saepulloh, J. Barr, F. Wong, P. Daniels and H. Field (2013). "Nipah Virus in the Fruit Bat *Pteropus vampyrus* in Sumatera, Indonesia." Plos One **8**(7): 6.

Serra-Cobo, J., M. Lopez-Roig, M. Segui, L. P. Sanchez, J. Nadal, M. Borras, R. Lavenir and H. Bourhy (2013). "Ecological Factors Associated with European Bat Lyssavirus Seroprevalence in Spanish Bats." Plos One **8**(6): 8.

Shi, Z. L. (2013). "Emerging infectious diseases associated with bat viruses." Science China-Life Sciences **56**(8): 678-682.

Tao, Y., M. Shi, C. Conrardy, I. V. Kuzmin, S. Recuenco, B. Agwanda, D. A. Alvarez, J. A. Ellison, A. T. Gilbert, D. Moran, M. Niezgoda, K. A. Lindblade, E. C. Holmes, R. F. Breiman, C. E. Rupprecht and S. X. Tong (2013). "Discovery of diverse polyomaviruses in bats and the evolutionary history of the Polyomaviridae." Journal of General Virology **94**: 738-748.

Thoroughman, D., J. Poe, T. Sloan, T. J. Sugg, K. Humbaugh, J. Blanton, E. S. Russell and R. M. Wallace (2013). "Assessment of Risk for Exposure to Bats in Sleeping Quarters Before and During Remediation - Kentucky, 2012." Mmwr-Morbidity and Mortality Weekly Report **62**(19): 382-384.

To, K. K. W., I. F. N. Hung, J. F. W. Chan and K. Y. Yuen (2013). "From SARS coronavirus to novel animal and human coronaviruses." Journal of Thoracic Disease **5**: S103-S108.

Udow, S. J., R. A. Marrie and A. C. Jackson (2013). "Clinical Features of Dog- and Bat-Acquired Rabies in Humans." Clinical Infectious Diseases **57**(5): 689-696.

Voelker, R. (2013). "Usher Bats Out of the Belfry to Reduce the Risk of Rabies." Jama-Journal of the American Medical Association **310**(1): 24-24.

Vieira, L. F. P., S. Pereira, P. Carnieli, L. C. B. Tavares and I. Kotait (2013). "Phylogeography of rabies virus isolated from herbivores and bats in the Espirito Santo State, Brazil." Virus Genes **46**(2): 330-336.

Vos, A., T. Nolden, C. Habla, S. Finke, C. M. Freuling, J. Teifke and T. Muller (2013). "Raccoons (*Procyon lotor*) in Germany as potential reservoir species for Lyssaviruses." European Journal of Wildlife Research **59**(5): 637-643.

Weir, D. L., I. L. Smith, K. N. Bossart, L. F. Wang and C. C. Broder (2013). "Host cell tropism mediated by Australian bat lyssavirus envelope glycoproteins." Virology **444**(1-2): 21-30.

Yuan, Z. G., S. J. Luo, J. P. Dubey, D. H. Zhou, Y. P. Zhu, Y. He, X. H. He, X. X. Zhang and X. Q. Zhu (2013). "Serological Evidence of *Toxoplasma gondii* Infection in Five Species of Bats in China." Vector-Borne and Zoonotic Diseases **13**(6): 422-424.

Conservation and management

Bernard, E., J. L. do Nascimento and L. M. D. Aguiar (2013). "Flagging a species as threatened: the case of *Eptesicus taddeii*, an endemic bat from the Brazilian Atlantic Forest." Biota Neotropica **13**(2): 314-318.

Garcia-Morales, R., E. I. Badano and C. E. Moreno (2013). "Response of Neotropical Bat Assemblages to Human Land Use." Conservation Biology **27**(5): 1096-1106.

Luo, J. H., T. L. Jiang, G. J. Lu, L. Wang, J. Wang and J. Feng (2013). "Bat conservation in China: should protection of subterranean habitats be a priority?" Oryx **47**(4): 526-531.

McCulloch, E. S., J. S. Tello, A. Whitehead, C. M. J. Rolon-Mendoza, M. C. D. Maldonado-Rodriguez and R. D. Stevens (2013). "Fragmentation of Atlantic Forest has not affected gene flow of a widespread seed-dispersing bat." Molecular Ecology **22**(18): 4619-4633.

McConville, A., B. S. Law and M. J. Mahony (2013). "Are Regional Habitat Models Useful at a Local-Scale? A Case Study of Threatened and Common Insectivorous Bats in South-Eastern Australia." Plos One **8**(8).

Rainho, A. and J. M. Palmeirim (2013). "Prioritizing conservation areas around multispecies bat colonies using spatial modeling." Animal Conservation **16**(4): 438-448.

Rockey, C. D., J. P. Stumpf and A. Kurta (2013). "Additional Winter Recoveries of Indiana Bats (*Myotis sodalis*) Banded during Summer in Michigan." Northeastern Naturalist **20**(3): N8-N13.

van der Heiden, L. J. and C. J. Webb (2013). "Mercury analysis in Rafinesque big-eared bat populations." Abstracts of Papers of the American Chemical Society **245**: 1.

Sherwin, H. A., W. I. Montgomery and M. G. Lundy (2013). "The impact and implications of climate change for bats." Mammal Review **43**(3): 171-182.

Talamoni, S. A., D. A. Coelho, L. H. Dias-Silva and A. S. Amaral (2013). "Bat assemblages in conservation areas

of a metropolitan region in Southeastern Brazil, including an important karst habitat." Brazilian Journal of Biology **73**(2): 309-319.

Distributions, systematics and taxonomy

Cawthen, L. (2013). "White-striped freetail bat in Tasmania - resident, vagrant or climate change migrant?" Australian Mammalogy **35**(2): 251-254.

Denys, C., B. Kadjo, A. D. Missoup, A. Monadjem and V. Aniskine (2013). "New records of bats (Mammalia: Chiroptera) and karyotypes from Guinean Mount Nimba (West Africa)." Italian Journal of Zoology **80**(2): 279-290.

Lopez-Garcia, J. M., H. A. Blain, E. Pagano, A. Olle, J. M. Verges and V. Forgia (2013). "The small mammals (insectivores, bats and rodents) from the holocene archaeological site of vallone inferno (scillato, lower imera valley, northwestern sicily)." Rivista Italiana Di Paleontologia E Stratigrafia **119**(2): 229-244.

Orozco-Lugo, C. L., D. Valenzuela-Galvan, A. Lavalle-Sanchez, A. Mora-Delgado and C. Ocampo-Ramirez (2013). "First record of the trumpet-nosed bat *Musonycteris harrisoni* (Chiroptera: Phyllostomidae) in Puebla, Mexico." Revista Mexicana De Biodiversidad **84**(2): 709-712.

Sauthier, D. E. U., P. Teta, A. E. Formoso, A. Bernardis, P. Wallace and U. F. J. Pardinas (2013). "Bats at the end of the world: new distributional data and fossil records from Patagonia, Argentina." Mammalia **77**(3): 307-315.

Senacha, K. R. and S. Dookia (2013). "Geoffroy's Trident Leaf-nosed bat, *Asellia tridens* (Geoffroy, E., 1813) from India." Current Science **105**(1): 21-22.

Velazco, P. M., H. O'Neill, G. E. Gunnell, S. B. Cooke, R. Rimoli, A. L. Rosenberger and N. B. Simmons (2013). "Quaternary Bat Diversity in the Dominican Republic." American Museum Novitates(3779): 1-20.

Velazco, P. M. and B. D. Patterson (2013). "Diversification of the Yellow-shouldered bats, Genus Sturnira (Chiroptera, Phyllostomidae), in the New World tropics." Molecular Phylogenetics and Evolution **68**(3): 683-698.

Echolocation and flight

Aihara, I., E. Fujioka and S. Hiryu (2013). "Qualitative and Quantitative Analyses of the Echolocation Strategies of Bats on the Basis of Mathematical Modelling and Laboratory Experiments." Plos One **8**(7): 8.

Bohn, K. M., G. C. Smarsh and M. Smotherman (2013). "Social context evokes rapid changes in bat song syntax." Animal Behaviour **85**(6): 1485-1491.

Barber, J. R. and A. Y. Kawahara (2013). "Hawkmoths produce anti-bat ultrasound." Biology Letters **9**(4): 5.

Conner, W. E. (2013). "An Acoustic Arms Race Bats and other animals use sound as a hunting tool-but their prey has also evolved ways to thwart detection." American Scientist **101**(3): 202-209.

Davies, K. T. J., P. J. J. Bates, I. Maryanto, J. A. Cotton and S. J. Rossiter (2013). "The Evolution of Bat Vestibular Systems in the Face of Potential Antagonistic Selection Pressures for Flight and Echolocation." Plos One **8**(4): 13.

Fenton, M. B. (2013). "Questions, ideas and tools: lessons from bat echolocation." Animal Behaviour **85**(5): 869 879.

Fuentes-Montemayor, E., D. Goulson, L. Cavin, J. M. Wallace and K. J. Park (2013). "Fragmented woodlands in agricultural landscapes: The influence of woodland character and landscape context on bats and their insect prey." Agriculture Ecosystems & Environment **172**: 6-15.

Ho, Y. Y., Y. P. Fang, C. H. Chou, H. C. Cheng and H. W. Chang (2013). "High Duty Cycle to Low Duty Cycle: Echolocation Behaviour of the Hipposiderid Bat *Coelops frithii*." Plos One **8**(5): 7.

Geipel, I., E. K. V. Kalko, K. Wallmeyer and M. Knornschild (2013). "Postweaning maternal food provisioning in a bat with a complex hunting strategy." Animal Behaviour **85**(6): 1435-1441.

Griffiths, S. R. (2013). "Echolocating bats emit terminal phase buzz calls while drinking on the wing." Behavioural Processes **98**: 58-60.

Guarato, F., J. Windmill and A. Gachagan (2013). "A beam based method for target localization: Inspiration from bats' directivity and binaural reception for ultrasonic sonar." Journal of the Acoustical Society of America **133**(6): 4077-4086.

Hristov, N. I., L. C. Allen and B. Chadwell (2013). "Flight modalities in the group behavior of free-tailed bats." Integrative and Comparative Biology **53**: E96-E96.

Jantzen, M. K. and M. B. Fenton (2013). "The depth of edge influence among insectivorous bats at forest-field interfaces." Canadian Journal of Zoology-Revue Canadienne De Zoologie **91**(5): 287-292.

Jones, P. L., H. E. Farris, M. J. Ryan and R. A. Page (2013). "Do frog-eating bats perceptually bind the complex components of frog calls?" Journal of Comparative Physiology a-Neuroethology Sensory Neural and Behavioral Physiology **199**(4): 279-283.

Jiang, T. L., Y. Y. You, S. Liu, G. J. Lu, L. Wang, H. Wu, S. Berquist, J. Ho, S. J. Puechmaille and J. Feng (2013). "Factors Affecting Geographic Variation in Echolocation Calls of the Endemic *Myotis davidii* in China." Ethology **119**(10): 881-890.

Kilgour, R. J., P. A. Faure and R. M. Brigham (2013). "Evidence of social preferences in big brown bats (*Eptesicus fuscus*)." Canadian Journal of Zoology-Revue Canadienne De Zoologie **91**(10): 756-760.

Koubinova, D., N. Irwin, P. Hulva, P. Koubek and J. Zima (2013). "Hidden diversity in Senegalese bats and associated findings in the systematics of the family Vespertilionidae." Frontiers in Zoology **10**: 16.
Liu, Y., J. Feng and W. Metzner (2013). "Different Auditory Feedback Control for Echolocation and Communication in Horseshoe Bats." Plos One **8**(4): 8.
Liu, Y., W. Metzner and J. Feng (2013). "Vocalization during copulation behavior in greater horseshoe bats, *Rhinolophus ferrumequinum*." Chinese Science Bulletin **58**(18): 2179-2184.
Low, D. H. W., K. Sunagar, E. A. B. Undheim, S. A. Ali, A. C. Alagon, T. Ruder, T. N. W. Jackson, S. P. Gonzalez, G. F. King, A. Jones, A. Antunes and B. G. Fry (2013). "Dracula's children: Molecular evolution of vampire bat venom." Journal of Proteomics **89**: 95-111.
Luo, B., T. L. Jiang, Y. Liu, J. Wang, A. Q. Lin, X. W. Wei and J. Feng (2013). "Brevity is prevalent in bat short range communication." Journal of Comparative Physiology a-Neuroethology Sensory Neural and Behavioral Physiology **199**(4): 325-333.
Mariappan, S., W. Bogdanowicz, G. Marimuthu and K. E. Rajan (2013). "Distress calls of the greater short-nosed fruit bat *Cynopterus sphinx* activate hypothalamic-pituitary-adrenal (HPA) axis in conspecifics." Journal of Comparative Physiology a-Neuroethology Sensory Neural and Behavioral Physiology **199**(9): 775-783.
Martinez, J. G., K. M. Bohn, R. J. Carroll and J. S. Morris (2013). "A Study of Mexican Free-Tailed Bat Chirp Syllables: Bayesian Functional Mixed Models for Nonstationary Acoustic Time Series." Journal of the American Statistical Association **108**(502): 514-526.
Matsuta, N., S. Hiryu, E. Fujioka, Y. Yamada, H. Riquimaroux and Y. Watanabe (2013). "Adaptive beam-width control of echolocation sounds by CF-FM bats, *Rhinolophus ferrumequinum nippon*, during prey-capture flight." Journal of Experimental Biology **216**(7): 1210-1218.
McCallum, K. P., F. O. McDougall and R. S. Seymour (2013). "A review of the energetics of pollination biology." Journal of Comparative Physiology B-Biochemical Systemic and Environmental Physiology **183**(7): 867-876.
Morse, S. F., S. E. Bush, B. D. Patterson, C. W. Dick, M. E. Gruwell and K. Dittmar (2013). "Evolution, Multiple Acquisition, and Localization of Endosymbionts in Bat Flies (Diptera: Hippoboscoidea: Streblidae and Nycteribiidae)." Applied and Environmental Microbiology **79**(9): 2952-2961.
Muijres, F. T., L. C. Johansson, M. S. Bowlin, Y. Winter and A. Hedenstrom (2013). "Comparing Aerodynamic Efficiency in Birds and Bats Suggests Better Flight Performance in Birds." Integrative and Comparative Biology **53**: E151-E151.
Patrick, L. E., E. S. McCulloch and L. A. Ruedas (2013). "Systematics and biogeography of the arcuate horseshoe bat species complex (Chiroptera, Rhinolophidae)." Zoologica Scripta **42**(6): 553-590.
Ratcliffe, J. M., C. P. H. Elemans, L. Jakobsen and A. Surlykke (2013). "How the bat got its buzz." Biology Letters **9**(2): 4.
Rodriguez-Pena, N., K. E. Stoner, J. Ayala-Berdon, C. M. Flores-Ortiz, A. Duran and J. E. Schondube (2013). "Nitrogen and amino acids in nectar modify food selection of nectarivorous bats." Journal of Animal Ecology **82**(5): 1106-1115.
Seibert, A. M., J. C. Koblitz, A. Denzinger and H. U. Schnitzler (2013). "Scanning Behavior in Echolocating Common Pipistrelle Bats (Pipistrellus pipistrellus)." Plos One **8**(4): 11.
Siles, L., D. M. Brooks, H. Aranibar, T. Tarifa, R. J. Vargas, J. M. Rojas and R. J. Baker (2013). "A new species of Micronycteris (Chiroptera: Phyllostomidae) from Bolivia." Journal of Mammalogy **94**(4): 881-896.
Sun, K. P., L. Luo, R. T. Kimball, X. W. Wei, L. R. Jin, T. L. Jiang, G. H. Li and J. Feng (2013). "Geographic Variation in the Acoustic Traits of Greater Horseshoe Bats: Testing the Importance of Drift and Ecological Selection in Evolutionary Processes." Plos One **8**(8): 10.
Taylor, P. J., S. Sowler, M. C. Schoeman and A. Monadjem (2013). "Diversity of bats in the Soutpansberg and Blouberg Mountains of northern South Africa: complementarity of acoustic and non-acoustic survey methods." South African Journal of Wildlife Research **43**(1): 12-26.

Diet and predation studies

Fukui, D., H. Dewa, S. Katsuta and A. Sato (2013). "Bird predation by the birdlike noctule in Japan." Journal of Mammalogy **94**(3): 657-661.
Gonsalves, L., B. Bicknell, B. Law, C. Webb and V. Monamy (2013). "Mosquito consumption by insectivorous bats: does size matter?" PloS one **8**(10): e77183-e77183.
Machado-Santos, C., J. C. F. Aquino, J. S. Mikalauka, M. Abidu-Figueiredo, R. M. M. Mendes and A. Sales (2013). "What difference exists in the pancreas of mammals with sanguivorous diet? A morphological, stereological and immunohistochemical study of the pancreatic islets of the hematophagous bat *Diphylla ecaudata*." Regulatory Peptides **183**: 62-68.
Madrid-Lopez, S. M., A. A. Castro-Luna and J. Gatando-Gonzalez (2013). "First report of a hard fruit in the diet of *Centurio senex* (Chiroptera: Phyllostomidae) in Mexico." Journal of Mammalogy **94**(3): 628-631.
Presetnik, P. and S. Aulagnier (2013). "The diet of Schreiber's bent-winged bat, *Miniopterus schreibersii* (Chiroptera: Miniopteridae), in northeastern Slovenia (Central Europe)." Mammalia **77**(3): 297-305.

Foraging behavior

Bennett, V. J., D. W. Sparks and P. A. Zollner (2013). "Modeling the indirect effects of road networks on the foraging activities of bats." Landscape Ecology **28**(5): 979-991.

Clarin, T. M. A., I. Ruczynski, R. A. Page and B. M. Siemers (2013). "Foraging Ecology Predicts Learning Performance in Insectivorous Bats." Plos One **8**(6): 12.

Gonsalves, L., B. Law, C. Webb and V. Monamy (2013). "Foraging Ranges of Insectivorous Bats Shift Relative to Changes in Mosquito Abundance." Plos One **8**(5): 11.

Jooste, E., J. G. Boyles, T. G. Hallam and G. F. McCracken (2013). "Feeding, foraging, and energetics of small bats at high latitudes." Integrative and Comparative Biology **53**: E305-E305.

Melber, M., D. Fleischmann and G. Kerth (2013). "Female Bechstein's Bats Share Foraging Sites with Maternal Kin but do not Forage Together with them - Results from a Long-Term Study." Ethology **119**(9): 793-801.

Sirami, C., D. S. Jacobs and G. S. Cumming (2013). "Artificial wetlands and surrounding habitats provide important foraging habitat for bats in agricultural landscapes in the Western Cape, South Africa." Biological Conservation **164**: 30-38.

Stead, N. (2013). "The art of finding prey: a bat's perspective." Journal of Experimental Biology **216**(7): II-II.

General ecology

Baigger, A., N. Perony, M. Reuter, V. Leinert, M. Melber, S. Grunberger, D. Fleischmann and G. Kerth (2013). "Bechstein's bats maintain individual social links despite a complete reorganisation of their colony structure." Naturwissenschaften **100**(9): 895-898.

Bellamy, C., C. Scott and J. Altringham (2013). "Multiscale, presence-only habitat suitability models: fine resolution maps for eight bat species." Journal of Applied Ecology **50**(4): 892-901.

Britzke, E. R., E. H. Gillam and K. L. Murray (2013). "Current state of understanding of ultrasonic detectors for the study of bat ecology." Acta Theriologica **58**(2): 109-117.

Eckenweber, M. and M. Knornschild (2013). "Social influences on territorial signaling in male greater sac-winged bats." Behavioral Ecology and Sociobiology **67**(4): 639-648.

Garbino, G. S. T., C. C. Aquino and C. C. Aires (2013). "Second record of the pale brown ghost bat *Diclidurus isabella* (Thomas, 1920) (Chiroptera, Emballonuridae) from Brazil and range extension into southwestern Brazilian Amazonia." Mammalia **77**(2): 231-234.

Gonsalves, L., S. Lamb, C. Webb, B. Law and V. Monamy (2013). "Do mosquitoes influence bat activity in coastal habitats?" Wildlife Research **40**(1): 10-24.

Gonsalves, L., B. Law, C. Webb and V. Monamy (2013). "Foraging Ranges of Insectivorous Bats Shift Relative to Changes in Mosquito Abundance." Plos One **8**(5).

Ingersoll, T. E., B. J. Sewall and S. K. Amelon (2013). "Improved Analysis of Long-Term Monitoring Data Demonstrates Marked Regional Declines of Bat Populations in the Eastern United States." Plos One **8**(6): 12.

Lucan, R. K. and M. Salek (2013). "Observation of successful mobbing of an insectivorous bat, *Taphozous nudiventris* (Emballonuridae), on an avian predator, *Tyto alba* (Tytonidae)." Mammalia **77**(2): 235-236.

McGuire, L. P. and W. A. Boyle (2013). "Altitudinal migration in bats: evidence, patterns, and drivers." Biological Reviews **88**(4): 767-786.

Moratelli, R. and D. E. Wilson (2013). "Distribution and natural history of *Myotis lavali* (Chiroptera, Vespertilionidae)." Journal of Mammalogy **94**(3): 650-656.

Muller, J., R. Brandl, J. Buchner, H. Pretzsch, S. Seifert, C. Stratz, M. Veith and B. Fenton (2013). "From ground to above canopy-Bat activity in mature forests is driven by vegetation density and height." Forest Ecology and Management **305**: 179-184.

Napal, M., I. Garin, U. Goiti, E. Salsamendi and J. Aihartza (2013). "Past deforestation of Mediterranean Europe explains the present distribution of the strict forest dweller *Myotis bechsteinii*." Forest Ecology and Management **293**: 161-170.

Norquay, K. J. O., F. Martinez-Nunez, J. E. Dubois, K. M. Monson and C. K. R. Willis (2013). "Long-distance movements of little brown bats (*Myotis lucifugus*)." Journal of Mammalogy **94**(2): 506-515.

Prugh, L.R. and Golden, D. C. (2013). " Does moonlight increase predation risk? Meta-analysis reveals divergent responses of nocturnal mammals to lunar cycle. "Journal of Animal Ecology **in press**

Regnery, B., D. Couvet, L. Kubarek, J. F. Julien and C. Kerbiriou (2013). "Tree microhabitats as indicators of bird and bat communities in Mediterranean forests." Ecological Indicators **34**: 221-230.

Regnery, B., Y. Paillet, D. Couvet and C. Kerbiriou (2013). "Which factors influence the occurrence and density of tree microhabitats in Mediterranean oak forests?" Forest Ecology and Management **295**: 118-125.

Rodriguez-Oseguera, A. G., A. Casas, Y. Herrerias-Diego and E. Perez-Negron (2013). "Effect of habitat disturbance on pollination biology of the columnar cactus *Stenocereus quevedonis* at landscape-level in central Mexico." Plant Biology **15**(3): 573-582.

Saldana-Vazquez, R. A., V. J. Sosa, L. I. Iniguez-Davalos and J. E. Schondube (2013). "The role of extrinsic and intrinsic factors in Neotropical fruit bat-plant interactions." Journal of Mammalogy **94**(3): 632-639.

Salicini, I., C. Ibanez and J. Juste (2013). "Deep differentiation between and within Mediterranean glacial refugia in a flying mammal, the *Myotis nattereri* bat complex." Journal of Biogeography **40**(6): 1182-1193.

Schoner, C. R., M. G. Schoner, G. Kerth and T. U. Grafe (2013). "Supply determines demand: influence of partner quality and quantity on the interactions between bats and pitcher plants." Oecologia **173**(1): 191-202.
Seltzer, C. E., H. J. Ndangalasi and N. J. Cordeiro (2013). "Seed Dispersal in the Dark: Shedding Light on the Role of Fruit Bats in Africa." Biotropica **45**(4): 450-456.
Smirnov, D. G. and V. P. Vekhnik (2013). "Trophic ecology and predation of the greater Noctule bat (*Nyctalus lasiopterus*) in Russia." Biology Bulletin **40**(2): 206-212.
Sugita, N., R. Ootsuki, T. Fujita, N. Murakami and K. Ueda (2013). "Possible spore dispersal of a bird-nest fern Asplenium setoi by Bonin flying foxes *Pteropus pselaphon*." Mammal Study **38**(3): 225-229.
Womack, K. M., S. K. Amelon and F. R. Thompson (2013). "Resource selection by Indiana bats during the maternity season." Journal of Wildlife Management **77**(4): 707-715.

Phylogeography / molecular studies

Barras, C. (2013). "The secret of long life that lies in bat genes." New Scientist **219**(2931): 11-11.
Beguelini, M. R., S. R. Taboga and E. Morielle-Versute (2013). "Ultrastructural Characteristics of the Spermatogenesis During the Four Phases of the Annual Reproductive Cycle of the Black Myotis Bat, *Myotis nigricans* (Chiroptera: Vespertilionidae)." Microscopy Research and Technique **76**(10): 1035-1049.
Cianciaruso, M. V., M. A. Batalha and O. L. Petchey (2013). "High Loss of Plant Phylogenetic and Functional Diversity Due to Simulated Extinctions of Pollinators and Seed Dispersers in a Tropical Savanna." Natureza & Conservacao **11**(1): 36-42.
Dool, S. E., S. J. Puechmaille, C. Dietz, J. Juste, C. Ibanez, P. Hulva, S. G. Roue, E. J. Petit, G. Jones, D. Russo, R. Toffoli, A. Viglino, A. Martinoli, S. J. Rossiter and E. C. Teeling (2013). "Phylogeography and postglacial recolonization of Europe by *Rhinolophus hipposideros*: evidence from multiple genetic markers." Molecular Ecology **22**(15): 4055-4070.
Fuller, T. L., H. A. Thomassen, M. Peralvo, W. Buermann, B. Mila, C. M. Kieswetter, P. Jarrin-V, S. E. C. Devitt, E. Mason, R. Heys, J. G., K. M. MacLeod, C. F. Moss and M. E. Hasselmo (2013). "Bat and Rat Neurons Differ in Theta Frequency Resonance Despite Similar Coding of Space." Science **340**(6130): 363-367.
Juste, J., P. Benda, J. L. Garcia-Mudarra and C. Ibanez (2013). "Phylogeny and systematics of Old World serotine bats (genus Eptesicus, Vespertilionidae, Chiroptera): an integrative approach." Zoologica Scripta **42**(5): 441-457.
M. Schweizer, J. Schlunegger, J. Chan, O. Wang, C. J. Schneider, J. P. Pollinger, S. Saatchi, C. H. Graham, R. K. Wayne and T. B. Smith (2013). "Intraspecific morphological and genetic variation of common species predicts ranges of threatened ones." Proceedings of the Royal Society B-Biological Sciences **280**(1760): 10.
Lau, S. K. P., K. S. M. Li, A. K. L. Tsang, C. S. F. Lam, S. Ahmed, H. L. Chen, K. H. Chan, P. C. Y. Woo and K. Y. Yuen (2013). "Genetic Characterization of Betacoronavirus Lineage C Viruses in Bats Reveals Marked Sequence Divergence in the Spike Protein of Pipistrellus Bat Coronavirus HKU5 in Japanese Pipistrelle: Implications for the Origin of the Novel Middle East Respiratory Syndrome Coronavirus." Journal of Virology **87**(15): 8638-8650.
Liang, L., Y. Y. Shen, X. W. Pan, T. C. Zhou, C. Yang, D. M. Irwin and Y. P. Zhang (2013). "Adaptive Evolution of the Hox Gene Family for Development in Bats and Dolphins." Plos One **8**(6): 8.
Lilley, T. M., L. Ruokolainen, A. Meierjohann, M. Kanerva, J. Stauffer, V. N. Laine, J. Atosuo, E. M. Lilius and M. Nikinmaa (2013). "Resistance to oxidative damage but not immunosuppression by organic tin compounds in natural populations of Daubenton's bats (*Myotis daubentonii*)." Comparative Biochemistry and Physiology C-Toxicology & Pharmacology **157**(3): 298-305.
Madsen, P. T. and A. Surlykke (2013). "Functional Convergence in Bat and Toothed Whale Biosonars." Physiology **28**(5): 276-283.
Mao, X. G., V. D. Thong, P. J. J. Bates, G. Jones, S. Y. Zhang and S. J. Rossiter (2013). "Multiple cases of asymmetric introgression among horseshoe bats detected by phylogenetic conflicts across loci." Biological Journal of the Linnean Society **110**(2): 346-361.
Minnis, A. M. and D. L. Lindner (2013). "Phylogenetic evaluation of Geomyces and allies reveals no close relatives of *Pseudogymnoascus destructans*, comb. nov., in bat hibernacula of eastern North America." Fungal Biology **117**(9): 638-649.
Moussy, C., D. J. Hosken, F. Mathews, G. C. Smith, J. N. Aegerter and S. Bearhop (2013). "Migration and dispersal patterns of bats and their influence on genetic structure." Mammal Review **43**(3): 183-195.
Olival, K. J., C. W. Dick, N. B. Simmons, J. C. Morales, D. J. Melnick, K. Dittmar, S. L. Perkins, P. Daszak and R. DeSalle (2013). "Lack of population genetic structure and host specificity in the bat fly, *Cyclopodia horsfieldi*, across species of Pteropus bats in Southeast Asia." Parasites & Vectors **6**: 18.
Pieczarka, J. C., A. J. B. Gomes, C. Y. Nagamachi, D. C. C. Rocha, J. D. Rissino, P. C. M. O'Brien, F. Yang and M. A. Ferguson-Smith (2013). "A phylogenetic analysis using multidirectional chromosome painting of three species (*Uroderma magnirostrum, U. bilobatum* and *Artibeus obscurus*) of subfamily Stenodermatinae (Chiroptera-Phyllostomidae)." Chromosome Research **21**(4): 383-392.
Pinto, C. M., K. M. Helgen, R. C. Fleischer and S. L. Perkins (2013). "Hepatozoon Parasites (Apicomplexa: Adeleorina) in Bats." Journal of Parasitology **99**(4): 722-724.

Porter, C. A., D. Hewett-Emmett and R. E. Tashian (2013). "Carbonic Anhydrase-Related Protein XI: Structure of the Gene in the Greater False Vampire Bat (*Megaderma lyra*) Compared with Human and Domestic Pig." Biochemical Genetics **51**(5-6): 474-481.

Razgour, O., J. Juste, C. Ibanez, A. Kiefer, H. Rebelo, S. J. Puechmaille, R. Arlettaz, T. Burke, D. A. Dawson, M. Beaumont and G. Jones (2013). "The shaping of genetic variation in edge-of-range populations under past and future climate change." Ecology Letters **16**(10): 1258-1266.

Ripperger, S. P., M. Tschapka, E. K. V. Kalko, B. Rodriguez-Herrera and F. Mayer (2013). "Life in a mosaic landscape: anthropogenic habitat fragmentation affects genetic population structure in a frugivorous bat species." Conservation Genetics **14**(5): 925-934.

Sartore, E. R. and N. R. dos Reis (2013). "Trophic niche of two sympatric frugivorous bat species in a periurban area of southern Brazil." Mammalia **77**(2): 141-148.

Scott, D. D., S. Fitzpatrick, D. A. Bailie, E. S. M. Boston, M. G. Lundy, D. J. Buckley, E. C. Teeling, W. I. Montgomery and P. A. Prodohl (2013). "Isolation and characterization of eight polymorphic microsatellite loci for Natterer's bat, *Myotis nattereri* (Vespertilionidae, Chiroptera)." Conservation Genetics Resources **5**(3): 643-645.

Seim, I., X. D. Fang, Z. Q. Xiong, A. V. Lobanov, Z. Y. Huang, S. M. Ma, Y. Feng, A. A. Turanov, Y. B. Zhu, T. L. Lenz, M. V. Gerashchenko, D. D. Fan, S. H. Yim, X. M. Yao, D. Jordan, Y. Q. Xiong, Y. Ma, A. N. Lyapunov, G. X. Chen, O. I. Kulakova, Y. D. Sun, S. G. Lee, R. T. Bronson, A. A. Moskalev, S. R. Sunyaev, G. J. Zhang, A. Krogh, J. Wang and V. N. Gladyshev (2013). "Genome analysis reveals insights into physiology and longevity of the Brandt's bat *Myotis brandtii*." Nature Communications **4**: 8.

Shen, B., X. Q. Han, G. Jones, S. J. Rossiter and S. Y. Zhang (2013). "Adaptive Evolution of the Myo6 Gene in Old World Fruit Bats (Family: Pteropodidae)." Plos One **8**(4): 11.

Velazco, P. M. (2013). "On the phylogenetic position of *Carollia manu* Pacheco et al., 2004 (Chiroptera: Phyllostomidae: Carolliinae)." Zootaxa **3718**(3): 267-276.

Villalobos, F., T. F. Rangel and J. A. F. Diniz (2013). "Phylogenetic fields of species: cross-species patterns of phylogenetic structure and geographical coexistence." Proceedings of the Royal Society B-Biological Sciences **280**(1756): 9.

Yoon, K. B., H. Rikim, J. Y. Kim, S. H. Jeon and Y. C. Park (2013). "The complete mitochondrial genome of the Ussurian tube-nosed bat *Murina ussuriensis* (Chiroptera: Vespertilionidae) in Korea." Mitochondrial DNA **24**(4): 397-399.

Zhuo, X. Y., M. Rho and C. Feschotte (2013). "Genome-Wide Characterization of Endogenous Retroviruses in the Bat *Myotis lucifugus* Reveals Recent and Diverse Infections." Journal of Virology **87**(15): 8493-8501.

Physiology / Temperature regulation

Abumandour, M. and R. El-Bakary (2013). "Morphological and scanning electron microscopic studies of the tongue of the Egyptian fruit bat (*Rousettus aegyptiacus*) and their lingual adaptation for its feeding habits." Veterinary Research Communications **37**(3): 229-238.

Ayala-Berdon, J., R. Galicia, C. Flores-Ortiz, R. A. Medellin and J. E. Schondube (2013). "Digestive capacities allow the Mexican long-nosed bat (*Leptonycteris nivalis*) to live in cold environments." Comparative Biochemistry and Physiology a-Molecular & Integrative Physiology **164**(4): 622-628.

Bergou, A., J. Franck, G. Taubin, S. Swartz and K. Breuer (2013). "How do bats turn?" Integrative and Comparative Biology **53**: E14-E14.

Cardini, A. and P. D. Polly (2013). "Larger mammals have longer faces because of size-related constraints on skull form." Nature Communications **4**: 7.

Cheney, J. A., K. M. Middleton, N. Konow, E. L. Giblin, K. S. Breuer and S. M. Swartz (2013). "Electromyography of bat wing membrane muscles." Integrative and Comparative Biology **53**: E34-E34.

Cooper, L. N., K. Sears and N. Simmons (2013). "Regional alterations in bone thickness and density helped bats acquire active flight." Integrative and Comparative Biology **53**: E40-E40.

Czenze, Z. J., A. D. Park and C. K. R. Willis (2013). "Staying cold through dinner: cold-climate bats rewarm with conspecifics but not sunset during hibernation." Journal of Comparative Physiology B-Biochemical Systemic and Environmental Physiology **183**(6): 859-866.

Dudek, D. M., L. Gao, H. Lu and R. Mueller (2013). "Mechanics of bat vocal folds." Integrative and Comparative Biology **53**: E57-E57.

Harper, C. J., S. M. Swartz and E. L. Brainerd (2013). "Specialized bat tongue is a hemodynamic nectar mop." Proceedings of the National Academy of Sciences of the United States of America **110**(22): 8852-8857.

Heinrich, M. and L. Wiegrebe (2013). "Size Constancy in Bat Biosonar? Perceptual Interaction of Object Aperture and Distance." Plos One **8**(4): 9.

Hinojosa, C. V., M. A. L. Galvan, M. T. Rodriguez, G. L. Ortega, M. A. C. Cervantes, C. A. M. Rodriguez, P. P. Cortes, L. A. M. Mendez and F. J. J. Trejo (2013). "Differential Expression of Serotonin, Tryptophan Hydroxylase and Monoamine Oxidase A in the Mammary Gland of the *Myotis velifer* Bat." Plos One **8**(9): 9.

Hoffmann, S., A. Warmbold, L. Wiegrebe and U. Firzlaff (2013). "Spatiotemporal contrast enhancement and feature extraction in the bat auditory midbrain and cortex." Journal of Neurophysiology **110**(6): 1257-1268.

Hope, P. R. and G. Jones (2013). "An entrained circadian cycle of peak activity in a population of hibernating bats." Journal of Mammalogy **94**(2): 497-505.
Klug, B. J. and R. M. R. Barclay (2013). "Thermoregulation during reproduction in the solitary, foliage-roosting hoary bat (*Lasiurus cinereus*)." Journal of Mammalogy **94**(2): 477-487.
Macias, S., J. C. Hechavarria, M. Kossl and E. C. Mora (2013). "Neurons in the inferior colliculus of the mustached bat are tuned both to echo-delay and sound duration." Neuroreport **24**(8): 404-409.
McGuire, L. P., M. B. Fenton and C. G. Guglielmo (2013). "Seasonal upregulation of catabolic enzymes and fatty acid transporters in the flight muscle of migrating hoary bats, *Lasiurus cinereus*." Comparative Biochemistry and Physiology B-Biochemistry & Molecular Biology **165**(2): 138-143.
Pan, Y. H., Y. J. Zhang, J. Cui, Y. Liu, B. M. McAllan, C. C. Liao and S. Y. Zhang (2013). "Adaptation of Phenylalanine and Tyrosine Catabolic Pathway to Hibernation in Bats." Plos One **8**(4): 14.
Piksa, K., J. Nowak, M. Zmihorski and W. Bogdanowicz (2013). "Nonlinear Distribution Pattern of Hibernating Bats in Caves along an Elevational Gradient in Mountain (Carpathians, Southern Poland)." Plos One **8**(7): 10.
Roy, V. K. and A. Krishna (2013). "Changes in Glucose and Carnitine Levels and Their Transporters in Utero Tubal Junction in Relation to Sperm Storage in the Vespertilionid Bat, *Scotophilus heathi*." Journal of Experimental Zoology Part a-Ecological Genetics and Physiology **319**(9): 517-526.
von Busse, R., S. M. Swartz and C. C. Voigt (2013). "Flight metabolism in relation to speed in Chiroptera: testing the U-shape paradigm in the short-tailed fruit bat *Carollia perspicillata*." Journal of Experimental Biology **216**(11): 2073-2080.
Wright, D. (2013). "Beer, bats, and taco shells: A career spent connecting the chemical "dots" with targeted sensory attributes." Abstracts of Papers of the American Chemical Society **245**: 1.
Xu, H. H., Y. Liu, F. X. Meng, B. B. He, N. J. Han, G. Li, S. J. Rossiter and S. Y. Zhang (2013). "Multiple bursts of pancreatic ribonuclease gene duplication in insect-eating bats." Gene **526**(2): 112-117.
Yartsev, M. M. and N. Ulanovsky (2013). "Representation of Three-Dimensional Space in the Hippocampus of Flying Bats." Science **340**(6130): 367-372.

Reproduction/development

Beguelini, M. R., C. C. I. Puga, S. R. Taboga and E. Morielle-Versute (2013). "Annual reproductive cycle of males of the flat-faced fruit-eating bat, *Artibeus planirostris* (Chiroptera: Phyllostomidae)." General and Comparative Endocrinology **185**: 80-89.
Jimenez-Trejo, F., M. A. Leon-Galvan, L. A. Martinez-Mendez, M. Tapia-Rodriguez, C. A. Mendoza-Rodriguez, I. Gonzalez-Santoyo, R. Lopez-Wilchis, C. Vela-Hinojosa, N. Baranda-Avila and M. Cerbon (2013). "Serotonin in Testes of Bat *Myotis velifer* During Annual Reproductive Cycle: Expression, Localization, and Content Variations." Journal of Experimental Zoology Part a-Ecological Genetics and Physiology **319A**(5): 249-258.
Rincon-Vargas, F., K. E. Stoner, R. M. Vigueras-Villasenor, J. M. Nassar, O. M. Chaves and R. Hudson (2013). "Internal and external indicators of male reproduction in the lesser long-nosed bat *Leptonycteris yerbabuenae*." Journal of Mammalogy **94**(2): 488-496.
Sharifi, M. and S. Vaissi (2013). "The impact of body mass at birth on postnatal growth in captive Kuhl's pipistrelle, *Pipistrellus kuhlii* (Chiroptera, Vespertilionidae)." Mammalia **77**(2): 181-186.
Toth, C. A. and S. Parsons (2013). "Is lek breeding rare in bats?" Journal of Zoology **291**(1): 3-11.

Roosting ecology

Gillam, E. H., G. Chaverri, K. Montero and M. Sagot (2013). "Social Calls Produced within and near the Roost in Two Species of Tent-Making Bats, *Dermanura watsoni* and *Ectophylla alba*." Plos One **8**(4): 5.
Johnson, J. S. and M. J. Lacki (2013). "Summer heterothermy in Rafinesque's big-eared bats (*Corynorhinus rafinesquii*) roosting in tree cavities in bottomland hardwood forests." Journal of Comparative Physiology B-Biochemical Systemic and Environmental Physiology **183**(5): 709-721.
McConville, A., B. S. Law and M. J. Mahony (2013). "Mangroves as maternity roosts for a colony of the rare east coast free-tailed bat (*Mormopterus norfolkensis*) in south-eastern Australia." Wildlife Research **40**(4): 318-327.
Patriquin, K. J., F. Palstra, M. L. Leonard and H. G. Broders (2013). "Female northern myotis (*Myotis septentrionalis*) that roost together are related." Behavioral Ecology **24**(4): 949-954.
Piksa, K., A. Gorz, M. Nowak-Chmura and K. Siuda (2013). "Mass occurrence of *Ixodes vespertilionis* (Acari: Ixodidae) in caves, on bats roosting in caves and in a nursery colony." International Journal of Acarology **39**(3): 257-262.
Sagot, M., B. Rodriguez-Herrera and R. D. Stevens (2013). "Macro and Microhabitat Associations of the Peter's Tent-Roosting Bat (*Uroderma bilobatum*): Human-Induced Selection and Colonization?" Biotropica **45**(4): 511-519.
Snider, E. A., P. M. Cryan and K. R. Wilson (2013). "Roost selection by western long-eared myotis (*Myotis evotis*) in burned and unburned pinon-juniper woodlands of southwestern Colorado." Journal of Mammalogy **94**(3): 640-649.

Streicker, D. G., R. Franka, F. R. Jackson and C. E. Rupprecht (2013). "Anthropogenic Roost Switching and Rabies Virus Dynamics in House-Roosting Big Brown Bats." Vector-Borne and Zoonotic Diseases **13**(7): 498-504.

Threlfall, C., B. Law and P. B. Banks (2013). "Odour cues influence predation risk at artificial bat roosts in urban bushland." Biology Letters **9**(3): 4.

Threlfall, C. G., B. Law and P. B. Banks (2013). "Roost selection in suburban bushland by the urban sensitive bat *Nyctophilus gouldi*." Journal of Mammalogy **94**(2): 307-319.

Tournant, P., E. Afonso, S. Roue, P. Giraudoux and J. C. Foltete (2013). "Evaluating the effect of habitat connectivity on the distribution of lesser horseshoe bat maternity roosts using landscape graphs." Biological Conservation **164**: 39-49.

White-nose syndrome

Cryan, P. M., C. U. Meteyer, J. G. Boyles and D. S. Blehert (2013). "White-nose syndrome in bats: illuminating the darkness." Bmc Biology **11**: 4.

Ehlman, S. M., J. J. Cox and P. H. Crowley (2013). "Evaporative water loss, spatial distributions, and survival in white-nose-syndrome-affected little brown myotis: a model." Journal of Mammalogy **94**(3): 572-583.

Johnson, L., A. N. Miller, R. A. McCleery, R. McClanahan, J. A. Kath, S. Lueschow and A. Porras-Alfaro (2013). "Psychrophilic and Psychrotolerant Fungi on Bats and the Presence of Geomyces spp. on Bat Wings Prior to the Arrival of White Nose Syndrome." Applied and Environmental Microbiology **79**(18): 5465-5471.

Shelley, V., S. Kaiser, E. Shelley, T. Williams, M. Kramer, K. Haman, K. Keel and H. A. Barton (2013). "Evaluation of strategies for the decontamination of equipment for geomyces destructans, the causative agent of white-nose syndrome (WNS)." Journal of Cave and Karst Studies **75**(1): 1-10.

Thogmartin, W. E., C. A. Sanders-Reed, J. A. Szymanski, P. C. McKann, L. Pruitt, R. A. King, M. C. Runge and R. E. Russell (2013). "White-nose syndrome is likely to extirpate the endangered Indiana bat over large parts of its range." Biological Conservation **160**: 162-172.

Warnecke, L., J. M. Turner, T. K. Bollinger, V. Misra, P. M. Cryan, D. S. Blehert, G. Wibbelt and C. K. R. Willis (2013). "Pathophysiology of white-nose syndrome in bats: a mechanistic model linking wing damage to mortality." Biology Letters **9**(4): 5.

Wibbelt, G., S. J. Puechmaille, B. Ohlendorf, K. Muhldorfer, T. Bosch, T. Gorfol, K. Passior, A. Kurth, D. Lacremans and F. Forget (2013). "Skin Lesions in European Hibernating Bats Associated with *Geomyces destructans*, the Etiologic Agent of White-Nose Syndrome." Plos One **8**(9): 10.

Wind energy

Arnett, E. B., R. M. R. Barclay and C. D. Hein (2013). "Thresholds for bats killed by wind turbines." Frontiers in Ecology and the Environment **11**(4): 171-171.

Arnett, E. B., C. D. Hein, M. R. Schirmacher, M. M. P. Huso and J. M. Szewczak (2013). "Evaluating the Effectiveness of an Ultrasonic Acoustic Deterrent for Reducing Bat Fatalities at Wind Turbines." Plos One **8**(6): 11.

Bastos, R., M. Santos and J. A. Cabral (2013). "A new stochastic dynamic tool to improve the accuracy of mortality estimates for bats killed at wind farms." Ecological Indicators **34**: 428-440.

Bicknell, L. J. and E. H. Gillam (2013). "Survey of Bat Mortalities at a Wind-Energy Facility in North Dakota." Journal of Fish and Wildlife Management **4**(1): 139-143.

Korner-Nievergelt, F., R. Brinkmann, I. Niermann and O. Behr (2013). "Estimating Bat and Bird Mortality occurring at Wind Energy Turbines from Covariates and Carcass Searches Using Mixture Models." Plos One **8**(7): 11.

Korstian, J. M., A. M. Hale, V. J. Bennett and D. A. Williams (2013). "Advances in sex determination in bats and its utility in wind-wildlife studies." Molecular Ecology Resources **13**(5): 776-780.

Peron, G., J. E. Hines, J. D. Nichols, W. L. Kendall, K. A. Peters and D. S. Mizrahi (2013). "Estimation of bird and bat mortality at wind-power farms with superpopulation models." Journal of Applied Ecology **50**(4): 902-911.

Roscioni, F., D. Russo, M. Di Febbraro, L. Frate, M. L. Carranza and A. Loy (2013). "Regional-scale modelling of the cumulative impact of wind farms on bats." Biodiversity and Conservation **22**(8): 1821-1835.

Table of Contents

Echo Meter Detectors

Handheld Bat Detectors/Recorders

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- Playback bat calls in Time Expansion mode at desired speed to hear details of the call.
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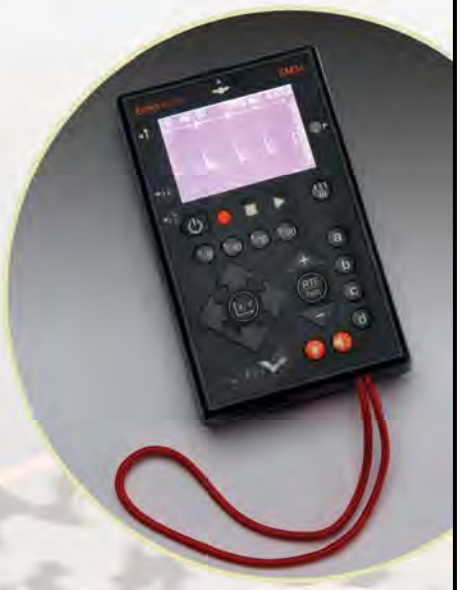

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