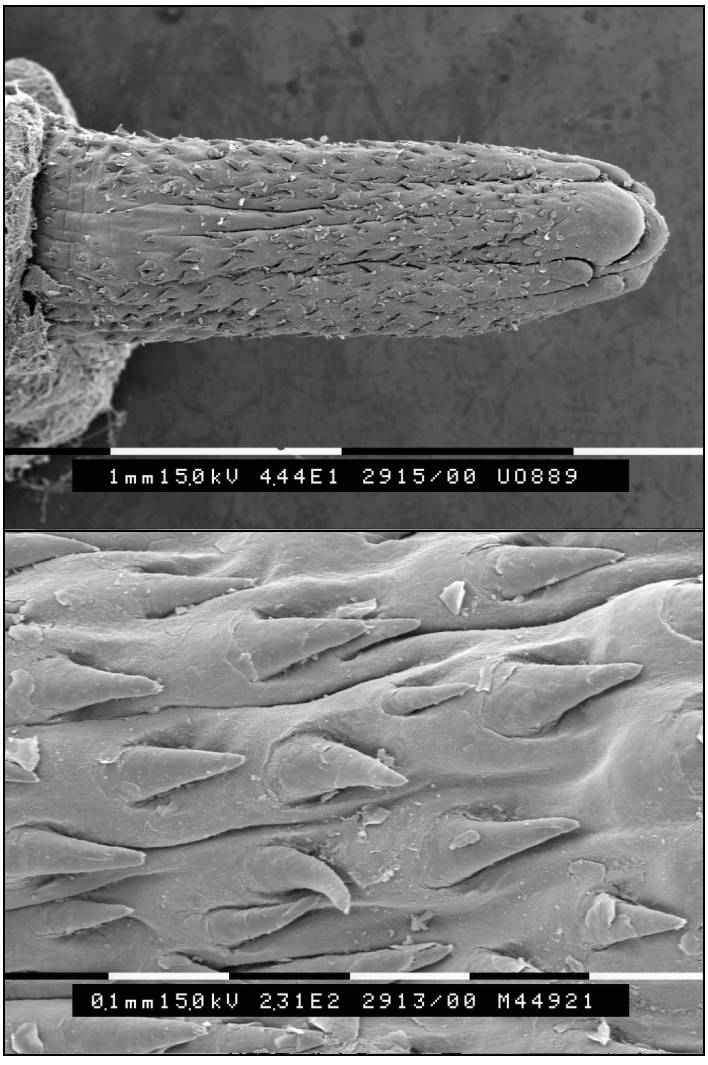
The Australasian Bat Society Newsletter

Number 18 June 2002



- 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: **21st March** for the April issue, and **21st October** for the November issue. The Editor reserves the right to hold over contributions for subsequent issues of the *Newsletter*, and meeting the deadline is not a guarantee of immediate publication.

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

For consistency, the following guidelines should be followed:

- Emailed electronic copy of manuscripts or articles, sent as an attachment, is the preferred method of submission. Manuscripts can also be sent on 3½" floppy disk. Faxed and hard copy manuscripts will be accepted but reluctantly!! All submissions are to be sent 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 1.6mm 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 ideally include: Title; Names and addresses of authors; Abstract (approx. 200 words); Introduction; Materials and methods; Results, Discussion and References. References should conform to the Harvard System (author-date).
- Technical notes, News, Notes, Notices, Art etc should include a Title; Names and addresses of authors. References should conform to the Harvard System (author-date).
- All pages, figures and tables should be consecutively numbered and correct orientation must be used throughout. Metric units and SI units should be used wherever possible.
- 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. If your article is too large to email, then submit the text and each picture (1MB max. size) separately. Alternatively, burn it to CD and post it.
- Research Papers are not being refereed routinely at this stage, although major editorial amendments may be suggested and specialist opinion may be sought in some cases. Articles will generally undergo some minor editing to conform to the *Newsletter*.
- Please contact the Newsletter Editor if you need help or advice.

President
Greg Ford
Project Officer
(Best Practice Agricultural Landscapes)
North East Downs Landcare Group Inc.
PO Box 199, Oakey Qld 4401
Ph: 07 4691 1499
Fax: 07 4691 2500
Mobile: 0427 245 211
fordg@powerup.com.au

Secretary
Nicola Markus
Species Program Coordinator
WWF - Australia
GPO Box 528
Sydney NSW 2000
Ph: 02 9281 5515
Fax: 02 9281 1060
NMarkus@wwf.org.au

Newsletter Editor
Kyle Armstrong
Biota Environmental Sciences P/L
2/186 Scarborough Beach Road
Mt Hawthorn WA 6016
Ph: 08 9201 9955
Fax: 08 9201 9599
kyle@biota.net.au

- Editorial -

Welcome to the 18th *Australasian Bat Society Newsletter*. Terry Reardon has handed the position of editor over to me. It was all very sudden, but I am pleased to be involved in the ABS in this role.

Cairns was terrific, I personally had a great time. We were privileged to have participants from Okinawa (Japan), Northern Marianas Islands, New Zealand, USA, France and Hong Kong, as well as most states of Australia. It was a little sad to say goodbye after just starting to get to know everyone. Being a relative newchum to the bat scene and living in Western Australia means I do not meet other bat people very often, so I am looking forward to the next gathering already. Thanks to all involved for such a great conference, especially Olivia, Jenny, Chris and Jon.

I have included the abstracts from the conference in this *Newsletter* as I realise that many members could not attend. You will also find other information from the conference in this *Newsletter*, plus some other papers, reports and news. The next *Newsletter* is not that far away (due out November) so I am hoping that you are beginning to write something for the next one.

Terry and I discussed the future of the *Newsletter* while in Cairns. As you all well know, Terry has continued to refine the format and look of the *Newsletter*, and he had some more ideas for the future. I am also hoping to continually improve the *Newsletter*, at least incrementally, each time. To start with, we will have a new cover on future issues. We discussed briefly whether the *Newsletter* should undergo a new format (e.g. similar to that of the defunct *Macroderma*), and whether a name change would be appropriate. In the past, I have found the short notes, interesting observations and particularly the technical articles on equipment and software to be very useful. I have benefited greatly from these and have saved much time while improving the quality of my work. At the moment I work as a consultant and realise that there are many interesting observations made during the course of fieldwork that can go unreported, and these can also be very useful. The *Newsletter* is an important forum for discussion and news, and these articles are also welcome. Therefore, the *Newsletter* caters very well to the diverse range of interests and levels in this field. I would be interested in peoples thoughts on the future of our *Newsletter*.

Thanks to everyone who submitted something for this *Newsletter*, I think it makes an interesting read. I look forward to receiving your future contributions so that the society can continue to raise the profile of bats in the Australasian region and around the world. The Australian continent, although girt by sea, is not isolated in terms of its evolutionary history and biogeography, so I am also looking forward to receiving articles and updates from people in other areas of Australasia and beyond.

I will send a bulk email to members prior to the next edition reminding them of deadlines and calling for submissions. Please note the instructions for contributors on the inside of the cover, and please let me or Lindy Lumsden (Lindy.Lumsden@nre.vic.gov.au) know if your email address changes. If you do not use email, feel free to contact me by post or telephone. Before I go, thanks to my new wife Yuki for her help in compiling this *Newsletter*. Until November then …

Kyle Armstrong

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Front cover: To continue a theme from the last *Newsletter*, here is presented the spiky glans penis of the Orange Leaf-nosed Bat *Rhinonicteris aurantius*, with some detail of those spikes.

– Australasian Bat Society Inc - Business and Reports –

President's report

G'day, and welcome to another edition of the *Australasian Bat Society Newsletter*. This issue will no doubt provide you with lots of interesting reading, including the proceedings of our recent conference in Cairns.

Those of you who attended the Cairns AGM will already be aware that Bruce Thomson decided to step down from his role as President, after four years in the hot-seat. Thanks to an unchallenged nomination from Bruce, I was duly elected to the position.

It is a great privilege for someone so new to the bat world to be taking over from a succession of Presidents (Bruce Thomson, Terry Reardon, Greg Richards, Len Martin), each of whom had many more years experience than my eight or so. I am honoured to have been given this opportunity, and will endeavour to continue in the same vein, raising the profile of the Society and bat conservation across the Australasian region.

I'd like to take this opportunity, on behalf of the ABS, to express our gratitude to Bruce for the marvellous job he did over those four years. Bruce presided over a period that saw the ABS strengthening ties with Bat Conservation International, a move that will benefit the Society in many ways. He played a pivotal role in co-opting BCI on issues such as bat conservation in mines in Australia. Who could forget the infamous Melbourne grey-headed flying-fox issue? During the debate over the botanical gardens camp, the ABS rose to the challenge and became a key advocate for flying-fox management and conservation. Bruce's efforts, along with those of Nicki Markus and many other ABS members are to be commended, especially in light of the role they played in finally getting governments to recognise the threatened status of the species. The Society, under Bruce's guidance, also played a significant role in stopping (at least temporarily) the inhumane slaughter of spectacled flying-foxes on electric grids around orchards in north Queensland.

Well done, Bruce! You've had some great achievements, no doubt well supported by the other executive members and Society membership in general. I hope you've paved the way for my presidency to travel through far less controversial times!

Terry Reardon, our industrious Newsletter Editor for the last few issues, has also decided to hand over the reins. Terry is to be congratulated for his enormous efforts in keeping the *Newsletter* on track since he rescued Peggy Eby from the role after her election at Tocal in 2000 (soon followed by the realisation that she could not find the time to commit to the job). The Editorial role is probably the toughest job in the ABS, and Terry has excelled with improved layout and his ability to elicit numerous papers and other articles of interest to chiropterophiles of all persuasions.

As you've seen in the Editorial, our new editor is Kyle Armstrong, who hails from that distant but not-quite-forgotten part of the region known as Western Australia. It's great to have some representation from the west, and I'm sure Kyle will continue churning out a high standard document for our membership.

The remaining members of the executive were re-elected, unopposed. So congratulations to Greg Richards (1st Vice-President), Kerryn Parry-Jones (2nd Vice-President), Nicola Markus (Secretary), Carole West (Minutes Secretary), Lindy Lumsden (Membership Secretary) and Natasha Schedvin (Treasurer). We have also appointed three "ordinary members", all with recent executive experience and a wealth of knowledge, to assist in Society matters. So, Bruce Thomson, Terry Reardon and Peggy Eby can't disappear and get too relaxed just yet! Nancy Pallin remains our Public Officer.

Our 10th conference, in Cairns just after Easter, was a fabulous one, with loads of papers and posters on a broad cross-section of topics. It was great to see contributions from a good number of international battos, some from as far away as Japan. The content and quality of presentations seems to get better every conference, and all presenters are to be congratulated on the high standards of their work. For those of you who missed the conference, I hope you enjoy reading the abstracts and proceedings that we've published in this newsletter issue.

Adulation is of course due also to the hard-working conference organisers, who did a tremendous job of making it happen and keeping it on an even keel for the duration of the event. Congratulations and many thanks to Olivia Whybird, Jenny Maclean, Chris Clague and Jon Luly for their mammoth effort.

Since the conference, the ABS has again taken its advocacy role seriously, with a recent submission in response to a call for public comment on yet another application from a farmer who wants to electrocute spectacled flying-foxes in a north Queensland orchard. Our submission focussed on the key roles that the species plays in the rainforest ecosystem of the Wet Tropics World Heritage Area, but also urged caution in light of the potential for the species to be added to the threatened species list. In this instance, the submission was made on the same date that the Commonwealth Government declared the spectacled flying-fox a "Vulnerable" species under the Environment Protection and Biodiversity Conservation Act.

Surely, now, we might see an end to destructive fruit-crop protection measures being used against the specs. Not to mention the hope that a similar listing for the grey-headed flying-fox (recently also declared Vulnerable) will help stop harmful control methods being applied across the range of that species.

That's about it for my first report. I'd like to finish by inviting all members of the ABS to contact me with any issues, concerning bats and bat conservation across the Australasian region, that they feel the ABS should be tackling more actively. Have a read of the Society's objectives, and if you think we're not doing enough to achieve one or more of them, then please let me know.

Until next issue…happy batting!

Greg Ford

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Minutes of the 6th Biennual General Meeting of the Australasian Bat Society, Inc.

Thursday, 4th April 2002, commencing 2:10 pm. Cairns Colonial Club, Cairns, Qld.

Chairperson Bruce Thomson
Minutes Peggy Eby

Open and Welcome: B. Thomson

Apologies: Carole West, Natasha Schedvin, Greg Richards, Len Martin, Kerryn Parry-Jones, Al Young, Dianne Vavryn

Minutes of the ABS Financial General Meeting Sydney
It was resolved: *that the minutes should be accepted as published in the ABS Newsletter:*
Moved: P. Eby
Seconded: D. Gee. Carried.

Business arising
1. A brochure providing information relevant to the flying-fox colony at Mareeba, Qld was not produced as the colony moved and there was no longer a crisis at that site.
2. The ABS sent a submission on "The Captive Species Management Plan for Bats" to the Association of Zoological Parks and Aquaria.
3. Information on Batwatch has been added to the ABS website. The position of the network needs to be clarified by K. Parry-Jones.

Reports from members of the Executive
President
Bruce Thomson

Secretary
Nicki Markus
The Secretary summarised her activities as spokesperson for the ABS on the issue of managing Grey-headed Flying-foxes in the Melbourne Botanical Gardens. A complete report was published in the *ABS Newsletter* no. 17, October 2001.

Treasurer
Presented by Robert Bender in the absence of Natasha Schedvin.

Robert presented the Treasurer's report and tabled an audited statement of accounts for the 2001 financial year (this *Newsletter -ed*).

Income for the period 1 January to 31 Dec 2001 was $10,293.26. Income was primarily derived from membership subscriptions. Expenditure for that period was $18,548.72. The largest items of expenditure were production and postage of the newsletter ($3,687.74) and the one-off cost of funding N. Markus to be the public spokesperson of the ABS on the Melbourne Botanical Gardens issues ($4,396.00). The total surplus at 31 December 2001 was $11,558.08.

The status of the Gift Fund was queried. B. Thomson indicated that final forms had yet to be submitted to Environment Australia.

Motion to accept the Financial Report and audited statement of accounts.
Moved: G. Ford
Seconded: A. Williams
Accepted unanimously by show of hands.

1st Vice President
Greg Richards
The 1st Vice President was absent and no report was tabled.

2nd Vice President
Kerryn Parry-Jones
The 2nd Vice President was absent and no report was tabled.

Membership Officer
Lindy Lumsden
Membership levels continued to increase during the 2001 financial year, with 21 new members joining. The proportion of financial members remained relatively high at 80.4%.

	31 Dec 2000	31 Dec 2001
Financial members	229	221
Members unfinancial for 1 year	25	41
Members unfinancial for 2 years	8	13
Total members	262	275
% of members financial	87.4%	80.4%

Editor
Terry Reardon
Terry announced that he would not be standing for a further term. He thanked the members of the ABS for their active support of the *ABS Newsletter* during his time as Editor and called on members to continue that support, particularly in the form of updates of activities in regional areas. Terry indicated that a decision had been taken to change the style of the *ABS Newsletter* and suggested the Executive act on that decision.

Election of Executive Officers
Chaired by B. Thomson
All Executive positions were declared vacant and the following members were elected unopposed:

Position	Member elected	Nominated by	Seconded by
President	Greg Ford	B. Thomson	T. Reardon
1st Vice President	Greg Richards	T. Reardon	P. Eby
2nd Vice President	Kerryn Parry-Jones	S. Wan	N. Markus
Secretary	Nicki Markus	P. Eby	N. Pallin
Treasurer	Natasha Schedvin	L. Lumsden	C. Turbill
Membership Officer	Lindy Lumsden	N. Markus	G. Hoye
Editor	Kyle Armstrong	T. Reardon	P. Eby

General Business
1. There was a general discussion about the location of the 2004 conference. T. Reardon raised concern that Australasian Bat Conferences be accessible to the the majority of members of the ABS. He and others pointed out that many members of the Society were self-funded and unable to afford to travel a substantial distance on a regular basis.

It was resolved: *that at least every second ABS conference be held in a location accessible to the majority of the membership.*
Moved: T. Reardon
Seconded: N. Markus. Carried.

Prior the 2002 conference, Stuart Parsons had indicated to the Executive that he would like to host the 2004 conference in New Zealand. It was generally agreed that it would be appropriate to hold the 2006 conference in N.Z. and Colin O'Donnell agreed to ask Stuart whether he would be prepared to defer his offer until 2006.

Christopher Turbill indicated that he and others at the University of New England might be interested in hosting the 2004 conference in Armidale, NSW. He agreed to confirm his position with the Executive quickly so that a decision could be taken.

2. N. Schedvin put forward as an agenda item a discussion about public liability insurance for the ABS. In her absence, N. Markus spoke to the item and expressed concern regarding the increasing cost of Public Liability Insurance in Australia, and the potential financial implications for the ABS. It was agreed that the Executive would review the current insurance coverage to ensure it was appropriate to the activities of the ABS, and review the current insurance provider to ensure the premiums were kept to a minimum amount.

3. N. Pallin tabled a Preliminary Determination by the NSW Scientific Committee to list competition by feral honey-bees as a Key Threatening Process. Discussion followed in which it was highlighted that honey-bees compete with microbats for tree hollows as well as potentially competing with flower-eating bats for nectar.

It was resolved: *that the ABS draft a submission to the NSW Scientific Committee, established under the Threatened Species Conservation Act, in support of the proposal to list competition from feral honey bees* Apis mellifera *as a Key Threatening Process on Schedule 3 of the TSC Act.*
Moved: N. Pallin
Seconded: D. Gee. Carried.
People interested in contributing to the submission should contact Nancy Pallin.

4. The need for the ABS to draft a policy on management of flying-fox camps was discussed. Nancy Pallin agreed to draft a policy and circulate it in the *ABS Newsletter* for comment. Members interested in participating in drafting the policy are to contact Nancy.

It was resolved: *that the ABS formulate a policy on flying-fox conservation and camp management.*
Moved: N. Pallin
Seconded: B. Thomson. Carried.

5. K. Parry-Jones (not present at the meeting) submitted a motion objecting to the NSW government's decision to grant licences to fruit growers to shoot Grey-headed Flying-foxes in orchards despite their listing as Vulnerable under the NSW TSC Act. The original motion was subsequently redrafted into three motions by the Executive and put to the meeting.

It was resolved: *that the ABS write to the NSW government explaining the strong objections of the Society to the continued issuing of licences to shoot flying-foxes to protect crops.*
Moved: K. Parry-Jones
Seconded: H. Spencer. Carried.

It was resolved: *that the ABS call on the NSW government to fund alternative non-lethal crop protection measures and to completely phase-out lethal measures by June 2003.*
Moved: K. Parry-Jones
Seconded: H. Spencer. Carried.

It was resolved: *that the ABS call for the NSW government to publicise to the public each year information on the number of culling licenses issued, the number of Grey-headed and Black Flying-foxes killed in each NSW NPWS regional area, and provide a summary of law enforcement procedures undertaken.*
Moved: K. Parry-Jones
Seconded: G. Bennett. Carried.

Concern was expressed that the letter be drafted from a scientific prospective in keeping with the general advocacy role of the ABS.

6. It was resolved: *that Les Hall be made a lifetime member of the Australasian Bat Society, Inc.*
Moved: G. Richards
Seconded: J. Maclean. Carried.
The Executive is to notify Les of the decision in an appropriate manner.

7. It was resolved: *that Ian Lester, who upgraded the ABS website, be reimbursed for his expenses to the amount of $500.00.*
Moved: B. Thomson
Seconded: A. William. Carried.

8. P. Eby offered thanks to the outgoing Executive, for their efforts in the proceeding two years. She reminded the meeting that all members of the Executive and the ancillary officers offer their time on a volunteer basis. Ancillary officers include the Auditor, R. Bender; the Public Officer, N. Pallin; and the Webmaster, Alexander Herr. The past two years have included some difficult and controversial periods for bat conservation, and have been demanding for the Executive. The meeting expressed its appreciation by applause.

9. The price of subscriptions to the ABS was discussed. Concern was raised that an anticipated increase in the premium for Public Liability Insurance would impact subscription levels and that this could not be taken into account at this stage.
It was resolved: *that the annual subscription for 2003 be held at the current level at this stage, but that the Executive be given the authority to revise subscriptions in light of information on the new premium for Public Liability Insurance.*
Moved: R. Bender
Seconded: R. Dilena. Carried.
Any changes to the subscriptions are to be advertised in the September issue of the *ABS Newsletter*.

10. Reports from ABS sub-committees:
    a. Education (N. Pallin) – several good ideas have been circulated, but implementation has been poor. After discussions during this conference, a decision has been taken to revise the sub-committee and work on actions.
    b. Flying-fox camps – no meetings, no actions in the past two years
    c. Bat viruses (T. Reardon) – no meetings, no actions. The committee was formed to help clarify the position with bat viruses in Australia. However, that role is no longer as relevant as at the time the committee was formed.
    d. Bats and mines (B. Thomson) – no meetings have been held. However, material produced by E. Hamilton-Smith has been placed on the ABS website.
    e. There was general agreement that sub-committees are not functioning as envisaged, and that it should be left to members to establish their own discussion groups. In particular, members should be encouraged to make use of the list-server.

Other Business
1. J. Maclean suggested the ABS consider offering favourable conditions, such as reduced registration fees, to members that are consistently disadvantaged by the distance they live from conference venues. A discussion ensued in which it was agreed that this was difficult to achieve in a consistent and equitable way. It was agreed that conference conveners should be mindful of the financial burden placed on some members and consider a method of reducing that burden.

2. G. Bennett reminded the meeting that has been three years since the first disturbance to remove flying-foxes took place at the Maclean colony in northern NSW; and that disturbances are still undertaken every time animals return to the Maclean Rainforest Reserve.

There being no further business, the meeting was declared closed at 4:40 pm.

Treasurer's report for the financial year ending 31 Dec 2001

	$	% (of income)
Income		
Membership subscription	6,868.00	66.7%
National Parks and Wildlife (GHFF Counts)	2,450.00	23.8%
Flying-fox campaign	660.00	6.4%
Donations (ABS Gift Fund)	286.00	2.8%
Interest	29.26	0.3%
TOTAL INCOME	10,293.26	100.0%
Expenditure		
Flying-fox campaign	6,896.00	67.0%
Grey-headed Flying-fox (Counts)	4,425.00	43.0%
Newsletter (production & postage)	3,687.74	35.8%
Insurance (public liability)	1,650.08	16.0%
Conference expenditure	1,000.00	9.7%
Executive committee (including travel expenses)	318.50	3.1%
Bank fees	261.73	2.5%
Stationery and postage	140.67	1.4%
Audit and accounting fees	110.00	1.1%
Incorporation Fee	59.00	0.6%
TOTAL EXPENDITURE	18,548.72	180.2%
SURPLUS (DEFICIT)	8,255.46	80.2%

Explanatory Notes:

This past financial year the ABS has a very large deficit, and we have consequently made significant inroads into our accumulated savings.

The reasons for this increased spending are as follows:

a. GIO charged us the public liability insurance twice, so an additional $825.04 has come out of the expenditure. After much chasing of GIO this was finally reimbursed but not until the 2002 financial year.
b. The Grey-headed Flying-fox campaign represented the largest proportion of the expenditure. Nicki Markus did a terrific job lobbying against the cull at the Melbourne Royal Botanical Gardens.
c. Another $2,500 was given to the Environmental Defenders Office for Carol Booth to fight the court case against orchardists exterminating flying-foxes.
d. An initial sum of $1,000 was paid to initiate the Cairns conference. It is expected this will be recouped by the end of the conference.

SUB-COMMITTEE ACCOUNTS

ABS Conference 2002 *

Conference Expenditure	1,000.00

* The conference accounts are incomplete because the conference finances are in progress (ie. no income received to 31/12/01).

NSW Flying-fox surveys (Grant from NSW NPWS)

Opening balance (surplus brought forward from 2000)	1,643.15	
Income	2,450.00	
Expenditure	4,425.00	
Balance (Deficit)	331.85	DR

Flying-fox Campaign

Income (Donations)	660.00	
Expenditure	6,896.00	
Balance (Deficit)	6,236.00	DR

ASSETS AT 31 DECEMBER 2001

ABS Cash Management Trust (Investment)	6,500.17	
ABS Cheque Account	4,039.66	
ABS Gift Fund (Donations)	1,018.25	
TOTAL ASSETS	11,558.08	CR

Natasha Schedvin
Treasurer

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A Grey-headed Flying-fox in the RMBG. Photo Lindy Lumsden

Abstracts from the 10th Australasian Bat Society Conference, Cairns, Queensland, 2-5 April 2002

Paper Presentations

Patterns of seed dispersal by spectacled flying-foxes in Australia's wet tropics

Andrew Dennis, David Westcott, Matt Bradford and Adam McKeown

CSIRO Sustainable Ecosystems and the Rainforest Cooperative Research Centre. Tropical Forest Research Centre, P.O. Box 780, Atherton Qld 4883. Email: Andrew.Dennis@csiro.au

Spectacled flying-foxes, *Pteropus conspicillatus,* are known to disperse the seeds of food plants in two ways, either: 1) by carrying fruit away in their mouth and dropping the seed/s; or 2) by ingesting seeds and voiding them away from the source. The former behaviour may involve the small-scale movement of fruits and seeds of any size (including very large fruits and seeds), whereas the latter method is restricted to fruits containing small seeds able to pass through the <5mm lumen. In this paper, we present data on the patterns and distances of seed dispersal by flying-foxes for seeds that are swallowed and defaecated. We do this by examining the rate of seed ingestion, the rate of seed passage through the gut and the movement of individual flying-foxes to calculate a typical seed shadow for the species. We go on to look at the physical characteristics of the fruits eaten and use this to predict a list other plants whose fruits are likely to be consumed. Most seeds found in spectacled flying-fox defaecations were <3mm, rarely up to 5mm. The rate of ingestion of seeds from an individual fruit was low when compared to many other frugivores, suggesting a high level of seed "wastage". Over 90% of ingested seeds pass through the gut in less than three hours, many in only twenty minutes and a rare few continue to pass through 6, 9, 13 and even 19 hours later. These rates of seed passage through the gut, combined with patterns of movement mean that SFFs disperse seeds at a wide range of distances from their source. The pattern of seed dispersal is not unique. However, there are only a few other frugivores that show similar patterns of movement and there are a few plant species where dietary overlap with other wide-ranging frugivores is not currently recorded.

A bloke in every port: group composition and gender bias in the migration patterns of grey-headed flying-foxes *Pteropus poliocephalus*

Peggy Eby [1] and Vivien Jones [2]

[1] PO Box 3229, Tamarama, NSW 2026. Email: peby@ozemail.com.au
[2] PO Box 131, Bellingen, NSW 2454.

Recent studies have demonstrated the influence of resource distribution on the social structure of mammals and birds. Studies of grey-headed flying-foxes (GHFF) have consistently shown their complex migration patterns to be largely determined by resource distribution. However, little is known of the influence of this complexity on social structure, group stability or the mating system of this social species. We studied variations in the size and composition of roosts from September to May (pre-birth to conception). Variations in the natural markings of GHFF were sufficiently conspicuous to enable individuals to be distinguished, and we used photographic identification to additionally study the structure and stability of harems. Harem males were highly specific and consistent in their roosting locations; adult females were never observed roosting outside the territory of a male. The size and composition of harems varied considerably through time and there was a positive relationship between the size of harems and the size of the roost population. Females arrived and departed from harems throughout the study period, accompanied by dependent young at all stages of development. During the period of conception, males copulated with short-term harem members as well as females that had roosted within their territorial areas for several weeks. When roost populations increased, males were first to inhabit previously unoccupied areas of the roost. They established territories that were later occupied by harem females. When populations decreased, females departed harems first,

generally independently of each other. Males occupied territories in the absence of females for up to nine consecutive weeks. We conclude that:

1. *Harems are generally unstable groupings, and members of harems do not migrate together or form long-term associations;*
2. The tendency to migrate is greater in females than in males;
3. A greater proportion of adult females than males use rich resource flushes from flowering eucalypts and melaleucas;
4. Females join the harem group of a different male at each new roost they occupy, including roosts used as short-term stop-over sites during migration;
5. The mating opportunities of males are related to resource distribution and roost size. We predict female mate choice and mixed mating systems in GHFF.

The forgotten fruit bat: ecology and conservation of the Comoros Roussette, *Rousettus obliviosus*

W.J. Trewhella [1] B.J. Sewall [2], and E.F. Granek [3]

[1] Department of Ecology & Biodiversity, The University of Hong Kong, SAR Hong Kong. Email: will.trewhella@notting.ac.uk
[2] Conservation Biology, University of Minnesota, 180 McNeal Hall, 1985 Buford Ave., St. Paul, MN 55108 USA.
[3] Zoology, Cordley Hall, University of Oregon, Corvallis, OR 97330, USA.

We present here the first study of the ecology and conservation of *Rousettus obliviosus*, a small Megachiropteran fruit bat endemic to the Comoros Islands in the West Indian Ocean. This species is broadly distributed on three of the Comoros Islands, but appears absent from the fourth, Mayotte. Total range for the species is less than 1,659 km^2. Roost sites are shallow and deep caves, and roosts are in dark locations with infrequent human disturbance. Colony size ranges from one hundred to several thousand, and at two sites we observed variation during different periods. Total known population size is 15,000–20,000. *R. obliviosus* appeared to use a variety of native and non-native trees for fruit and flower resources, and was found in agricultural areas, underplanted forest, and native forest habitats flying below, at, and above the forest canopy. *R. obliviosus* is a manoeuvrable flyer able to hover for brief periods, and may be using echolocation to navigate. A small range, sensitivity to human disturbance, limited availability of suitable roost sites, and deforestation combine to make the future of this species uncertain. Protection of known roost sites, further surveys to identify additional roost sites, conservation of remaining forest, and research focused on foraging and roosting ecology are priorities for the conservation of *R. obliviosus*.

Assessing the World Heritage values of a single taxon: the case of the spectacled flying-fox

David Westcott, Andrew Dennis, Adam McKeown and Matt Bradford

CSIRO, Sustainable Ecosystems and The Rainforest CRC, PO Box 790 Atherton Qld 4883, Australia.
Email: david.westcott@csiro.au

The Convention Concerning the Protection of the World Cultural and Natural Heritage (UNESCO 1972), forms the basis of the listing and protecting of places of significant global heritage. While the convention explicitly protects natural heritage, listing is restricted to places and land rather than moveable or temporal entities such as species. This means that application of the Convention to species is possible only through their habitat. The Convention's focus on places also means that its use to protect species must be done through the contribution of that species to the value of the place rather than value of the species itself. Can the value of a single species be assessed in the context of World Heritage Values? In this paper we examine the spectacled flying-fox in the context of the World Heritage Values of the Wet Tropics World Heritage Area. In our assessment spectacled flying-foxes contribute to all four natural heritage values for which the Wet Tropics gained World Heritage Status. For some of the area's World Heritage values, such as representation of a major stage in the earth's

evolutionary history, the spectacled flying-fox is a clear embodiment of that value. Through their participation in ecosystem processes, such as pollen and seed dispersal, spectacled flying-foxes also contribute to the maintenance of the ecosystems that under pin several of the World Heritage values. That they contribute to these processes is clear, however, their contribution relative to that of other species remains unquantified both in terms of its importance or even necessity. Few data exist for the significance of pollen dispersal by spectacled flying-foxes over and above the fact that flower feeding by the species is common in some contexts, particularly in sclerophyll forests. With respect to seed dispersal our current data suggests that the contribution of spectacled flying-foxes is most likely to be additive rather than unique or even particularly efficient. There are only a handful of plant species for which spectacled flying-foxes are the only known dispersers, and, for some of these, this situation is likely a sampling artefact. Unlike most dispersers, spectacled flying-foxes are capable of very long distance dispersal and dispersal across a wide variety of ecological boundaries. Once again, they are not unique in this. Spectacled flying-foxes probably contribute most significantly in providing long-distance and cross-boundary dispersal to cauliforous (trunk-fruiting) tree species. Taken together these observations lead to the conclusion that spectacled flying-foxes do make a significant, even if not unique, contribution to the World Heritage Values of the Wet Tropics. Protection of the region's World Heritage values therefore requires appropriate management of this, and other species, that underpin those values.

Spectacled flying-foxes, paralysis ticks and introduced *Solanum*: a novel and lethal ecological interaction

Andrew Dennis, Jenny Maclean, Ceinwen Edwards and Lisa Dwyer

CSIRO Sustainable Ecosystems and the Rainforest Cooperative Research Centre.
Tropical Forest Research Centre, P.O. Box 780, Atherton Qld 4883. Email: Andrew.Dennis@csiro.au

Spectacled flying-foxes, *Pteropus conspicillatus*, on the Atherton Tableland have suffered high levels of mortality from envenomation by paralysis ticks, *Ixodes holocyclus*, since at least the early 1990's. Bats carrying a single tick always die unless treated, suggesting they are not a natural host. A change in foraging behaviour to include the fruit of an introduced weed (wild tobacco, *Solanum mauritianum*) was thought to have brought the bats into contact with questing ticks. The hypothesis had never been adequately tested and remains controversial. This study used mortality and foraging data to design a sample regime to determine if paralysis ticks could infest flying-foxes while they were foraging on tobacco bushes. A sample of 2,479 mock bat foraging events on tobacco bushes resulted in the collection of 12 paralysis ticks at heights up to 1.7m. From our calculations based on infestation rates measured at a colony, we were expecting only one tick in each 2500 foraging events. The large number collected suggests:

1. Spectacled flying-foxes do acquire ticks from tobacco bushes;
2. Mortality from paralysis ticks may be significantly greater than that measured at colonies. Many bats may die and fall undetected away from colonies.

While wild tobacco may not be the only source of infestations, our results suggest that a campaign of tobacco bush eradication should significantly reduce mortality due to paralysis tick envenomation. A project to test this is now under development.

Lost and found – spectacles

Olivia Whybird

Phoniscus Environmental Services, P.O. Box 9 Millaa Millaa Qld 4886.
Email: Phoniscus@austarnet.com.au

Spectacled flying-foxes are an extremely important species to the wet tropics ecosystem as they are both pollinators and seed dispersers of rainforest trees. Monitoring was commenced in 1998 due to anecdotal evidence of a decline in the species. This monitoring suggested a decline in the number of bats especially between November 1998 and November 1999 (reduction of 35 percent). November counts estimate the population size, at a population low, they include adult bats and the surviving juveniles from the previous breeding season, but not the non-flying young of the season. The camps were located by checking all known camps - occupied during previous counts and historical camp sites. New sites of possible occupation were found through public information. Over 120 volunteers were organised to count the camps at fly-out. The fly-out counts were undertaken at all colonies on the 16th, 17th and 18th of November 2001. Very small camps were estimated from the ground, during the day. In previous years count numbers for each camp have been very similar over the three nights. Where variation existed it was due to better count locations or weather on subsequent nights. However this year fly-out directions and camp numbers fluctuated wildly. In some cases counters had the impression that some bats did not fly-out or visibility was low. In other cases movement between camps is suspected. The November 2001 survey has located over 187,000 Spectacled Flying-foxes, a larger total number of bats than any previous year. This increase can be explained by an increase in the number of camp sites located. If the same camps are compared between 1998 and 2001 there are a reduced number of bats. However the number for these camps is greater than in 1999 and 2000. The addition of two significant camp sites this year accounts for much of the increase in numbers. According to locals these camps have been occupied in the past and in greater numbers than during the survey. Even though more sites are known there are fewer camps occupied, however they contain a greater number of animals. Although the number of flying-foxes located is higher than previous years it is still much less than the number of flying-foxes seen in the past. There has been some decreases in threatening processes including tick paralysis and damage mitigation in fruit farms. This survey has greatly increased the knowledge of the species behaviour, distribution and population trends. But until we understand more about flying-fox behaviour it is very hard to collect comparable results.

An assessment of counter accuracy in camp fly-out counts

David Westcott and Adam McKeown

CSIRO Sustainable Ecosystems and the Rainforest Cooperative Research Centre.
Tropical Forest Research Centre, P.O. Box 780, Atherton Qld 4883.

Estimating population sizes is a fundamental part of any wildlife management program and inevitably incorporates errors. Understanding the nature of these errors provides: i) an indication of the likely accuracy of surveys; ii) guidelines for the degree of data interpretation; and, iii) potential means of improving survey methodologies. Like all animals, flying-foxes present their own special challenges for survey attempts. One method, fly-out counts, is currently used in North Queensland to monitor population sizes of Spectacled Flying-foxes, *Pteropus conspicillatus*, and in NSW with Grey-headed Flying-foxes, *P. poliocephalus*. These counts provide a quantitative assessment of population behaviour for these species, the importance of which is only highlighted by their current conservation status. In this paper we present an assessment of the accuracy with which counters are able to estimate fly-out size. Fly-out counts are performed by volunteers, with a number assigned to each camp. Counters are stationed in positions around camps which give them a good view of each fly-out stream. Each counter then estimates the number of flying-foxes in their stream or side of the camp. Population estimates for each camp are calculated from the estimates of individual counters, and in some cases overall population estimates are derived from these camp estimates. There are a number

of stages at which errors can enter in this processes, however, of fundamental importance is the accuracy of individual counters. We assessed counter error at camps by identifying a "window" in which flying-foxes were counted. This window was framed using landscape features such as telephone poles and wires. Individual counts were performed onto audiotape and simultaneously videotaped using a low-light video camera. Minimum fly-out size was subsequently determined from the video tape and compared with the individual audio counts. Comparison of the estimates of fly-out size by individual counters showed high levels of variation, maximum variation ranged between 25 and 100% of the video count. Variance between counters increased with time from start of count, potentially due to i) light conditions, ii) fatigue, and/or iii) compounding errors. When all counts of single fly outs are averaged, the estimate was generally lower than that of the video count. Based on our data and assuming no error other than counter errors, the population estimates in this study would at best have been within ± 13% and at worst ± 35% of the video estimate.

The Food for Wildlife Project: turning research into action

Nicola Markus

Consultant Zoologist, Brisbane, Qld. Ph: 0438 125 266. Email: nmarkus30@hotmail.com

In the past 15 years, a number of detailed studies have enhanced our understanding of flying-fox ecology. Declining forests, loss of foraging and roosting habitat, and human/wildlife conflict pose serious threats to flying-foxes worldwide, and to at least two species in Australia. In response to diminishing forest resources, flying-fox populations have increased in areas of dense human settlement, where cultivated food resources in suburban gardens and green spaces provide comparatively reliable floral resources throughout the year. However, a recent radio-tracking study in Brisbane showed that there are substantial gaps in the annual menu of flying-foxes even in urban areas. The Food for Wildlife Project is a pro-active community initiative to ameliorate seasonal resource shortages in suburban Brisbane, Queensland. The project is a collaboration of three local councils, Greening Australia and other non-government organisations and will coordinate the involvement of more than 40 volunteer bushcare groups with the aid of Natural Heritage Trust funding and in-kind contributions. Using a two-tiered approach, the project will focus on the restoration and maintenance of five established urban flying-fox camps, and on the planting of native food-yielding trees and shrubs of local provenance in surrounding urban greenspaces. The planting of 30,000 trees, accompanied by an extensive public awareness program, in the first year will benefit a wide range of birds, mammals and insects in addition to local flying-fox populations. It is hoped that the project will encourage further initiatives to accommodate wildlife in urban areas.

A structured decision-aiding approach for the establishment of an alternate camp site for the grey-headed flying-fox *Pteropus poliocephalus* in Melbourne

Tim Clancy, Andrew Bearlin, Lindy Lumsden and Ian Temby

Arthur Rylah Institute for Environmental Research, Department of Natural Resources & Environment, PO Box 137, Heidelberg Vic 3084.

In March 2001, the Victorian Minister for Environment and Conservation announced the establishment of a Task Force to investigate the option of providing an alternative roost site for grey-headed flying-fox as part of a broader strategy to alleviate damage to the Melbourne Royal Botanical Gardens. Provision of an alternative roost site was seen as a positive way of reducing numbers of flying-foxes in RBG while still allowing for the conservation of the species in Victoria. A range of sources was used to build a conceptual model of what a potential camp site would look like, including the size of the area, the structure of the vegetation, and proximity to water, foraging areas and the existing site at the RBG. Anthropogenic factors such as land tenure, distance to houses, extent and land use within buffer zones, were also included. GIS techniques were used to identify potential sites within a 20 km radius of the

RBG, which were then examined and assessed in relation to the conceptual model. Potential sites were scored and prioritised using a Multiple Criteria Decision Model. This decision support tool engages the decision maker in the process of assigning weights to the criteria selected. Weights were based on the best understanding of the biology of the grey-headed flying-fox and of factors likely to influence camp establishment, including social issues and costs. The decision aiding tool was also useful in the development of an active adaptive management framework for the relocation attempt. A site along the Yarra River in Ivanhoe (Wilsons Reserve – Horseshoe Bend) was selected, which has subsequently been approved by government as the preferred location for the trial establishment of an alternate roost site for the grey-headed flying-fox in Melbourne.

Neighbours of the Ku-ring-gai Flying-fox Reserve: community attitudes survey 2001

Elisabeth Larsen [1], Marjorie Beck [2], Elizabeth Hartnell [2], Michael Creenaune [3]

[1] Division of Environmental and Life Sciences, Macquarie University, NSW 2101.
[2] Ku-ring-gai Bat Conservation Society Inc., PO Box 607, Gordon, NSW 2072.
[3] Michael Creenaune & Associates, 7 Eden St., Chatswood, NSW 2067.

The Grey-headed Flying-fox was listed as a vulnerable species (Schedule 2) under the *NSW Threatened Species Conservation Act 1995* in May 2001. As a result of this listing, the NSW National Parks and Wildlife Service is required to prepare a Recovery Plan for the grey-headed flying-fox. To assist in the planning process, a community survey was conducted by the Ku-ring-gai Bat Conservation Society (KBCS) in November 2001 among residential properties neighbouring the Ku-ring-gai Flying-fox Reserve in Gordon, Sydney. Grey-headed flying-foxes have occupied this Reserve for most of the year since 1965. Door-to-door interviews were carried out among 126 properties, including 25 properties following the two main dusk fly-out paths. The survey was aimed at examining residents attitudes to flying-foxes, and how these attitudes are affected by a series of variables, including the location of properties relative to the flying-fox colony, the residents' general awareness of flying-fox ecology and the management of the Reserve, and the effectiveness of KBCS' education activities. The majority of the respondents stated a strongly positive (28%) or positive (28%) attitude to living near the flying-fox colony. Only 11% stated a negative or strongly negative attitude, with as many as 32% being neutral. Smell and noise rated highest among the reasons for negative attitude change. There is an indication that the distance from the house to the edge of the flying-fox colony affects attitudes. Households living more than 100m from the edge of the colony generally expressed a positive attitude toward flying-foxes. The most adverse comments received were from people living closer than 100m. However, 60% stated that the presence of the colony does not affect property values. As many as 82% of the respondents had no awareness of the management plan for the Reserve, and only 50% were aware of the habitat restoration program. Although the KBCS has an extensive education program targeting schools and the wider community, it was disappointing that the education program seems to have reached only approximately 50% of the respondents. Although 67% knew that flying-foxes carry diseases dangerous to humans, more than 50% answered incorrectly about the potential causes for disease transmission. Furthermore, 80% did not know what causes the fluctuations in flying-fox numbers in the colony. This result suggests that the way information is disseminated to the local residents needs to be reassessed. Despite the lack of knowledge, a majority of the residents expressed appreciation of the bats, with 71% agreeing that 'Living near the colony is a source of interest and enjoyment to me' (43% strongly agreed, 28% agreed). Only 8% disagreed with this statement. Also, as many as 74% stated that they would choose to live as near to the flying-fox colony again.

Raising public awareness of spectacled flying-fox issues – an NHT project about partnerships

Jenny Maclean

Tolga Bat Rescue & Research, PO Box 685 Atherton Qld 4883.

The summary in the grant application read – "This project will raise public awareness of the threatening processes affecting the spectacled flying-fox on the Atherton Tablelands. The listing of SFFs as a threatened species appears imminent. Education of the community will ease them through an acceptance of this species as a valued keystone species with natural resource management issues. Skills development and training can be gained through on the ground projects run in conjunction with the rescue of SFFs with tick paralysis. These projects will also serve to close some gaps in knowledge of the species and so help determine future management."

The outcomes of the project have been:

1. Improved community knowledge and understanding of SFF issues. This has involved educational talks; film, radio, television and print media
2. Identification of wild tobacco as the main source of paralysis ticks for SFFs. Our partner is Dr. Andrew Dennis from CSIRO.
3. Removal of canine teeth from 245 dead adult SFFs for age analysis work. Our partners are Dr. David Blair *et al* from JCU who are applying for grants for the laboratory work. On Les Hall's advice, we also removed the penis bone for age analysis work on all dead males – 77 altogether.
4. Removal of wing tissue from 73 dead bats for JCU's molecular genetics project.
5. Improving the management of tick paralysis in SFF. Our partners have been Prof. Rick Atwell from UQ and Merial, a veterinary pharmaceutical company.
6. Information about the incidence of tick paralysis in SFFs on the Atherton Tablelands – 10 percent of the population at the Tolga Scrub colony this year.
7. The provision of rich volunteering experiences for the community.
8. The development and production of educational poster and car stickers.
9. The release in 2002 of about 90 adults and 105 orphans back to the wild.
10. Identification of the high incidence of severe cleft palate in SFF young born 2001. (Similar to 1998). Karyotyping work being done on fresh blood by Dr Graham Webb from Adelaide.

This project has been made easier by the provision of a new computer and peripherals from an IYV grant, free t-shirts for all volunteers from another IYV grant and free soap powder for the bat hospital from Planet Arc (buy Planet Arc products!). We will continue to collect 'body parts' for JCU over the next few years in the belief that it will yield important information for SFF population modelling and management plans.

QPWS policy for issuing damage mitigation permits for flying-fox mitigation in commercial fruit crops

Bruno Greimel

Wildlife Management, Queensland Parks and Wildlife Service.

Flying-foxes and fruit growers have a history of conflict that can be traced back to early European settlement. The conservation status of flying-foxes enjoys a similar colourful history. It was only 10 years ago that, with the assent of the *Nature Conservation Act* 1992 flying-foxes were permanently classified as protected wildlife in Queensland. The main objective of the Act is the conservation of nature. While this includes the conservation and management of all protected wildlife, the Act regulates other aspects of wildlife management, such as recreational keeping of wildlife, the sustainable use of wildlife and the lawful taking of common protected wildlife that causes significant economic loss under a damage mitigation permit. It is well documented that flying-foxes can cause significant damage to commercial fruit crops and growers have traditionally employed lethal control methods for crop

protection. In relation to crop damage, there are four species of fruit bats of concern: the grey-headed flying-fox (*Pteropus poliocephalus*), the spectacled flying-fox (*P. conspicillatus*), the little red flying-fox (*P. scapulatus*) and the black flying-fox (*P. alecto*). All species are currently listed as common wildlife under Queensland legislation, although the conservation status of *P. conspicillatus* and *P. poliocephalus* is currently under review. As a result of advice regarding the inhumaneness of this practice and of concerns regarding the ecological sustainability of using lethal electric grids, QPWS has banned the use of these devices and over the past year, has considerably changed the way in which damage mitigation permits are assessed and issued. This change in policy reflects a move towards a more comprehensive conservation strategy for flying-foxes and collaborative partnerships with growers to achieve sustainable crop protection.

Managing flying-fox colonies in urban areas

Christiane Roetgers

Wildlife Management, Queensland Parks and Wildlife Service.

Flying-foxes are subject to a number of threatening processes, particularly the loss of habitat through large scale clearing. This shift in the availability of resources is thought to have brought many flying-fox colonies closer to urban areas. Conflicts arise when flying-foxes select a camp site in or near residential areas and residents complain about noise, smell and disease implications. Community pressure is often very high to shift flying-fox colonies away from the close proximity of human residences. However the dispersal or movement of a flying-fox colony can be a difficult task, requiring resources such as money, time and staff and under no circumstances is a success guaranteed. Often colonies will only move short distances and create the same problem for other members of the community. Under the *Nature Conservation Act 1992* and associated regulations flying-foxes are a protected native species and the interference with a protected species requires a permit under the Act. Section 234 of the *Nature Conservation Regulation 1994* further restricts the interference with animal roost sites and during times when young are present. To ensure consistency Queensland Parks and Wildlife Service (QPWS) responses to complaints about flying-fox camps in urban areas, QPWS has developed a policy for managing flying-fox camps in urban areas. The policy recognises that it is not feasible to provide uniform directions regarding the movement of flying-fox camps due to the unique circumstances of each individual situation. However it provides a framework, which guides decision makers in the dealings with urban flying-fox camps and sets out procedures to be followed in the decision-making process. This paper will outline the guidelines and procedures put in place by the QPWS in response to public complaints about flying-fox camps in urban areas and discuss practical examples of the use of this policy in Queensland.

Putting bat biodiversity on the map: a global bat GIS

Allyson Walsh [1], Kate Jones [2], Wes Sechrest [2] and John Gittleman [2]

[1] Bat Conservation International, Austin , Texas, USA.
[2] University of Virginia, Charlottesville, Virginia, USA.

The geographic ranges of species are profoundly important to our understanding and ultimately conserving ecological diversity. Worldwide, bats constitute over ¼ of all mammalian biodiversity and over a half of the thousand species of bats are threatened or near threatened with extinction. To understand the patterns of threats facing bats, and identify how and where effort should be invested to have maximum impact on the future conservation of bat biodiversity, a crucial element is an analytically rigorous data set of species geographic ranges. We are therefore constructing a taxonomically complete geographical information database (GIS) of geographic ranges for all extant bat species worldwide. Extent of occurrence maps are being generated from the latest information (publications and unpublished records), and where point locality data is limited, a variety of range estimation

techniques are being applied. The process of data collation and quality checking will involve a network of experts and researchers in the field, in particular we are collaborating with a consortium currently developing a global database of terrestrial vertebrate distributions and life history data. Consortium members include the IUCN, CABS / Conservation International, University of Virginia, Institute of Zoology London, Leiden University and the IUCN. The completed GIS will be a publicly available resource on the web that will provide information to test hypotheses for explaining variation in range distributions in bats, and, more generally, to assist in establishing and refining conservation priorities. Importantly it will serve as a focus for future geospatial mapping and will highlight poorly surveyed areas and those species whose distributions are poorly known.

A short tale – getting the hang of New Zealand bats

Marieke Lettink

Department of Conservation, New Zealand.

The bat fauna of New Zealand consists of two species of microbat (the long-tailed bat *Chalinolobus tuberculatus*, and the lesser short-tailed bat *Mystacina tuberculata*). A third species (*M. robusta*) was last recorded during the 1960s and may now be extinct. Both extant species have undergone a considerable decline in abundance since pre-European times and continue to face a number of threats, including loss of foraging and roosting habitat and predation. This talk will cover aspects of the historical and cultural significance of bats (or *peka peka*) to Maori, and highlight emerging themes from past and present research. A Bat Recovery Plan (Department of Conservation) is now in place to address research and management issues, and ultimately, to preserve and restore bat populations throughout New Zealand.

Adapting to habitat change in rural environments: a comparison of the roosting ecology of the lesser long-eared bat *Nyctophilus geoffroyi* and Gould's wattled bat *Chalinolobus gouldii* in contrasting rural landscapes

Lindy Lumsden [1, 2], and Andrew Bennett [2]

[1] Arthur Rylah Institute for Environmental Research, PO Box 137, Heidelberg, Vic 3084.
[2] School of Ecology and Environment, Deakin University, 221 Burwood Highway, Burwood, Vic 3125.

Roost sites are a critical habitat requirement for bats. There is now increasing knowledge of the roosting ecology of Australian tree-hole roosting bats, but little is known about the influence on roost site selection and roosting behaviour of differing levels of availability of roosts. Extensive clearing throughout agricultural regions of southern Australia has resulted in an overall reduction, and marked local variation, in the availability of potential roost sites. We propose five ways in which tree-hole roosting bats could respond to this change in roost abundance:

1. use a broader range of roost sites by being less specific in roost selection;
2. use fewer roosts by shifting between roost sites less frequently;
3. move regularly between roosts, but re-use roosts more frequently;
4. occupy a larger roost area by moving greater distances between roosts;
5. increase colony sizes so that fewer roosts are required for the population.

To investigate these options, we compared the roosting ecology of two species of common and widespread vespertilionids, the Lesser Long-eared Bat *Nyctophilus geoffroyi* and Gould's Wattled Bat *Chalinolobus gouldii*, between two study areas with contrasting tree cover, in rural environments of northern Victoria. The Barmah area included farmland and adjacent extensive forests along the Murray River floodplain; while the Naring area consisted of small remnants of woodland vegetation within an intensive agricultural region, with less than 5% tree cover remaining. At Barmah, 45 *N. geoffroyi* and 27

C. gouldii were radio-tracked resulting in the location of 139 and 89 roosts, respectively. At Naring, 34 *N. geoffroyi* and 25 *C. gouldii* were radio-tracked resulting in the location of 86 and 62 roosts. *C. gouldii* selected similar types of roosts in both areas – predominantly dead spouts on large, live trees. *N. geoffroyi*, however, utilised a broader range of roost types, especially for maternity roosts. At Barmah, these were predominantly narrow fissures in large-diameter, dead trees, while at Naring maternity roosts were also found under bark, in buildings, and in small-diameter, live and dead trees. Individuals shifted roost sites regularly in both areas, however, *N. geoffroyi* shifted significantly less frequently at Naring (2.5 vs 1.8 days), with a similar (but non-significant) trend for *C. gouldii* (2.5 vs 2.0 days). *C. gouldii* re-used roosts twice as often at Naring compared to Barmah, while roosts were re-used at a similar rate by *N. geoffroyi* in both areas. When *N. geoffroyi* moved to a new roost, the distance travelled was greater at Naring than at Barmah, while *C. gouldii* did not vary in this respect. Colony sizes for both male and female *N. geoffroyi* were similar in the two study areas, while colony sizes were either similar (females) or smaller (males) for *C. gouldii* at Naring compared with Barmah. These differences in roosting ecology of *N. geoffroyi* and *C. gouldii* between study areas show that bats do not necessarily respond to changes in roost abundance in the same way. This suggests that habitat loss and modification in rural environments may affect population and behavioural processes of bats in different ways.

Does increased forest clutter force bats onto the edges?

Maria Adams

Institute for Conservation Biology, Dept. of Biological Sciences, University of Wollongong, NSW, 2522.
Email: mda01@uow.edu.au

Vespadelus vulturnus is a commonly trapped and detected bat in the forests of southeastern NSW, yet little is known of its ability to commute and forage within forested areas affected by logging. Current local logging practices incorporate the conservation of “habitat” trees for wildlife, thus ensuring the maintenance of some roosting sites for bats and other fauna. However, consideration is not given to the capacity of logged forests to support bat species with a variety of wing morphologies, echolocation call structures and, thus, differing commuting and foraging strategies. *V. vulturnus* is one species that may be negatively impacted by the increased structural clutter of young regrowth forest, which tends to have a higher density of stems and fewer/smaller gaps than old regrowth forest. This bat has been shown to forage between the canopy and understorey forest layers, flying close to vegetation and within gaps in the vegetation (O’Neill and Taylor 1986). While highly agile and manoeuvrable in flight, it does not appear to utilise denser areas within vegetation, such as has been demonstrated by the slower-flying *Nyctophilus* species. In the summer of 2002, *V. vulturnus* individuals were trapped on tracks adjacent to old regrowth (little or no logging for 60+ years) and young regrowth (heavy logging ~30 years ago) sites in *Eucalyptus maculata* forest north of Batemans Bay, NSW. A cyalume light tag was attached to each individual and the bats were released at a point 50 m or more from the track at the same site. Observers were positioned around the perimeter of a 30 m radius circle, with the release point at its centre. A 50 m radius circle was also marked out from the same point. Observers recorded activity height and type and the times of leaving/entering the 30 and 50 m radius circles for each light-tagged bat. As of February 2002, field work was still being undertaken, however early indications are that *V. vulturnus* spends more flight time in old regrowth sites than in young regrowth sites. Time spent within both the 30 and 50 m radius circles was greater in old regrowth and there were more observations of bats returning to the observation area after having exited. In contrast, in young regrowth most bats left the forest at canopy level, often before reaching the 30 m perimeter, and observations of returning bats were almost non-existent. Individuals in old regrowth demonstrated more apparent foraging activity from the shrub level up to the canopy, while those bats released in young regrowth tended to show a more direct climbing flight, finally disappearing at canopy level. The results of all replicate sites will be presented and the advantages and disadvantages of the methods used discussed.

O’Neill, M. G. and Taylor, R. J. (1986). Observations on the flight patterns and foraging behaviour of Tasmanian bats. *Australian Wildlife Research* 13: 427-432.

Tracks and riparian zones facilitate the use of regrowth forest by insectivorous bats

Bradley Law and Mark Chidel

Research and Development Division, State Forests of NSW, PO Box 100, Beecroft, NSW, 2119.

Little is known about habitat use by Australian microbats, although it is a key issue when assessing impacts from logging. Logging results in a successional change in forest structure from open (extent depends on whether logging is clear-fell or selective) immediately after logging to dense young regrowth as the forest regenerates. Regrowth eventually either self-thins slowly or is silviculturally thinned to produce a forest that has structural similarities to mature forest. We used bat detectors to compare activity between unlogged and regrowth forest 15 years after logging (pre-thinning age). Management history was replicated at the scale of small catchments, with detectors positioned on-tracks, off-tracks and in small riparian zones. The study was undertaken in wet sclerophyll forest in Chichester State Forest, northern NSW. The highest bat activity was recorded on-tracks, with no significant difference between regrowth or unlogged catchments (regrowth=183 passes/night, unlogged=196 passes/night). Activity in riparian zones (regrowth=55 passes/night, unlogged=26 passes/night) was lower, while activity off-tracks in regrowth (5 passes/night) was lowest. Clutter formed by regrowth eucalypts and understorey rainforest had a significant negative relationship with bat activity. Similar to activity, the number of species and foraging attempts was lowest off-tracks in regrowth and highest on-tracks (irrespective of treatment). Identification of calls to species revealed the species which used tracks and those that did not benefit from the presence of tracks. Our results suggest that many bat species are able to use otherwise unsuitable regrowth forest by focusing their activity on tracks and to some extent small riparian zones.

The box-ironbark forests of central-western New South Wales are a distinct stronghold for *Nyctophilus timoriensis* (southeastern form)

Murray Ellis [1] and Christopher Turbill [2]

[1] NSW National Parks and Wildlife Service, Western Directorate, Dubbo.
[2] Zoology, School of Biological, Biomedical, and Molecular Sciences, University of New England, Armidale, 2351. Email: cturbill@hotmail.com

Little is known about the habitat preferences or general ecology of the south-eastern form (species) of *Nyctophilus timoriensis*, which has been captured rarely and sporadically across its range within the Murray Darling Basin (MDB). It was therefore of interest that 80 *N. timoriensis* were caught in harp traps out of a total of 935 bat captures during recent vertebrate fauna surveys in the Brigalow Belt South bioregion of central-western NSW. *Nyctophilus timoriensis* comprised 8.8 % of total bat captures in Pilliga West State Forest (0.3 captures per harp-trap night), 7.0 % of total bat captures in Pilliga East State Forest/Pilliga Nature Reserve (0.6 captures per harp-trap night) and 6.6 % of total bat captures in Goonoo State Forest (0.14 captures per harp-trap night). A comparison with very low capture rates elsewhere in the MDB (i.e. 0.02 per harp-trap night in woodland of NW NSW and 0.06 per harp-trap night in mallee of SW NSW) indicates that the box-ironbark forests of central-western NSW are a distinct stronghold for this vulnerable species (EPBC Act 1999). Within the Pilliga and Goonoo forests, *N. timoriensis* was relatively common in vegetation dominated by box and/or ironbark species, with scattered or dense patches of cypress pines and a shrubby understorey; but was also captured in belah (*Allocasuarina cristata*) and red gum dominated forests. *Nyctophilus timoriensis* was sympatric with *N. gouldi* and *N. geoffroyi* in this region, from which it was distinguished its large size (mean FA of females: 46.4 mm, males: 43.6 mm; mean Wt of females: 16.7 g, males: 13.2 g) and relatively short, broad snout (outer canine width >5.6 mm).

History in a box: patterns of usage of bat roost boxes at Organ Pipes National Park 1994 to 2002

Robert Bender and Robert Irvine

Friends of Organ Pipes N.P., 9 Bailey Grove Ivanhoe Vic 3079.

10 roost boxes were installed in 1992 and first used in 1994. 27 more boxes have been added, and three removed, in small increments, each time changing the range of alternatives open to the bats using the area. Other animal species (especially rats and ants) have also at times occupied the boxes, some of them tolerant of bats, others intolerant, and these, too have affected the history of individual box usage by bats. Bat species rarely mix in the same box. The range of group sizes using particular boxes varies – some accommodate only large groups, others only bachelor males, others are used by a wide range of group sizes. Thick-walled boxes, installed from 1998, significantly affected usage of thinner-walled boxes installed earlier. A relationship is suggested between the experience with these boxes and the dynamics of natural forests, in which hollows appear, change shape and collapse, thus altering the usage of remaining hollows. Implications of what we have learned for design and management of other roost box projects.

Variability in numbers of long-tailed bats (*Chalinolobus tuberculatus*) roosting in Grand Canyon Cave, New Zealand: implications for monitoring population trends

Colin F. J. O'Donnell

Science and Research Unit, Department of Conservation, Private Bag, Christchurch, New Zealand.
Email: codonnell@doc.govt.nz

Counts of roosting bats undertaken within caves are used frequently as indicators of population size, long-term indices of population trends, and as measures of response to management. Numbers of New Zealand long-tailed bats (*Chalinolobus tuberculatus*) using Grand Canyon Cave were monitored over 8 years. Grand Canyon Cave is a focal point for one of the largest known populations in New Zealand. Its has been used by long-tailed bats consistently for >40 years. The aims were to examine the utility of cave-roost counts for long-term monitoring of population trends in this threatened species and to establish a baseline for future monitoring. Two population indices, number of bats counted roosting inside the cave during the day and net number emerging at dusk, were not significantly different. Monthly and daily counts were characterised by high variability. Indices varied significantly through the year but not between years. Distribution of bats within the cave was not random. Bats avoided roosting within 30 m of each entrance and larger groups were always concentrated along two 50 m stretches of cave ceiling. Large groups occurred when cave temperatures were 10-13^{o}C, suggesting an optimum temperature range. Maximum counts of 250 (day-roosting) and 358 (night-roosting) bats confirm that Grand Canyon Cave is significant as a site for *C. tuberculatus*. Bat numbers using the cave appear not to have declined over the last ca. 40 years, if maximum group size is indicative of population trend. Counts can be used as a baseline against which to judge future trends in the population of *C. tuberculatus* at Grand Canyon Cave and contribute to national monitoring of bat populations. Effects of variation can be overcome with standardisation of repeat counts, adopting a sampling frequency that provides sufficient power to detect changes, and use of statistical models that separate sampling effects from variance in bat activity.

Does roost cavity quality affect reproductive success in the New Zealand long-tailed bat? A preliminary investigation

Jane Sedgeley and Colin O'Donnell

Department of Zoology, University of Otago, Dunedin, New Zealand and Science and Research Unit, Department of Conservation, Private Bag, Christchurch, New Zealand. Email: mohua@xtra.co.nz

Roost cavity quality can profoundly affect reproductive success and survival in tree roosting bats. For example, roost temperature can influence length of the gestation period in breeding females, and post natal growth rates in young. This in turn can affect rate of over-winter survival. Roosting behaviour of a population of long-tailed bats, *Chalinolobus tuberculatus*, was studied in the Eglinton Valley, an extensive area of unlogged primary beech forest in Fiordland. Reproductive history of 789 marked bats was studied over seven summers. Annual productivity was consistently high (mean = 0.91 $\pm$ 0.07 SE juveniles/female weaned). However, probability of survival of juveniles to one year old varied from 0.26 - 0.88 (mean = 0.53 $\pm$ 0.06). In contrast, productivity and survival in a more northerly population of *C. tuberculatus* inhabiting a highly modified agricultural landscape (Hanging Rock, Canterbury; 163 bats were studied over 3 summers), was considerably lower. Productivity averaged 0.23 $\pm$ 6.66 young per parous female weaned. Probability of surviving the first year averaged 0.23. We assume cavities used by bats in unmodified forest are likely to be of higher quality than those used by bats in a highly modified landscape, and suggest roost quality is a contributory factor explaining the differential in productivity and survival between the two populations. We investigated differences in structural characteristics and internal microclimate of cavities used as maternity roost sites. In the Eglinton Valley roosts were in large diameter trees (mean = 96.1 $\pm$ 33.1 SD cm) and were small-moderate size knot-holes. The trees used at Hanging Rock had significantly smaller stem diameters (mean = 71.6 $\pm$ 48.6 SD cm), and cavity entrance and internal dimensions were significantly larger than Eglinton Valley roosts. Hanging Rock roosts were often poorly insulated, mean cavity wall thickness was 15.4 ± 9.6 cm, and internal roost temperature was highly variable often fluctuating in line with external ambient temperature. By contrast the cavity walls of Eglinton Valley roosts were significantly thicker (mean = 21.7 ± 11.1 cm) and internal temperatures were very stable. Thermal benefits of Hanging Rock roosts are likely to be further reduced because only comparatively small numbers of bats used the relatively large cavities. Mean roosting group size in Hanging Rock was 8.8 ± 7.6 bats (n = 63), compared with 34.7 ± 23.4 bats (n = 178) in Eglinton Valley. Other factors explaining differences in rates of productivity and survival between the two bat populations may include varying quality of foraging habitat, differential pressure from introduced predators, and quality of winter roost sites.

The structure of a tropical urban micro-bat community

Clare Hourigan

School of Tropical Biology and Ecology, James Cook University, Townsville Qld 4811.

I investigated the structuring of a micro-bat community in relation to variation in the urban environment in Townsville, tropical north Queensland. I determined the species composition and foraging activity of micro-bats within the area, and established if differences in the spatial distribution of species and foraging activity were influenced by gradients of environmental variation. To achieve this a random stratified sampling technique was adopted, and 32 sites across 8 habitat types (Old suburbs, Intermediate suburbs, New suburbs, Amenity grasslands, Riparian areas, Woodland areas, Cleared areas, and Gardens) were chosen to represent variation in the urban environment. Each site was sampled on three occasions using an automated ANABAT detector system. A number of environmental variables were measured at each site, including housing density, numbers of mercury and sodium vapour streetlights and foliage density. All species were identified from the recorded echolocation calls, and foraging activity was determined by the presence of feeding buzzes. Fifteen micro-bat species/groups from four different families were detected in Townsville, and of these, ten were recorded foraging. *Chaerephon jobensis* was the most spatially common species in this study, being detected at all 32 sites. This is perhaps due to the high intensity at which this species calls,

allowing it to be detected flying high above the canopy. *Nyctophilus spp.* and *Rhinolophus megaphyllus* were detected in a small number of sites in close proximity to natural woodland or in riparian habitats. As these species are gleaning insectivores and clutter foragers, they are strongly influenced by habitat fragmentation and, as such, are less common in disturbed habitats. Foraging activity was dominated by species belonging to the Molossid and Vespertilionid families. *Mormopterus loriae* alone contributed 28% of all feeding buzzes recorded, reflecting its ability to exploit urban environments. *Rhinolophus megaphyllus* and *Nyctophilus spp.* were not detected feeding. As these species are gleaning insectivores and clutter foragers they are less likely to be detected feeding than continuous aerial foragers. Multidimensional scaling of the environmental data revealed two distinct gradients in foliage density and urbanization across Townsville. The species richness and total foraging activity of the community were negatively correlated with the urbanization gradient, so that increases in urbanization lead to decreases in species richness and foraging activity. This suggests that few species of microbat benefit from urban development. Regression trees were used to determine the individual foraging preferences of micro-bats within this community and revealed that only *Mormopterus loriae* benefited from increased urbanization, as this species preferred to forage in areas with higher numbers of white streetlights. The remaining species preferred to forage in close proximity to natural vegetation, where there were low numbers of streetlights, within close proximity to freshwater or where housing densities were low. This suggests that the extent to which most species of microbat are able to exploit urban environments is limited.

Bat box study in suburban Brisbane

Monika Rhodes

Suburban Wildlife Research Group
Australian School of Environmental Studies, Griffith University, Nathan Qld 4111.

While South-east Queensland has lost 65% of its native vegetation since European settlement in the 1820's, its capital city, Brisbane, has only 1% of the pre-European bushland remaining. Although some vegetation has been replanted, many old mature eucalypts, which provide important roosts for bats and other arboreal vertebrates in suburbia, have been already lost and the remaining trees are in danger due to vegetation clearance and trimming. A decrease in roosting habitat is directly linked to a decrease of wildlife biodiversity in suburban areas. Nest boxes have been shown to provide successful nesting opportunities in environments where hollow availability is limited (e.g. Organ Pipes National Park, Victoria). In this study 70 bat boxes were installed between October and December 2000. Bat box monitoring started in January 2001. The first boxes were used by bats in the first six weeks. Although occupation progresses slowly, 25% of these boxes were occupied within the first year.

The population dynamics and roosting ecology of Gould's long-eared bat (*Nyctophilus gouldi*) in a coastal urban environment

Glenn Hoye

Fly By Night Bat Surveys PL, PO Box 271, Belmont NSW 2280.

A population of Gould's Long-eared Bat (*Nyctophilus gouldi*) utilising remnant palm forest in an urban setting near Newcastle, New South Wales was studied over a period of seven years. Bats were captured using collapsible harp traps at selected sites within Cabbage Palm forest with sampling initially undertaken over a range of seasons to ascertain seasonal fluctuations in the abundance and sexual composition of the population. All bats captured were sexed, measured and banded to allow identification of individuals. Capture and banding of free-flying juveniles present in the population from late November, was undertaken to allow the fate of known age individuals to be monitored. Selected bats were fitted with transmitters prior to release and tracked to diurnal roosts. 192 bats were captured on 534 occasions over a seven year period from March 1995 until January 2002. This included 173

individuals, captured initially as free-flying juveniles. Many bats were recaptured on a number of occasions with one female recaptured 15 times. Juvenile males were seldom recaptured as adults despite comprising over half of all juveniles recorded at the site. Juvenile females exhibited a high fidelity to the site from year to year. In contrast, juvenile males free-flying in late November, are virtually absent by the following July. This may be due to dispersal of juvenile males to other areas or/and increased mortality in juvenile males as opposed to higher rates of survival of juvenile females. The effects of periodic fire on the population are also discussed.

Roost and foraging ecology of the white-striped freetail bat (*Tadarida australis*) in suburban Brisbane

Monika Rhodes

Suburban Wildlife Research Group
Australian School of Environmental Studies, Griffith University, Nathan Qld 4111.

Tadarida australis is an abundant bat species and frequently heard foraging in suburban areas, yet very little is known about its roost and foraging ecology. Recent research in Brisbane shows *T. australis* to roost in hollows of mostly old eucalypts with colony sizes up to 300 individuals. Roost exits and fly-outs can be easily observed using ambient light at dusk and numbers can be counted by observing bats against the evening sky (visual monitoring). Anabat detectors were used to confirm identification. From May 2000 onwards, I monitored several known and newly found roost trees. Roost occupation, roost cohabitation, emergence time and behaviour were observed during a two year period. Foraging behaviour was observed using radio-telemetry in November 2001 (n=5). While radio-tracking *T. australis* in suburban Brisbane was very difficult, some new information emerged: *T. australis* used the Brisbane River and adjacent suburbs for foraging and returned to their roost after two hours. Individual bats were also found not to leave the roost every night. More radio-tracking will be undertaken in March 2002 using collars (n=6) instead of the glued attachment used here.

Specialisation and breadth of habitats used for foraging by Microchiroptera in south east Queensland

Martin P. Rhodes

Department of Veterinary Pathology, University of Queensland, Qld 4072

I observed habitat use of Microchiroptera in south east Queensland by light tagging. This is probably the best method at the moment, although potential biases have to be avoided. The strongest patterns within the eight species I examined were similar times spent in habitats, and frequent lack of habitat specialisation. The sum or percent times in habitats showed these patterns better than means, such as Habitat Use index. The 'evenness' or breadth of habitat use, was well described by the Shannon Diversity Index, and is as strong a characteristic of species habitat use as mean habitat use. Species that spent more time in the most cluttered habitat also had more even use of all habitats, and vice-versa (esp. *Tadarida australis*). This skewed the habitat use index of species with high times in cluttered habitats, such as *Phoniscus papuensis*. I compared habitat use to obstacle negotiation ability, measured in a flight chamber, and to wing morphology. The breadth of habitat use was correlated with obstacle negotiation ability, but was not correlated with 'standard' wing morphology descriptors (aspect ratio and wing loading). The (skewed) habitat use index was correlated with aspect ratio and wing loading, but not obstacle negotiation. The stronger relation between habitat breadth and obstacle negotiation suggests habitat use is related to morphological features other than wing aspect ratio and wing loading. Morphology that relates to the wing functions lift *and* thrust in *flapping* flight may be more strongly correlated with habitat use.

The bats that time forgot: Pliocene relicts in the Pilbara of Western Australia

Kyle Armstrong

Department of Zoology, The University of Western Australia, Crawley WA 6009.

The findings from my study on the Orange Leaf-nosed Bat *Rhinonicteris aurantius* are presented. There were two main lines of inquiry: the distribution and roost habitat; and the taxonomic status of the Pilbara population. Although widespread in the region, *R. aurantius* appeared restricted to certain rare types of underground structures for roosting including mines, gorge caves and granite rockpiles. Modelling the spatial distribution in the Pilbara using a GIS predicted that three main population subunits were present with infrequent dispersal over 'impediment' regions. Morphometric examination of the skull, noseleaf and wing revealed small but significant differences in the dimensions of the snout and the noseleaf between the Pilbara and the northern populations, but the taxon was otherwise conservative in terms of morphology. Snout size was further examined using measurements from x-rays, which confirmed the pattern of smaller nasal chamber size in Pilbara animals. The morphometric analyses provided a structural basis for differences found in the frequency of echolocation calls. Consistent with smaller snouts, Pilbara animals were found to have a higher call frequency (Fpeak) than those in the Kimberley and Northern Territory. The functional and ecological bases for these differences have yet to be examined. The final genetic component of the study entwined both lines of inquiry. Mitochondrial DNA markers showed evidence of subdivision between the spatial subpopulation units of the Pilbara modelled using GIS. Furthermore, they suggested that *R. aurantius* had existed as a set of semi-independent units throughout northern Australia for a long period of time. Minimum spanning network showed large differences between the Pilbara and Northern Territory populations. *R. aurantius* is a relict in the Pilbara, and the differences between the Pilbara and northern populations appear to have been shaped by their isolation by the Great Sandy Desert and the differences between the two environments. Thus, *R. aurantius* is part of a generalised track of evolution in the northwest as similar patterns are observed in other vertebrates.

The ecology of insectivorous bats in the Simpson Desert: roost site selection, food preferences and water availability

Amy Williams

School of Biological Sciences, University of Sydney.
Current address: Ecotone Ecological Consultants Pty Ltd, 39 Platt Street, Waratah, NSW 2298.

This honours project aimed to identify the species of insectivorous bats that occur in the Simpson Desert and to investigate aspects of their ecology, providing some insight into how bats successfully exploit this harsh, unpredictable environment. Roost site selection, food preferences and water availability will be the focus of this presentation. Seven species of insectivorous bats were positively identified with the combined use of harp traps, cave inspections and ultrasonic call recordings (using Anabat II detector systems). These species were *Nyctophilus geoffroyi, Vespadelus finlaysoni*, *Chalinolobus gouldii*, *Scotorepens balstoni*, *Taphozous hilli*, *Saccolaimus flaviventris* and *Tadarida australis*. A total of six *N. geoffroyi* roosts were located in tree hollows and under the bark of coolibah and gidgee trees, which were either dead or in the dead part of a living tree, and all roost entrances had a minor dimension of less than 4 cm. *N. geoffroyi* did not appear to be highly selective in its roost choice. Several roost caves of *Taphazous hilli* and *V. finlaysoni* were located and although a small sample size, these caves illustrated little consistent pattern of shape or size. This study showed that *S. balstoni*, *C. gouldii*, *N. geoffroyi*, *V. finlaysoni* and *T. hilli* consumed a variety of insect orders. Lepidoptera, Coleoptera, Hymenoptera, Hemiptera, Blattodea, Mantodea and Diptera were all positively identified in faecal pellets. Although there was some interspecific selectivity for softer or harder prey, and possibly an avoidance of the smaller size classes, these five species appear to be mostly opportunistic foragers. Overall, bats foraged most often over water, however they were also commonly found to forage in areas with no access to permanent water. High levels of bat activity were recorded

around rocks and the creek line at 'Painted Gorge' and the river system at 'Field River'. Neither site had permanent water in the vicinity. At 'Main Camp' where habitats were more open, activity was concentrated over permanent water. Larger sample sizes and further investigation during harsher periods of less rainfall, and during warmer months in the year, are necessary to evaluate the temporal stability of the results presented.

Utilisation of water resources by insectivorous bats in a semi-arid landscape

Andrea L Solly

School of Science & Engineering, University of Ballarat, PO Box 663, Mt. Helen, VIC, 3353.
Email: a.solly@ballarat.edu.au

The microbat fauna of the semi-arid regions of southeastern Australia represents a significant component of Australia's arid zone biodiversity. However due to its remote geographic location the bat fauna of these inland areas remain largely unstudied. All animals require a source of water to survive and the artificially boosted supplies of water resulting from farm dams may be a factor influencing current population sizes and distribution in semi-arid lands. Recent suggestions to close down artificial watering points to restore natural landscapes across former pastoral regions emphasises the need to investigate the ways in which water is used by bats and determine the possible effects of return to the original landscape. Through this study it is hoped to determine the significance of water available from earth tanks to bats in a semi-arid landscape including the distance bats move from roost sites to water and their movement patterns between water bodies. This will be possible through the use of banding and the recapturing of individuals at a number of different dams and radio-tracking. This study will also assess any seasonal change in the bat's response and how this varies at temporary and permanent dams. Radio-tracking will be used primarily to locate roost-sites to determine the distances roosting occurs from water bodies and to also measure the temperatures of the roosts inside and out, to determine the bat's water requirements. An ultraviolet light trap and anabat equipment will be simultaneously set at each water body and a corresponding site distant from water for two consecutive nights. This will determine if insect densities are greater in the vicinity of water bodies in xeric environments compared to sites removed from water and whether there is evidence of increased foraging activity by microbats near water. Preliminary results from Spring 2001 and Summer 2002, indicated that aerial insect abundance, principally beetles, moths and flies, was higher at sites located at water. Furthermore, bat activity as measured by frequency of echolocation calls was also higher near water. The prevalence of feeding activity at all sites suggests that in cooler months feeding activity takes precedence over drinking. Very few bats were seen to drink during periods of observation in the spring, however drinking was observed during the summer. It is considered that during times of higher water demand, summer and early autumn and during lactation, water consumption may take preference. Roosts have been located for two species *Nyctophilus geoffroyi* and *Chalinolobus gouldii* with distances ranging from 1 – 4 km from roost to closest watering point. Further studies will be conducted at replicated locations over all seasons as part of an ongoing three year study.

Impact of artificial watering points on the activity of arid zone microchiropterans

Nathalia Velez

School of Biological Science, University of New South Wales, Sydney NSW 2052.

Although fauna surveys have provided an insight into the occurrence and distribution of microchiropterans in the arid regions of Australia, only a limited number of studies have focused on the role of artificial watering points (AWPs) on the activity of bats in these environments. Therefore the Anabat (II) detection system was deployed around two earthen tanks within Sturt National Park in the far north west of NSW to survey microchiropteran activity. The aim of this study was to determine whether there was a significant difference between the activity levels, species richness and species diversity at the AWPs and two sites distant from each water impoundment. The results revealed that the majority of the seven taxa identified in the study area concentrated their activity at AWPs, with the dependence on water availability increasing from winter to spring. The species richness and diversity was also greater (up to five times) at these sites, than at sites away from water. These findings highlight the importance of this essential resource for arid zone microchiropterans and raise questions concerning the proposed plans to close some of these tanks within Sturt National Park in order to restore natural landscapes across former pastoral enterprises and sustain biodiversity.

Taxonomic and conservation status of *Taphozous troughtoni*

Terry Reardon [1] and Bruce Thomson [2]

[1] *South Australian Museum*
[2] *Queensland Parks and Wildlife Service*

Taphozous troughtoni (Troughton's sheathtail bat) was described by Tate in 1952, the type specimen collected from Rifle Creek near Mt Isa. Specimens identified as *T. troughtoni* are few in collections. In their revision of the Australian sheathtail bats, Chimimba and Kitchener (1991) recognised *troughtoni* as a distinct taxon based on four specimens. In 1999 The Bat Action Plan listed *T. troughtoni* as one of two Australian bat species as being Critically Endangered. The primary reasons for listing was that it was known from only three localities, one of which had recently been destroyed. There has been a persistent doubt as to the taxonomic status of *troughtoni*, that is, whether it is distinct from the widespread and partly sympatric *T. georgianus* (common sheathtail bat). A Recovery Plan for *T. troughtoni* was commissioned by Environment Australia though an NHT grant to Bruce Thomson and Terry Reardon. One of the key elements of the plan was to resolve the taxonomic status of *troughtoni*. A collecting trip to the Mt Isa region by the authors in March 2000, found *troughtoni* (as defined by Chimimba and Kitchener 1991), at several localities. Blood samples and some external measures were taken of some 15 specimens from the region. Preliminary allozyme electrophoresis on the blood samples showed that at three loci, two genetic types were present (apparent departure from Hardy-Weinberg equilibrium). There appeared to be a correlation between size and genotype, although the *troughtoni* genotype specimens, had measures outside those defined by Chimimba and Kitchener (1991). A handful of tissue samples from WA and eastern Qld *T. georgianus* became available, and these were subjected to allozyme analysis. These showed the surprising result that the *troughtoni* genotype ranged from Mt Isa to far eastern Qld while the *georgianus* genotype ranged from Mt Isa to northern WA. To fully check the apparent Hardy-Weinberg disequilibrium, and also to determine the area of overlap of the two genotypes, requited more sampling. Further NHT funding allowed us to survey through the region of overlap of genotypes in November/December 2001. Results from the allozyme analysis are presented and interpreted.

Size does matter

Chris Clague

Vision Touch and Hearing Research Centre, Department of Physiology and Pharmacology,
School of Biomedical Sciences, University of Queensland, St Lucia Qld 4072.

An investigation into the mechanisms determining bat community structure was undertaken in the upland wet sclerophyll zone of tropical Australia. Seven summer assemblages and five winter assemblages were identified and the mechanisms determining species membership investigated. The potential mechanisms of structure examined were size, flight morphospace, dietary ecospace, echolocation ecospace, structural environmental complexity, history and roost requirements. A source pool was generated and the species broken into five guilds based on foraging style (slow aerial insectivore, fast aerial insectivore, flycatching, gleaning and trawling). The source pool was found to be generally structured for size with only one species pair in the fast aerial insectivore guild and one species pair in the gleaning guild displaying overlap in size related morphospace. No overlaps were observed in the slow aerial insectivore, flycatcher or trawling guilds. The measures of flight morphospace were noted to have two gleaning guild species pairs in overlap at the source pool level, five species pairs in overlap in the fast aerial insectivore guild, five species pairs in overlap in the slow aerial insectivore guild and no overlaps were apparent in the flycatcher or trawling guilds. Echolocation ecospace was measured based upon the minimum frequency of the species calls and numerous overlaps were noted in the Steep-FM (gleaning) and FM echolocation guilds whilst no overlaps were apparent in the CF-FM guild (flycatcher). Dietary partitioning was investigated using gape as an estimate of the maximum manipulable prey size and echolocation parameters to determine the minimum detectable prey size. The slow aerial insectivore and gleaning guilds each had one overlap in this estimation of niche overlap. Environmental clutter, roost resources and history also influenced the membership of the identified assemblages. Competition between species overlapping in morphological or ecological space for one or more of the measured parameters is also suggested by the data to have a structuring influence through competitive exclusion and diffuse competition.

Anabat-computer survey for microbats: sampling considerations, call identification and analysis

Patrick Prevett

University of Ballarat, Mount Helen, Vic, 3355.

Detection of bats from their ultrasonic echolocation calls has gained acceptance as a convenient and efficient method of bat survey where the main purpose is to detect and identify the presence of bats. Some researchers have recently made the transition from detectors linked to tape recorders to detectors linked to laptop computers with the equipment enclosed in a waterproof box. It is generally recognised that a detector linked to a laptop via a zero crossing unit provides cleaner calls than calls recorded using a detector linked to a tape recorder. Processing time is also saved since calls are saved directly to disc. Often it is desirable to sample simultaneously at multiple sites using several sets of equipment. There are some obvious advantages in acquiring data simultaneously from multiple bat detector-computers deployed in the field. However few have reported on problems associated with simultaneous use of several sets of equipment or even considered the suitability of bat detectors for comparative studies. This technology is being applied to an assessment of the response of microbat guild structure to shelterwood management in a mixed species foothill forest. Before using anabat equipment in comparative studies it is important to be aware of the capability and limitations of the equipment. Initially 9 sets of equipment were assembled using cheap second-hand laptops to satisfy the initial sampling strategy and research design. Following some initial electronic problems I am trialling the use of 4 anabat-computers simultaneously and rescheduling site visits accordingly. Some loss in statistical power has been replaced with gains in equipment reliability and savings in time. Ultimately the sampling strategy chosen is a compromise between time available for the survey, equipment availability and the purpose for which the results will be used. Data collected in pilot studies

confirmed the desirability of sampling at least at 2 points simultaneously to counter the apparent uneven use of forest habitat by bats. Sampling on two or more nights will provide a more accurate understanding of nightly variation in bat activity. It is important to sample continuously throughout the night to detect those species that become active at different times. Whilst there are advantages in standing by a computer through the night and observing bat activity in the air and on screen simultaneously, monitor mode becomes a more attractive proposition in the early hours of the morning. Calibration of equipment is important to reduce differences in instrument sensitivity, vital when attempting to compare one site with another. Differences have been found in numbers of calls with detectors deployed side by side. To counter this we are building a device to improve calibration of the detectors. It will produce artificial ultrasonic sound tunable to imitate the sound frequencies produced by the species of bats present. Some species of bats with low amplitude calls are however less detectable than others. Low batteries may also contribute to glitches and failures during the course of the night. There are several potential sources of signal buffering in forest environments that may lead to underestimates of bat activity or (worse), spurious differences between sites. Of particular concern is the possibility that there is a reduction in bat ultrasonic sound reaching a detector due to absorption by vegetation clutter between source of sound emission and the microphone. Greater stem density may result in signal dispersion or loss particularly at certain frequencies. A software program has been developed which facilitates rapid identification of large numbers of bat calls in the study region. The scheme uses pulse parameters unique to individual species enabling stepwise discrimination leading to identification. The system is fully automated and offers substantial time savings in identification.

Acoustic dimorphism in *Rhinolophus philippinensis*

Roger B. Coles

Vision Touch and Hearing Research Centre, Department of Physiology and Pharmacology,
School of Biomedical Sciences, University of Queensland, St Lucia Qld 4072.

Traditionally, *Rhinolophus philippinensi*s has been represented in Australia by the single species or sub-species *R. philippinensis robertsi*, although up to 6 sub-species have been recognised throughout it's range in South East Asia. Two size morphs have been known in Australia since the early 1980's, readily distinguished by several external features (mean FA 57.6mm and 53.9mm for *R. p. maros*, and *R. p. achilles* respectively – Churchill 1999). Questions have been raised as to the taxonomic status of these forms, together with that of *R. megaphyllus*, and recent genetic evidence suggests that all three taxa are very closely related indeed (Cooper *et al* 1998). Both forms of *R. philippinensis* (and *R. megaphyllus*) are sympatric in the region of Cape York around Iron Range, but the distribution of the larger form of *R. philippinensis* extends further south to near Townsville. *R. megaphyllus* is distributed widely along the entire east coast of Australia as far south as eastern Victoria. In further support of the distinctiveness of the two forms of *R. philippinensis*, acoustical data reveal that the CF component of the echolocation call differs significantly between the two morphs. CF for the large (big) form is around 28kHz compared to 40kHz for the smaller 'intermediate' form, quite separate from *R. megaphyllus* echolocation call frequencies (CF 67-74kHz). These acoustic observations are consistent with the differing size and shape of the external ear (pinna) and noseleaf for each morphotype, and which determine the biophysical properties of their echolocation systems such as directionality and gain. The preferred use of such a low CF by the large form has been recorded in the field as well as from captive individuals. It is confirmed here as the expression of the first harmonic, in marked contrast to the dominance of the second harmonic in possibly all other Rhinolophids. As the CF is so low, it raises the question as to whether Doppler shift compensation is possible at all in the large form, and if not, whether there is any influence on the flight and foraging style between the two morphs, given that there are very few behavioural observations.

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Cooper *et al* (1998) *Australian Journal of Zoology* 46: 203-220.

Acoustic divergence in two cryptic *Hipposideros* species: a role for social selection?

Tigga Kingston, Marcia C. Lara, Gareth Jones, Zubaid Akbar
and Christopher J. Schneider

We present evidence that a relatively widespread and common bat from South East Asia comprises two morphologically cryptic but acoustically divergent species. A population of bicoloured leaf-nosed bat (*Hipposideros bicolor*) from Peninsular Malaysia exhibits a bimodal distribution of echolocation call frequencies, with peaks in the frequency of maximum energy at *ca*. 131 and 142 kHz. The two phonic types are genetically distinct, with a cytochrome *b* sequence divergence of just under 7%. We consider the mechanisms by which acoustic divergence in these species might arise. Differences in call frequency are not likely to effect resource partitioning by detectable prey size or functional range. However, ecological segregation may be achieved by differences in microhabitat use; the 131 kHz *H. bicolor* is characterized by significantly longer forearms, lower wing loading, a lower aspect ratio and a more rounded wingtip, features that are associated with greater manoeuvrability in flight that might enable it to forage in more cluttered environments relative to the 142 kHz phonic type. We suggest that acoustic divergence in these species is a consequence of social selection for receptor systems imposed by the highly specialized nature of the hipposiderid and rhinolophid echolocation system.

Bats of New Caledonia: Bioacoustics as a complementary inventory tool for bat conservation planning in a Melanesian biodiversity hotspot

Ronan A. Kirsch [1], Yves Tupinier, Grégory Beuneux and Ana Raihno

[1]Museum National d'Histoire Naturelle, Laboratoire Zoologie Mammifères & Oiseaux,
55 rue Buffon, 75005 Paris, France. Email: kirsch@mnhn.fr

The Melanesian archipelago of New Caledonia is a biological jewel identified as a rainforest biodiversity hotspot of major conservation importance in the Pacific Ocean region and world-wide. The nine bat species occurring on the territory (genera *Pteropus, Notopteris, Chalinolobus, Miniopterus,* and *Nyctophilus*) are poorly known and surveys have been conducted in 2000-2001 to improve our knowledge on the species systematics, distribution, and conservation status in the frame of the French Mammals Society's "*Strategy for the conservation of Bats and their Habitats in the Overseas Territories*". Analysis of time-expanded echolocation call spectrograms associated with eco-ethological observations of foraging allowed to produce a discrimination key that was used to improve our knowledge of the species distribution in the archipelago. We present partial results of our fieldwork in the archipelago, emphasising on two endemic microbats: the rediscovery of the New Caledonia wattled bat *Chalinolobus neocaledonicus,* and the validation of the *Miniopterus robustior* as the world most restricted species of bent-winged bat. The distributional data was incorporated into a Geographic Information System that will be used as an integrated tool for planning future research and building recommendations towards the conservation and sustainable management of fruit bats and vespertilionids in the archipelago.

Posters presentations

Proactive management of the bat *Macroderma gigas* in the Pilbara of WA

Stuart Anstee [1], Kyle Armstrong [2] and Neville Havelberg [1]

[1] Hamersley Iron Pty Ltd, GPO Box A42, Perth, WA 6837.
[2] Biota Environmental Sciences Pty Ltd, 2/186 Scarborough Beach Road, Mt Hawthorn WA 6016.

Hamersley Iron Pty Ltd has been involved in research on threatened or vulnerable Pilbara bats since 1996 and, more recently, has initiated three projects to manage *Macroderma gigas* in the region. The first project used materials left over from mining at the Tom Price iron ore mine to construct an artificial bat roost. A cylindrical railway culvert functions as the main chamber and the access tunnel was constructed from used haulpak truck tyres welded together. The structure was established on the top of a large waste dump between June – December 2001. Its location corresponds with that of bluff caves which occur typically below the mesa bluffs that occur in the region. The second project involves rendering barbed wire fences safe for *M. gigas*. A recent publication highlighted the adverse effect of barbed wire fences on this species in the region and recommended remedial action in 'hotspots' where the greatest numbers were becoming entangled (Armstrong and Anstee 2000). Hamersley Iron has commenced a qualitative experiment designed to determine the effectiveness of two possible solutions. The first was to replace the top barbed strand of wire on two 1km sections of fence. Interspersed between these sections, used aluminium cans were hung between the top and second barbed strands. The effectiveness of these solutions will be assessed through an ongoing program of regular fence checks, and improvements will be made if appropriate. The third project involves gating 10 adits between 46 – 265m deep constructed for bulk sampling of iron ore between 1969 – 1978. Entry to these adits is considered a safety hazard. Each adit was entered (with breathing apparatus due to the risk of asbestos fibres) to determine if *M. gigas* was present. *M. gigas* was observed in 6 adits and scat material was present in a further 2. The 10 adits are currently being gated with reinforced concrete mesh with sections measuring 20cm high by 40cm wide removed at the top for access by *M. gigas*. Future monitoring should establish whether *M. gigas* continues to use these habitats in spite of the presence of gates.

Armstrong, K.N. & Anstee, S.D. (2000). *Australian Mammalogy* 22: 93-101.

A survey of the bats along a proposed railway between Port Hedland and Hope Downs, Pilbara, Western Australia

Kyle Armstrong

Biota Environmental Sciences Pty Ltd, 2/186 Scarborough Beach Road, Mt Hawthorn WA 6016.

As part of a baseline biological survey to obtain approval for a proposed new railway, bat fauna were surveyed between Port Hedland and Hope Downs station in the Hamersley Range, a distance of approximately 400km. A variety of habitats were sampled, including large rivers with pools, smaller creeks and pools, granite rockpiles and adjacent flooded quarries, *Triodia* grasslands and mangal. Surveys were conducted by trapping with harp traps and mist nets, and by recording echolocation calls. A total of 163 bat call sequences were analysed. To determine bat species identification, three call variables were entered into the discriminant function from McKenzie and Muir (2000) to aid identification. Eight bat species were positively identified from call attributes. A further two species might have been present, but cannot be positively identified since their calls are difficult to distinguish from those of other bats in the region and also since they were not captured. *Macroderma gigas* was positively identified without capture bringing the total species richness to 9 bat species with 2 other possible species. This represents approximately half of the species previously recorded from the Pilbara. The construction of the railway was predicted to have no significant effect on any bat species. It was recommended that granite rockpiles not be quarried for construction material because of their importance for *M. gigas* and many other flora and fauna. Although *Rhinonicteris aurantius* is thought to

use these habitats on occasions, it was not recorded. Mangal habitats were identified as being in need of further survey work. This study represents one of the few relatively comprehensive studies of bat fauna in the region.

McKenzie, N.L. & Muir, W.P. (2000). *Records of the Western Australian Museum* Supplement 61: 465-477.

Monitoring the effects of RC drilling on colonies of *Rhinonicteris aurantius* and *Macroderma gigas* at the Klondyke Queen mine, Marble Bar, WA

Kyle Armstrong

Biota Environmental Sciences Pty Ltd, 2/186 Scarborough Beach Road, Mt Hawthorn WA 6016.

An evaluation drilling program conducted by Lynas Corporation in close proximity to the Klondyke Queen mine provided an opportunity to examine the effect of this type of disturbance on colonies of *Rhinonicteris aurantius* and *Macroderma gigas*. Prior to drilling, a plan was devised to minimise the disturbance to bats in the morning after they had returned from their nightly foraging activity, while at the same time minimising the cost of moving the drill rig to achieve this. Bats were subject to two types of disturbance: noise and vibration from the drill rig on the surface, and noise and vibration from the RC (Reverse Circulation) drill below the surface. Monitoring involved watching for bats exiting the mine during daytime drilling and listening for bats flying about within the mine (but not exiting) via bat detectors lowered through a hole in the roof of the mine. In addition, counts were made of *M. gigas* as they emerged at dusk to determine if the previous days drilling had caused some bats to seek roosts elsewhere. Only the presence or absence of *R. aurantius* could be monitored due to the difficulty of counting this species at this mine without introducing a further disturbance. Contingency plans were to be implemented if certain response types were detected from the bats. *R. aurantius* was always present during the drilling program. A marked increase in the number of *M. gigas* was observed, thought to be independent of the activities associated with the drilling program and possibly due to concurrent human activities in other local mines. It was concluded that while no response to drilling was detected in the short term, the cumulative effects of continued disturbance to the colony are predicted to be detrimental. The magnitude of the disturbance was also less than that originally planned, and less than that which has occurred previously from other mining activities. Since the population strongholds of these two species occur in a small number of mines in the eastern Pilbara, collaboration is required between parties who have these bat species on their leases to avoid concurrent impacts to colonies. The mines in this district need to be managed with greater care.

Fly-out census of spectacled flying-foxes in the Cairns central swamp

Sandra Clague, Jean Horton, Megan Laing, Neil Warburton, Nigel Weston, Chris Clague and Olivia Whybird

Wildlife Preservation Society of Queensland (Cairns), PO Box 1350 Cairns Qld 4870.

Cairns Branch of the Wildlife Preservation Society of Queensland has been monitoring the Cairns Central Swamp Spectacled Flying-fox camp monthly since early 1998. The monitoring has taken the form of fly-out counts with members stationed to count the various streams during the evening exodus from the camp. The swamp has been fragmented by urban development and the bats vary their location between the different remnants at various times. The counts have demonstrated a regular fluctuation in the numbers of bats in the camp with a maximum number present during the summer maternity period and a minimum in July / August. There also seems to be a seasonal pattern in the location of the camp in the various remnants of swamp, although extraneous damage to some areas by fire or wind appears to have influenced these movements.

Fanihi for the future? A survey of Mariana fruit bats (*Pteropus mariannus*) in the northern islands of the Mariana Archipelago

Nathan C. Johnson

Commonwealth of the Northern Mariana Islands, Division of Fish and Wildlife, P.O. Box 10007, Lower Base, Saipan, MP 96950. Email: nathancj@saipan.com

Eight of the remote northern islands in the Mariana archipelago were surveyed for the endemic Mariana fruit bat (*Pteropus mariannus*) [Latin], or *fanihi* [Chamorro] in July 2001. Many of these islands are subjected to severe feral ungulate damage and fruit bat poaching pressure. Surveys were conducted using evening/morning station counts, evening departure counts, direct colony counts, and aerial searches. The objectives of the bat surveys were to establish a more definite minimum population estimate, to obtain any valuable behavioral, foraging, or roosting observations, and help document the current status of the Mariana fruit bat in the Mariana archipelago. Fruit bat surveys performed in the year 2000 identified several new colonies and confirmed the disappearance of others. In 2001, there was a strong need to quantify the Mariana fruit bat population in such a way that migration between the islands in the archipelago could be eliminated as a factor that confounds population estimates. Therefore, all northern islands of the archipelago where Mariana fruit bats are known to occur were surveyed during a time period of short duration in order to minimize the chance of migration between the islands. Results indicated the presence of four new colonies and confirmed three of the year 2000 colonies utilizing the same roosting sites. It is believed that fruit bat populations on the islands of Anatahan and Pagan have declined dramatically since 1983 due to the cumulative effects of poaching and forest degradation by feral ungulates.

The Malaysian Bat Conservation Research Unit - research, capacity building, and education in an Old World hotspot

Tigga Kingston, James Elder, Suchi Gopal, Thomas H. Kunz and Zubaid Akbar

Peninsular Malaysia is a critical country for bat conservation, with over 100 known species and local richness estimates of more than 60 species. Insectivorous bats of the forest interior are an exceptionally diverse group in Malaysia (> 30 species) and are of particular conservation concern. These bats are characterized by ecomorphological specializations that equip them to forage in the forest understory, but may greatly constrain their ecological flexibility. They are ill-suited for prey detection and capture in more open habitats that arise from disturbance events, and as a consequence, they are likely to experience a severe decline in diversity as forest habitats are lost and fragmented. The Malaysian Bat Conservation Research Unit (MBCRU) was established to promote research and conservation education of this unique fauna. It is a collaboration between scientists from the USA (Boston University) and Malaysia (Universiti Kebangsaan Malaysia (UKM) and the Department of Wildlife and National Parks (DWNP)) and is supported by the National Science Foundation (USA). The primary objectives of the MBCRU are:

1. Long-term research into bat diversity and conservation in Malaysia. The primary research objective of the MBCRU is to investigate the patterns and processes affecting diversity in insectivorous bat communities in undisturbed rainforest. Our prior work demonstrated that bat species of the forest interior differ in several diversity parameters (e.g. local abundance and local species distribution patterns) that have the potential to inform relative extinction risk. The project will determine how consistent these patterns are both spatially and temporally and will investigate the ecological processes behind them.

2. Institutional capacity building in Malaysia. Development and acquisition of skills and resources in Malaysia to complete 1 above. We are supporting 4 Malaysian MSc students, running an annual workshop on survey techniques, and developing a field manual, photographic guide to bats, and an acoustic library.

3. Development and implementation of an education program. To highlight the diversity and biology of bats and the important contribution of Malaysia to international bat conservation. Talks and demonstration nights will be supported by the development of educational materials and a website.

Monitoring a population of the fishing *Myotis macropus*

Brad Law and Mark Chidel

Research and Development Division, State Forest of NSW, PO Box 100, Beecroft, NSW 2119.

Bats are inconspicuous and assessing their conservation status is difficult. Long-term monitoring provides one means of documenting the changes in abundance over time and in relation to particular management treatments. The ecological attribute of diurnal roosting in colonies means that local populations of bats are concentrated at one or a few locations. For the purposes of monitoring, this presents enormous advantages over populations that are naturally dispersed (e.g. birds). We present data on six years of annual trapping (constant trapping effort) and banding at a roost of the vulnerable Large-footed Myotis *Myotis macropus*, in Kerewong State Forest on the mid-north coast of NSW. This bat fishes for aquatic prey on the surface of still water. Because not all roost locations are known for this local population, we use mark-release-recapture techniques to model population size and account for the portion of the population that is not trapped each year. The number of individual bats caught annually between 1996 and 2001 varied between 40 and 94, with an increase in population size being evident over time. Recapture rates ranged between 33 % and 56 %. Annual population size is compared with rainfall during the sample years and a logging event that took place upstream of the bat's roost in 1999. Comparisons are also made between raw data capture rates and modelled annual population sizes between 1996 and 2001. The implications of using a monitoring method that can account for individuals not detected during a sampling event, but still present in the local population, are discussed.

Ecology of the Ryukyu flying-fox *Pteropus dasymallus inopinatus*

Kazumitsu Kinjo, Atsushi Nakamoto and Masako Izawa

Faculty of Science, University of the Ryukyus, Okinawa, Japan.

The Ryukyu flying-fox, *Pteropus dasymallus* is a medium-sized megabat endemic to Taiwan and the southwestern Ryukyu archipelago of Japan, which is the northern limit of distribution of the Pteropodidae. Body weight of the Ryukyu flying-fox is 400-500 g and forearm length is 135-145 mm. This bat is listed as an Endangered species in the IUCN Red List 2000 and is protected by Japanese law. This species is divided into four subspecies living in different islands. We have studied the ecology of a subspecies of the Ryukyu flying-fox *P. d. inopinatus* endemic to Okinawa-jima Island from 1995 by using radio-tracking, survey of field sign and night observation. The home range size varied from 5 ha to 800 ha among individuals, regardless of age or sex. Most individuals used more than two feeding sites and their distribution affected the home range size and movement pattern. They roosted in a thick canopy during the day. Roost sites were not fixed. While some used one site for a few months or less, some changed the site in a few days. They are considered to adapt to the urban environment, where they could feed on fruits in gardens and parks, and use green zones and old sacred forests in a town as a roost site. They were mainly solitary when at rest, feeding or on the move, though some interactions were observed at feeding sites. We discuss the habitat use of this species based on the above results.

Strategy for the Conservation of Bats and their Habitats in the French Overseas Territories

Ronan A. Kirsch

Muséum National d'Histoire Naturelle, Laboratoire Zoologie Mammifères & Oiseaux, 55 Rue Buffon 75005 PARIS, France.
Email: kirsch@mnhn.fr

France administers a certain number of overseas territories located mainly in the tropical regions of the world, most of them being archipelagos of geologically and biogeographically highly diverse histories that bear remarkable endemic floras and faunas. This situation implies a strong responsibility for the French authorities to preserve the biodiversity of exceptional tropical island ecosytems and related species which depends on their management. These territories include Guadeloupe archipelago and Martinique Island in the Caribbeans, French Guiana within the neotropical Guiana belt, Réunion and Mayotte Islands in the Indian Ocean, Wallis and Futuna Islands and the New Caledonia archipelago in the South-West Pacific. The chiropterofauna of these territories forms the largest group of mammals, represented by 10 families, 62 genus and 132 species, amongst which 15 are at risk of extinction and 17 near threatened according to the latest IUCN conservation status (IUCN 1992 & 2001). The French Mammals Society, through its Overseas Territories Bat Conservation Specialist Group has initiated a joint programme with local and national wildlife management agencies, national parks and protected areas, and local NGOs to develop a coherent conservation programme for bats in each of the French Overseas Territories. This strategy, running for 5 years, includes a revision of species systematics, the completion of distribution maps using bioacoustic and capture inventories, a process for setting species-oriented and habitats-oriented priorities with the input of atlas data into a conservation GIS and the synthesis of results into recommendations. The programme is also emphasizing conservation education and local capacity building for bat conservation, and is aimed at participating with regional programmes developed through the Chiroptera Specialist Group of the IUCN Species Survival Commission.

Effect of roost behaviour and sampling technique on sex ratio estimates in an inland cave bat (*Vespadelus findlaysoni*) population

Brendan Metcalf

5/16 Heron Place, Maddington WA 6109.

During fieldwork, it was noted that there was a difference in the roosting behaviour between the different sexes in a population of the Inland Cave Bat *Vespadelus finlaysoni*. Females appeared more likely to roost in large clusters whilst males were more likely to roost in smaller groups, often in hard to reach crevices. A cluster sampling technique was originally being used to sample the population, however it was thought that the difference in roosting behaviour might produce a sampling bias towards females. To test this hypothesis, two different sampling techniques were used:

1. Internal sampling - the cluster sampling technique, where a net was used to sample random clusters within the colony.
2. External sampling – a harp trap was used outside the cave to capture bats as they departed the cave.

The results showed a significant bias towards females in the cluster sampling technique, although the colony seemed to contain a greater number of females regardless. The external sampling technique, although more time consuming and requiring a greater amount of equipment, produced what is expected to be a less biased sample of the population.

Getting around: bats, birds and rainforest seeds in fragmented forests

Cath Moran, Carla Catterall, Ronda Green and Mike Olsen

Rainforest Co-operative Research Centre, Griffith University, Brisbane Qld. Email : c.moran@mailbox.gu.edu.au

It has been suggested that the abundance and distribution of fruit-eating bats and birds may be affected by forest fragmentation. Seeds of fleshy-fruited plants in subtropical rainforests are mostly dispersed by these frugivores. Changes in frugivore assemblages in fragmented landscapes may therefore have implications for the conservation of these taxa as well as for forest regeneration processes. A 400km^2 study region has been selected in subtropical southeast Queensland. Preliminary data from surveys of frugivorous bird assemblages show differences between large forest tracts, isolated remnants and patches of rainforest re-growth. This poster will outline our plans for comparing bat visitation to fruiting plants in fragmented and forested landscapes within the study region. Proposed means of interpreting consequences for rainforest seed dispersal and implications for forest management will also be discussed.

Ku-ring-gai Flying-fox Reserve habitat restoration project - phase 3

Nancy Pallin and Elizabeth Hartnell

Ku-ring-gai Bat Conservation Society Inc., P.O. Box 607, Gordon NSW 2072.

Ku-ring-gai Flying-fox Reserve at Gordon, a northern Sydney suburb, provides roosting habitat for the grey-headed flying-fox *Pteropus poliocephalus*. Weeds from urban gardens have invaded the bushland of the valley, smothering native plants including trees and preventing the recovery of roosting habitat. Phase 1 of the Habitat Restoration Project began in 1987. This poster paper reports on Phase 3, which has been financially supported by the landowner, Ku-ring-gai Municipal Council, the Commonwealth Government through the Natural Heritage Trust and donations. The NHT grant is dependent on the contributions of Ku-ring-gai Bat Conservation Society volunteer bush regenerators, the volunteer project manager and Council's maintenance allocation. Vegetation structure and composition is compared between treated and untreated areas which are occupied by the flying-foxes. Similarly, treated and untreated vegetation outside the area occupied by the flying-foxes is compared. The location of the flying-fox camp in the Reserve over time and the fluctuations in numbers of flying-foxes in residence will be shown. A KBCS supported preliminary study of climatic factors influencing camp site choice has been undertaken in the Reserve. This study is still in progress and has reached the stage of helping in decisions on improved experimental procedures. Recommendations for Phase 4 of the project are outlined.

A community driven microbat survey in the Mount Lofty region, South Australia – a progress report

Terry Reardon, Gerry Butler, Stan Flavel, Scott Philcox and Kaye Richardson

The bat fauna of the Mt Lofty region has never been thoroughly surveyed, despite its proximity to Adelaide. In fact there are surprisingly few bat records, and these have been sporadically collected over several decades, mainly as opportunistic records rather than from bat survey work. European settlement of the region began in 1836, and by 1976 (when the first comprehensive native vegetation assessment was conducted), 95 percent of the native vegetation had been cleared. The effect of habitat loss on bats must have been significant but the absence of early baseline information on bats means that the effect is difficult to quantify. This project aims to make a benchmark assessment of the bat fauna in the region. The survey method is based on bat call data (ANABAT). Although under the guidance of the South Australian Museum, the project is novel in that it is a community based project, conducted by landholders and funded through the Landcare program. This is the first season, and program has been a success in terms of the great number of landholders wanting to participate, and the data thus far generated.

Water, insects and microbats: is there a connection?

Andrea L. Solly and Patrick Prevett

School of Science & Engineering, University of Ballarat, PO Box 663, Mt. Helen, Vic, 3353.
Email: a.solly@ballarat.edu.au, p.prevett@ballarat.edu.au

Beetles, moths and flies are the *raison d'être* for insectivorous bats. Both insects and bats are often found in high concentrations around artificial water bodies in the arid zone. This study, conducted in far western New South Wales, attempts to determine whether water availability or insect presence at water is the reason for the concentration of bat activity at these sites. A study has been initiated to determine: whether insect densities are greater in the vicinity of water bodies in xeric environments compared to sites removed from water and; whether there is evidence of increased foraging activity by microbats near water. This is assessed by setting an ultraviolet light trap and anabat equipment simultaneously at each of 4 water bodies and 4 sites distant from water for 2 consecutive nights. Air temperature was recorded on site throughout each night using a temperature data logger. Preliminary results from spring 2001 and summer 2002, indicated that aerial insect abundance, principally beetles, moths and flies, was higher at sites located at water. Furthermore bat activity, as measured by frequency of echolocation calls, was also higher near water. In the analysis, insects were categorised according to taxon and size class since bats may discriminate food items on both criteria. The prevalence of feeding activity at all sites suggests that in cooler months feeding activity takes precedence over drinking. Very few bats were seen to drink during periods of observation during spring, however drinking was observed in summer. It is considered that during times of higher water demand, summer and early autumn and during lactation, water consumption may take preference. Further studies will be conducted at replicated locations over all seasons to assess the fluctuating demands for water and insects.

A radar-based orchard invader detection system (R.O.I.D.S.)

Hugh J.Spencer [1], Fuad Khan [2] and Stan Newman [3]

[1] Cape Tribulation Tropical Research Station.
[2] Toronto Canada.
[3] Yeppoon Qld.

Flying-fox (*Pteropus* spp.) populations are increasingly at odds with farmers, through their penchant for feeding on ripening fruit - from apples to lychees. This has resulted in farmers taking quite strenuous measures against flying-foxes, from shooting, electrocution and more recently poisoning. These measures have resulted in *Pteropus poliocephalus* being declared as a vulnerable species and pressure for *P. conspicillatus* to be similarly declared. Since the successful prosecution of a N. Queenland lychee farmer for electrocution of an estimated 12,000 flying-foxes, the Queensland Departments of Primary Industries and Environment have realized that non-lethal deterrent measures need to be trialled. However, presently no satisfactory method of assessment of these deterrent measures exists, so funds expended on such measures is largely wasted. We, (through the Cape Tribulation Tropical Research Station) are developing non-lethal deterrent systems to humanely protect fruit orchards from flying-foxes - and to consequently protect bats from annihilation by fruit farmers. In order to assess (and demonstrate) the effectiveness of these non-lethal approaches, we are developing a radar-based orchard invader detection system ('R.O.I.D.S.') to analyse the distribution of bats within an orchard over time. A radar system such as this allows the researcher to view the FF visits to the orchard trees over a set period (usually over-night), with each visit being time stamped - any effectiveness of a deterrent measure being tested will be immediately evident, as the remainder of the orchard acts as a control. Visits are displayed as contour or other displays of relative density of visits during the night. As part of the present development of the actual radar system (based on a highly modified small ships' radar) we have produced a demonstration program which allows the user to place trees and deterrent systems in an orchard, specifying their parameters and location. The demo

uses a Monte-Carlo simulation to generate "bats" that chose to visit (or not visit) regions of the orchard based on the attractiveness of trees and the effectiveness of deterrents. This demonstrates the operation of the radar system. The user defines trees by specifying their location and two additional parameters 'attractiveness' and 'range'. 'Attractiveness' is a relative measure of how attractive a given type of tree is to FF's (with 100 being the most attractive). 'Range' is a measure of dispersion, specifically the radius (in metres), over which 95% of the tree's attractiveness is distributed. The technology is relatively cheap and its great advantage is that it can be used to objectively assess ANY measures that reduce (or even increase) the attractiveness of specific orchard areas. This demonstration program will provide the conference visitor with an overview of the controls and a brief tutorial to guide them through its use.

The ecology of insectivorous bats in the Simpson Desert: habitat use

Amy Williams

School of Biological Sciences, University of Sydney.
Current address: Ecotone Ecological Consultants Pty Ltd, 39 Platt St., Waratah, NSW 2298.

Bats living in Australia's arid zone have been largely ignored by researchers. The honours project aimed to identify the species of insectivorous bats that occur in the Simpson Desert and to investigate aspects of their ecology. This poster will focus on habitat use by the bat species present. Seven species of insectivorous bats were positively identified with the combined use of harp traps, cave inspections and ultrasonic call recordings (using Anabat II detector systems). These species were *Nyctophilus geoffroyi, Vespadelus finlaysoni*, *Chalinolobus gouldii*, *Scotorepens balstoni*, *Taphozous hilli*, *Saccolaimus flaviventris* and *Tadarida australis*. An additional species, *Scotorepens greyii* was tentatively identified by call recordings. The bats foraged most often over water and on calmer nights, when insects were more active. Bats predominantly utilised water sources, rocks, dune/swale near woodland, dry creek line and coolibah woodland habitats. They rarely used open habitats (open plain and dune / swale), *Acacia* scrub and gidgee woodland. Several different requirements may influence habitat use by bats in the Simpson Desert. One study site at the Field River contained the highest activity of tree-dwelling bat species, and here the coolibah woodland is denser and contains a larger number of hollows and dead trees than coolibah woodland at the other sites. It appears that both tree and cave roost sites may be a limiting resource, resulting in bat activity being predominantly restricted to the 'oases' in the Simpson Desert study area. Food availability (total abundance and biomass of insects) and permanent water, surprisingly, do not appear to determine the use of different habitats. Although highly active over water in some areas, bats may survive in the Simpson Desert without access to permanent water. Larger sample sizes and further investigation during harsher periods of less rainfall, and during warmer months in the year, are necessary to evaluate the temporal stability of the results presented.

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Bats - show and tell
Community Education

Nancy Pallin
Ku-ring-gai Bat Conservation Society Inc., 45 Highfield Rd, Lindfield NSW 2070. pallin@bigpond.com

With members widespread geographically, the previous plan to have an education sub-committee has not produced an Australasian Bat Society specific education program. Nevertheless, many members contribute time and resources in their local area to educating the community about bats either through their jobs, study or as community volunteers.

At the 10th Australasian Bat Society Conference in April 2002 lunch times were long enough for participants to meet and discuss issues. Twenty-six people gathered along a veranda at the Cairns Colonial Club, in large cane chairs, to discuss education. In turn, each of us outlined how we are involved in or interested in educating the community about bats. The following notes give an indication of what is happening.

Since the previous conference in 2000 the Australasian Bat Society (ABS) has gained a new website - an effective educational resource and one we need to support by providing more content.

Researchers such as Maria Adams, Wollongong University and Patrick Prevett and Andrea Solly, from University of Ballarat explained how they showed bats to local people and explained why and how research was undertaken. The University of Ballarat involves high school (Year 10) students by running an introductory session and a field trip which includes radio-tracking and harp trapping. Then it is the responsibility of the teacher to supervise the school students in making posters, reports or a website. Patrick also holds meetings at the pub, where dinner is served and he gives a slide show about bats followed by an evening of spotlighting, harp trapping and using an Anabat system to record bat calls. These public talks involve members of the community who would not otherwise come into contact with bats and bat people.

In the Hunter Valley, NSW, Lynda Stephenson gives half hour talks to primary school children. With a Natural Heritage Trust grant a trailer has been purchased to carry display materials to explain issues facing all fauna especially threatened species. She takes grey-headed and little red flying-foxes to talks so the children can relate better to these social native animals.

Gill Bennett a member of the wildlife care group, Clarence Valley WIRES, takes every opportunity to educate people about bats. She encouraged us all to wear t-shirts promoting bats and has found the 'grey-headed flying-fox doll' designed and made by Janet Hutchinson from Pymble NSW to be effective in gaining the attention of children and their families. Gill links up with the NSW National Parks and Wildlife Service in its Ranger Discovery Tours.

Llyris Wood from WIRES in Coffs Harbour said her group had been successful in getting stories about bats into the media, especially newspaper articles.

Vivien Jones, a wildlife photographer from Bellingen, NSW, has found that selling her photographs of flying-foxes through her website, as greeting cards, is helping to change attitudes to bats.

Allyson Walsh, from Bat Conservation International, mentioned the BCI website and how BCI has 'bat trunks' which contain all sorts of materials for learning about bats. These can be borrowed by educators in schools and colleges to assist them in teaching about bats.

Elizabeth Hartnell, from Ku-ring-gai Bat Conservation Society reminded us that the 'Pollination and Seed Dispersal by Flying-foxes' - posters were on the ABS and KBCS websites. These were developed by Janet Hutchinson, Marjorie Beck and other members of KBCS and are available for educational use by anyone. Elizabeth also explained that Denise Ford had evaluated the effectiveness of the KBCS bat talks which include meeting a live flying-fox and a talk illustrated with slides. Her main

conclusion was that the students learned most effectively about the roles of bats in the environment if they undertook activities in school before and after the talk which reinforced their learning about bats.

Will Trewhella, University of Hong Kong, outlined his work with the community while researching the bats of the Comores.

Tips - wear t-shirts showing bat-related website addresses;
- design educational programs to fit into the school curriculum of your State.

Needed - short (3 - 10 minute) videos of bats in the wild.

We have to accept, as Robert Bender observed, that some people don't want to know or learn, however, we agreed that it is worth encouraging the majority of people who have just not had the opportunity, to learn about bats.

Dear folks, this summary is from memory and the notes made during the meeting. There is no doubt that there is plenty of commitment, ingenuity and determination among ABS members to spread the word about bats in our home town - urban or rural. It was suggested that the group keep in contact by email through the ABS listserver.

Enjoy spreading the word about the benefits of bats.
Regards to you all.

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Awards for presentations at the 10th Australasian Bat Society Conference

Congratulations to the following people who received awards at the Cairns conference:

Life Membership to the Australasian Bat Society (see *News and Announcements* section):
Les Hall

Bat Conservation International Best Conservation Paper (presented by Allyson Walsh):
Nicola Markus (*The Food for Wildlife Project: turning research into action*)

Best Student Paper (one years subscription to *Wildlife Research* and *Bat Research News*):
Kyle Armstrong (*The bats that time forgot: Pliocene relicts in the Pilbara of Western Australia*)

Encouragement Award for a Student Paper (bat detector kindly donated by Rob Gration):
Clare Hourigan (*The structure of a tropical urban micro-bat community*)

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Notes from the Microbat Forum and Panel discussion
Held on 6 April 2002 after the 10th ABS conference

Chaired by Chris Clague
Summary by Kyle Armstrong and Greg Ford

This was a very valuable and enjoyable workshop that was full of the technological and methodological techniques that microbat researchers find useful. It was structured as a series of short presentations by people with some experience or expertise in that particular area, and by the end of the day, we had discussed a wide variety of topics. Some of these were of techniques described previously (including previous editions of the ABS newsletter) and other presentations were of new products or little-known techniques. Short summaries are provided below. These are by no means comprehensive descriptions of the techniques, and hopefully in upcoming newsletters, more information will be available. Alternatively, contact the presenter indicated for more information.

A speedy new way of identifying bats from Anabat files
Patrick Prevett
Patrick presented an automated method of identifying Anabat calls developed by Matt Gibson, Ballarat University. This electronic key and automated system have been developed for Patrick's local area of study, the Wombat State Forest in Victoria, where he has collected reference calls of most species. There are a couple of species that he cannot separate using Anabat calls (*Nyctophilus* spp. and *Vespadelus* spp.). The system was demonstrated, and provided identifications from 275 standard Anabat files in about 2.75 seconds. During this process, each call identification is given a measure of confidence (expressed as a percentage). At the current setting, a 'tick' output (as against a 'cross') indicated that 50% or more pulses within the sequence had been identified to one species. The program is still in development and appears to be flexible in terms of altering keys and confidence measurements.

The key is based on numerical cut-offs. F_end gives good discrimination for many species, while other parameters such as slope are useful for *Nyctophilus* and *Tadarida*. However, concern was raised that F_end may be a poor discriminator as it could relate to the shower of blips or downturn that often occurs at the end of each pulse. This could be further complicated by the presence of echoes in the call. It was suggested that 'characteristic frequency' (= frequency of flattest part of call), as used by Analook, might be a better discriminatory parameter to use in the automated key. Echoes should be identified and removed from the call before it is analysed, otherwise false F_end or F_c values would be read.

It is relatively easy to write programs to extract parameters from Anabat files and provide an automated analysis. However, it is vital to have good quality reference calls, so the programmer can choose appropriate characteristics to use. The program can be written to discriminate feeding buzzes and exclude them from the analysis, but you have to know what a feeding buzz is and what species it belongs to.

Bat detectors – an overview
Roger Coles
There are alternatives to the Anabat detector. The data you collect initially from the bat needs to be as good as it can be. There is little you can do afterwards to improve quality as such. Various detectors are available, which range in price and the number of features they have. The detector is the critical interface between you and the bat. More specifically, it is the transducer that is the critical interface. The best microphones for general bat work have a good response at high frequencies, but also a broad frequency response so a range of calls can be detected. Transducers turn airborne signals into electronic signals. Some transducers (e.g. ceramic) are highly tuned and sensitive to a small range of frequencies. Electret (hearing aid microphones) are used by mini-bat detectors (UltraSound Advice) and have a reasonable frequency range. The Anabat system uses a device from the Polaroid camera auto-focus system. Other detectors have a sensitive mylar diaphragm transducer (U30, S25 and

Pedersen detectors), with accompanying electronic compensation to flatten the response curve. The frequency response needs to be as flat as possible across the entire frequency range (although there was argument that the response needs to be poorer at the lower end to avoid audible and low frequency sounds). The Bruel and Kjaer is a good standard. Large diameter microphones have a lower frequency response. The smaller the transducer diameter, the better response at higher frequencies. Also, the thinner the membrane, the more sensitive the transducer will be, but it will also be less durable. The type of signal transducer also affects the range and directionality. A comparison of transducer sensitivity demonstrated some variation between models. Some further information is presented in Spencer and Coles (1996) and at:
http://www.biology.leeds.ac.uk/staff/dawa/bats/Detector.htm.

Latest Developments in the Anabat System
Chris Corben
Chris reported on a new model of Z-CAIM which replaces the laptop computer in the field. The Anabat II detector is connected to the new Z-CAIM, and calls are recorded onto a Compact Flash (CF) card which inserts into the Z-CAIM. Data from the CF card is easily downloaded to the PC via a readily-available (and relatively cheap) card reader. Interpretation of the bat detector signals is done on the computer in Anabat, resulting in standard Anabat files.

The advantages of this new system are obvious. Apart from being more compact, it collects the same quality of data as with a laptop. Power consumption is much lower (hence less battery capacity required) than using the laptop system, and failure due to flat batteries is a much lower risk. It also reduces the likelihood of failure due to problems associated with cables or old unreliable laptops. Feedback loops are also avoided with the new system.

Tests have shown the capacity of flashcards to be adequate. One test night collected 14MB worth of data, while on another (windy) night, 32 000 files took up 40MB. CF card capacities range from 4MB to over 64MB and are readily available (they're commonly used in digital cameras). So, if whole night's Anabat data takes up around 16MB, it is conceivable that the larger capacity CF cards could be left in a remote situation for 3-4 nights. It operates on 4 x standard 1.5 volt AA batteries (gives about 10 days) or 4 x 1.2 volt rechargeable AA batteries, or a 12 volt gel cell. The unit also has a timer incorporated plus a port is available to connect a GPS. The new Z-CAIM comes in your choice of colours, as long as it's beige and is available now. See the Titley Electronics website for further details – www.titley.com.au/anabatcf.htm. Other future plans for Anabat development include a single unit that incorporates all features, including an LCD screen so that signals can be seen in real time.

Setups for wet weather
We all know that rain and humidity is bad news for electronic equipment, particularly the sensitive transducers on bat detectors. Patrick Prevett presented his Anabat setups as a talk in the conference. Bat detector, battery, laptop and Z-CAIM were all carefully arranged in a green-painted plastic tub. There was some discussion on other setups for rain at the workshop and attention was drawn to a recent publication in Bat Research News that describes how a piece of curved pipe can be placed over the transducer (O'Farrell 1998). This method was found to be effective, and while it did not seem to affect directionality, there was a tendency to lose weaker signals. It is not recommended that gladwrap or thin rubber be placed over transducers as this will block the signals. Optimal conditions for bat call detection are low humidity and low temperature. Dusty, humid or windy conditions will reduce the range of a detector and the quality of the signals received.

Want a waterproof laptop? Why not pull the electronic guts from the computer and put it into a PVC tube? Power it using a solar cell. Perhaps the person who conceived and developed this clever system could write a note for the newsletter?

Vertical stratified sampling
Olivia Whybird
An article of Olivia's appeared in a previous edition of the newsletter (Whybird 1998). Often mist nets don't catch much when they are hoisted into the forest canopy, and it is often possible to hear the echolocation call of a bat change as it encounters and avoids a net. An S-25 bat detector (Ultra Sound Advice) with the transducer mounted on a long cable was used to sample bat calls at various heights within the forest strata. A 45 m long, 3-core shielded cable was used with no significant signal loss. The transducer was protected in a piece of pipe with no loss in directionality. The body of the detector and the tape recorder remained on the ground with the researcher, and comments could be made into the commentary channel available on the S-25. A spotlight covered with a red filter (theatre gel only – do not use normal cellophane) was used to observe bats in flight.

Obtaining release calls
Chris Corben
The importance of obtaining good release calls was emphasized in this section of the workshop. There are a variety of methods for release advocated by various researchers (let them fly off the hand, tethered, fly around a small room or in a mosquito net, throw into the air) but these are either a little too stressful on the bat or do not elicit the flat search phase calls that are most likely to be detected from a bat in free flight.

The calls of many bats look similar when in clutter. The best way of obtaining good quality reference calls is to find a large open space with no obstructions. Forest tracks might look like clutter to some bats, whereas open spaces give good calls and good range. However, there is also something to be said for recording bats in similar habitats to where they are being studied. A good reference library should include a range of calls from each species, and it is also important to know where the bat was in relation to clutter when its call was recorded. A larger number of reference calls will result in a better understanding of the range of calls a species will make. It might be useful to record feeding buzzes if studying bats in cluttered environments.

The use of filters in the program Analook, the new look Analook for Windows
Chris Corben
The 'filter' function in the latest Analook is not often used, but Chris described how useful it could be. A 'filter' can be written to select sequences based on variables you choose for the species of interest. It is also useful for removing poor quality calls. Each of the chosen files can then be scanned and the pulses that meet the entered variables can be displayed in another colour for further analysis. Alt + B gives the filter menu.

Chris also described new software in development called AnaScan. It scans many files to return a number of files that have the variables you set, plus a summary table. This table could be in the form of a daily report – its structure is very flexible. The data can be imported into Microsoft Excel and graphed. Chris presented some results from a large dataset where bats had been recorded every night of the year. A summary of bat activity over the whole year was presented. This highlighted the differences between species, and showed a migration event. This software will be free but will rely on a Windows version of Analook. Stay tuned …

Alternative ways of analyzing bat calls - Ultabyte
Roger Coles
Ultrabyte is a system for analysing bat calls collected using, for example, an UltraSound Advice bat detector such as a U30. It gives simultaneous views of spectral and waveform information and zero-crossings analysis. Calls are played from a tape recorder into the computer sound card. For the best quality calls, you need a high signal to noise ratio. Bat calls are saved as WAV files, which uses quite a lot of computer memory. Zero-crossing analyses can be saved in a separate WAV file. A variety of measurements can be made from the calls with the computer cursor, with the values being presented in the bar at the bottom of the window.

The waveform (time by amplitude) can help the diagnosis of species. The sonagram (time by frequency) also includes amplitude information, presented on a colour scale. The user can zoom in on the time scale. A pop-up spectral analysis (frequency by amplitude) may give harmonic information, although this is generally lost when recording from detectors with frequency division. It is a similar program to BatSound.

Another alternative for selected types of analyses
Kyle Armstrong
If you find that some programs like UltraByte or BatSound are unavailable or a little expensive, then Cool Edit might be a cheap alternative. I used it for my PhD to obtain the peak frequency of the constant frequency pulses that are produced by *Rhinonicteris aurantius*. For identifying different species of bats I find the Anabat system clearer and quicker.

Cool Edit does most of the things that the others do with the exception of zero-crossings analysis. It has waveform (time by amplitude), sonagram (time by frequency, with amplitude on a colour scale) and a floating window containing the spectral analysis (frequency by amplitude). Various windowing functions and FFT sizes are available. I purchased the lite version over the internet at www.syntrillium.com and paid less than AUS$100.

Radiotracking techniques
Lindy Lumsden
A very comprehensive and clear presentation was given by Lindy on the radiotracking of bats. It was full of useful do's and don't's. A summary is not provided here, as Lindy is planning to submit an article on this in the future. Stay tuned …

Routine collection of material for genetic analysis
Terry Reardon
Taxonomists do not always have the same opportunities to collect genetic material as do ecologists and other researchers. It behoves those capturing bats to collect genetic material, especially from those bats that have an uncertain taxonomic status.

There are three reasons for collecting genetic material:

- Phylogenetics: to examine the relationships of species in a genus, or relationships at a higher taxonomic level.
- Species boundaries: to identify cryptic species (e.g. the *Taphozous troughtoni* work currently being conducted).
- Population genetics: to examine genetic population structure and dispersal below the species level.

There are two main types of genetic markers:

- Allozymes: these are alternative forms of enzyme proteins. They are obtained from very fresh tissue such as blood, liver, kidney or muscle. Liver is the preferred tissue.
- DNA: this is the fundamental genetic material in cells that codes for proteins. It can be obtained from most biological material, including skin, liver, muscle and even fur follicles.

Below are the recommended preservation methods for the two types of marker.

Allozymes: Immediately frozen in liquid nitrogen; stored in –70 or –80^{o}C freezers. If liquid N not available immediately, store in a –20^{o}C freezer but transfer to N as soon as possible. If a liquid N dewar is difficult to transport, then consider using a dry shipper. This is a smaller dewar that is chilled using liquid N but, after charging, does not contain any liquid N and would therefore not be regarded as a dangerous good for transporting.

DNA: Store in 100% alcohol. You can also store in 70% but 100% is better. DNA can also be preserved in liquid nitrogen. If transport is difficult, consider using a 20% DMSO (dimethyl sulphoxide) 6M NaCl solution (Worthington-Wilmer and Barratt 1996). A small circle of skin (3-4mm diameter) can be removed with a wing punch from the wing membrane. Small blood samples can be removed from wing veins.

It is especially important to preserve (frozen or in alcohol) some tissue from specimens that are to be preserved in formalin (which chemically alters the structure of DNA). Contact Terry for more information.

Nancy Irwin would like material from *Nyctimene*, so if anyone encounters individuals from this genus during surveys please consider collecting genetic material.

Standards of Anabat reporting; voucher calls and bat call libraries
Terry Reardon

There was some discussion on whether the ABS should promote and prepare a set of standards to be used by people identifying bats from their echolocation calls. This is particularly relevant for consultants and researchers using the Anabat system. These standards must incorporate ways for analysis of calls to be conducted as objectively as possible, and standards of reporting must allow a reviewer some means of assessing the results. This issue is now being discussed with a view to producing a policy paper, and might appear as a discussion paper in the next issue. Stay tuned …

There was also disappointment expressed that few had taken advantage of initial efforts to add to regional call libraries, particularly that developed by Alexander Herr. Call libraries and databases might need to be revisited after the standards above have been developed and decided upon. Stay tuned for more …

Our attention was drawn to a recent publication of Lindy's on Anabat methodology (Duffy *et al.* 2000).

Capture techniques
Greg Ford

A review of the various bat capture techniques was described and discussed, including harp traps, mist nets and trip lining. To aid capture using harp traps, optimal placement strategies were described, as well as the use of funnels, blockers and curtains to encourage bats to fly into the traps. The use of blacklights was also described to attract insect prey. Blacklights are available from Australian Entomological Supplies on their website.

Significant discussion time was also devoted to the ethical considerations of trapping, particularly in relation to trip-lining. It was suggested that, while the use of trip-lines may be widely used by bat researchers and in ecological surveys, the method poses as considerable stress risk to the bats. This discussion highlighted the need for the ABS to consider developing a series of policies or standards for

bat survey techniques. In light of this, there has been some ongoing discussion amongst members of the executive and it appears likely that we will be putting a discussion paper together for the next newsletter.

Various opinions were also expressed about handling bats and the risk of contracting lyssavirus. There was some concern about students handling bats, especially those that are not immunised. Everyone handling bats should be immunised and should follow an appropriate hygiene protocol. Safety is the responsibility of everyone, and bats do not need the bad publicity that a human death from lyssavirus would bring.

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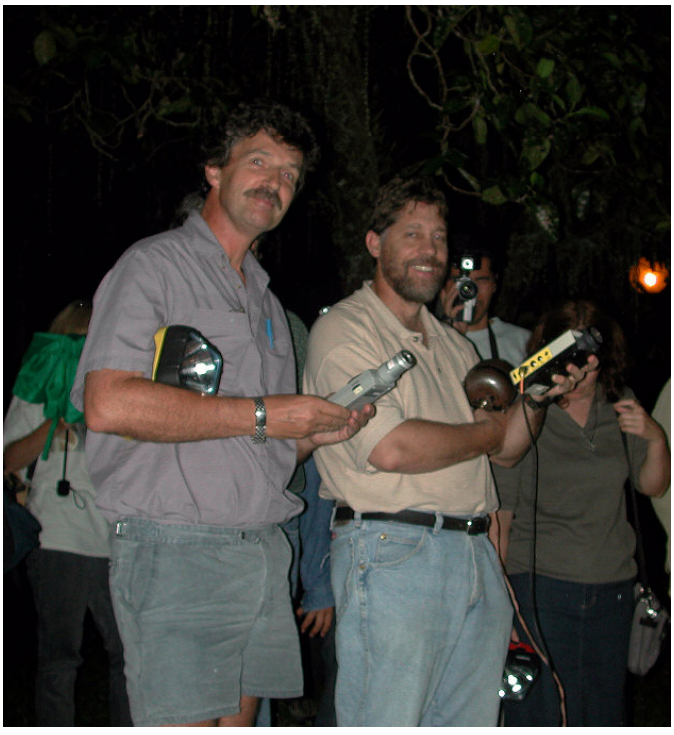

Roger Coles and Chris Corben

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Instructions for the ABS listserver

Alexander Herr (Herry)
Johnstone Centre, Charles Sturt University. Email aherr@csu.edu.au

Why Are We Here?
The ABS listserver is a mailing list for members of the Australasian Bat Society to raise and discuss bat related issues. It also serves as an information exchange network between the ABS members and the ABS executives and is moderated by myself (contact details above). When you subscribe to the ABS list you will be able to:

- quickly and easily send messages to ABS members subscribed to this list;
- take part in on-line group discussions, and;
- make contact with other people with similar interests over long distances and without the hassle of working out time differences.

Guidelines
Topics can be anything to do with the ABS. Commercial advertisements are NOT accepted. However, information and discussions regarding products (including their suppliers) are encouraged. To prevent information from non-list members (including spam), ABS is a 'moderated' list, which simply means you must subscribe to post messages, and you must post from your subscribed address.

Instructions
(NOTE: contents of brackets <> require information from you!)

To subscribe, send an email command to majordomo@batcall.csu.edu.au
The email should contain only one line (do not attach signature) as follows:

subscribe abs <type here your email address>

To unsubscribe, send the following email command to majordomo@batcall.csu.edu.au:

unsubscribe abs <type here your currently subscribed email address>

To post a message to the list, simply email it to:

abs@lorenz.mur.csu.edu.au

If you have any problems subscribing or unsubscribing then send a message explaining the problem to:

owner-abs@lorenz.mur.csu.edu.au

For further useful commands, send an email to majordomo@lorenz.mur.csu.edu.au or to majordomo@batcall.csu.edu.au containing one line (in the Command column of the table below):

Command	Explanation
who abs	Who is subscribed to the ABS list
help	General help about the listserver
info abs	Introductory information about the ABS list

Happy cyber-batting ...

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– Research Papers and Notes –

The Little Red Flying-fox *Pteropus scapulatus*: a previously unrecorded and semi-permanent camp in Northern Victoria

Lawrie E. Conole
Senior Zoologist, Ecology Australia Pty Ltd, 88B Station Street, Fairfield Vic 3078.
ocoineoil@bluep.com

Menkhorst (1995) shows the distribution of the Little Red Flying-fox *Pteropus scapulatus* in Victoria as a series of widely spaced casual records, and says of this species that it is a less regularly recorded species in Victoria than the Grey-headed Flying-fox *P. poliocephalus*. Most *P. scapulatus* records are from the northern parts of the state, north of the Great Dividing Range, and its distribution is almost the reverse of *P. poliocephalus* (Menkhorst 1995).

In this note I record the presence of a previously undocumented, semi-permanent camp of *P. scapulatus* in the town of Numurkah (36° 5' 48"S 145° 26' 23"E) in the upper Goulburn Valley, northern Victoria. Approximately 200 bats constitute this camp, and the bats are present between about September/October – April. I observed harem formation in November (1999) and abundant bats copulating in December (1999), and John Nelson (*pers. comm*.) believes that young may have been born in the camp in April 2000. They are certainly present there at a time when young would be born (McCoy 1995). The camp is in introduced willow trees (*Salix* sp.) on the Broken Creek near the southern end of the main shopping strip of Numurkah. Locals have noted the bats' presence for 'many years', going back to at least the late 1970s (F. Kinsey, M. Kinsey, G. Collier; *pers. comm*.), and the size of the camp has been much as it is now during that time.

It is interesting that this camp has gone unnoticed by wildlife biologists and naturalists in Victoria for so long. The proximity of Numurkah to large stone-fruit growing areas in the Shepparton-Mooroopna area makes the oversight even more interesting. I only discovered it during social/family visits to Numurkah between 1998-2000.

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The impact of a large number of ticks on a Gould's Wattled Bat *Chalinolobus gouldii*

Lindy Lumsden
Arthur Rylah Institute, 123 Brown St., Heidelberg, Vic 3084 and Deakin University, Burwood, Vic 3125.
Lindy.Lumsden@nre.vic.gov.au

While radiotracking bats at Numurkah, northern Victoria, in early December 2001, an apparently healthy male Gould's Wattled Bat *Chalinolobus gouldii* was caught. We wanted to attach radio transmitters to lactating females, but for some reason these were being elusive. As males were also being caught in only low numbers I decided to hold this male for a day to see if a female was trapped the next night. When no females were caught, a transmitter was attached to the male and I took it back to the capture site for release. However, despite appearing alert, it would not fly. The night was fairly cool but no matter how much I warmed it up and gave it encouragement, it refused to fly. I then attempted to feed it some mealworms, to give it more energy, but it would not eat properly and only reluctantly took the insides of a couple. After many hours of trying to revive this animal, I gave up; thinking its future did not look good. The next day it was still very sluggish and we removed the transmitter. We noticed a tick on its back, hidden within the fur. We removed this tick and had a closer look through the fur and removed 15-20 more ticks. The bat immediately became extremely active, started eating mealworms with great enthusiasm and then readily flew around the room.

I was amazed at this rapid recovery as it was literally within minutes of removing the ticks. Normally I do not remove parasites from wild caught animals as I figure it is a natural part of life. High parasite loads are generally believed to be the result, not the cause, of ill health, due to the incapacity to groom (Marshall, 1982). In other respects, this individual appeared to be in good health, weighing 13.9 g. It had increased its weight since being banded two months previously (13.0 g). So was this recovery a coincidence? Was it due to the transmitter? I have never observed any reaction like this to transmitter attachment in many years of radio tracking. Or was it really an immediate response to the removal of the ticks that may have been injecting toxins into its system? But would the removal of the ticks immediately remove the toxins? I would be interested to hear if anyone else has observed similar reactions of bats to their parasites.

Thanks to John Silins for helping remove the ticks.

Marshall, A.G. (1982). Ecology of insects ectoparasitic on bats. pp. 369-401. In: *Ecology of Bats* (T.H. Kunz, ed.). Plenum Press: New York.

A happy Gould's Wattled Bat! Photo Lindy Lumsden

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Attachment of radio transmitters to insectivorous bats

David Gee
P.O. Box 189, Gol Gol NSW 2738. Ph. (03) 50 220 995. dgee@mildura.net.au

This brief report is to inform researchers who are involved in radio tracking bats of a product that greatly reduces the stress on bats and handlers. After painstakingly cutting the hair from the backs of bats to facilitate the gluing of transmitters, I thought that there had to be a better method. One of the greatest challenges was being able to cut the hair close enough to the animal's back without accidentally cutting the skin. This meant that handling the bat and manoeuvring it into the correct position during hair clipping was a slow and delicate process. Often this took between 10 to 15 minutes and I felt that this unduly stressed the animal. The resulting hair clip was also uneven because the person cutting the fur was trying to do so without injuring the animal, keeping away from the animal's skin as much as possible. Cutting usually occurred in poor light conditions. As a result, the attachment of the transmitter was unsatisfactory as the fur length was too long, allowing the bat to scratch the transmitter off.

So I searched around for an alternative solution. I found a small handheld battery operated hair clipper that is manufactured by a company called Wahl (Figure 1). The clipper was designed to cut patterns into closely-cropped hair. The cutter width is 9 millimetres, with an actual cutting path of 7 millimetres. The design of the cutter means that the blades are shielded from the skin, and therefore it can cut very close to the skin. It is powered by one AA battery so is very portable and able to be used in the field, and it works!

I have tried it on several bats and found that hair clipping now only takes about a minute (Figure 2). The bats appear to be less stressed with very little protestation at the procedure. This is possibly due to the shorter handling time and the gentle nature of the clipper action. The clipper provides better attachment of the transmitter due to the even fur length and closeness of the cut. Lindy Lumsden reported one transmitter staying attached for 20 days. Lindy and I have found that not using the oil supplied with the clipper works better as the fur does not clog the blades. The clippers obviously have potential to be used on other furred animals.

The clippers are suppled by a company in Queensland. The cost when I brought mine was $43.90, ($37.90 + $7.00 postage). Contact the company by calling (07) 3349 5366. Ask for a Wahl: Edger, Trimmer & More, (sorry there is no model or item number). You will need to directly deposit the money into their account, the company will supply you the correct details.

Figure 1. The Wahl clippers.

Figure 2. Clipping fur from a bat.

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– Reports and Viewpoints–

Summaries of the three main documents involved in the Grey-headed Flying-fox relocation project to Horseshoe Bend in Ivanhoe

Robert Bender
Friends of Organ Pipes N.P., 9 Bailey Grove Ivanhoe Vic 3079. robertb@angliss.vic.edu.au
28 December, 2001

This is an important issue and the relocation is likely to commence implementation after next month's meeting of Banyule Council, once the 30-day public response period for the Draft Management Plan expires.

Options for the establishment of an alternate campsite for the Grey-headed Flying-fox **Pteropus poliocephalus** *in Melbourne, September 2001*

This 90-page document was prepared by a Task Force of 12 people from the Department of Natural Resources and Environment (NRE), the Botanical Gardens, Parks Victoria, the Melbourne Zoo, and the universities, to develop a proposal to deal with the problem of the flying-fox colony established since 1981 in the Botanical Gardens in South Yarra.

Introduction
The number of bats has increased to exceed the carrying capacity of the tiny Fern Gully and is causing increasing damage, including the death and removal of some trees and ferns. Mechanical and noise deterrents had little effect. A culling program in 2000 stimulated pressure to develop alternative solutions. Efforts to develop a relocation proposal to Mallacoota (where a colony already exists) elicited strong resistance. In March 2001 the Task Force was set up to investigate options for an alternative roost site within Greater Melbourne, to take pressure off the Gardens while still conserving the species. Such a project has never been attempted before. Part of the problem is the mass planting of NSW and Qld eucalypts and figs in Melbourne's well-watered gardens since the 1960s, creating an excellent food source, likely to improve further over coming decades.

Methods
The project was to find a long-term secure campsite. The Task Force's 10 meetings from April to July, had sub-committees, and reported to a Steering Committee. They decided on a structured approach dealing with a range of criteria each given subjective weightings between 0 to 1. The aim was to maximise the prospect of success in establishing a new campsite, and identify impediments to success. The best available model of campsite parameters is Fern Gully (tree cover, water, open grassy space, proximity to housing and roads etc), that was used to quickly eliminate low-grade sites and help rank the best ones. All this had to be developed in a state of uncertainty as so little is known about what factors make a good campsite and how to rank their relative importance. Aggregation of these weighting factors produced final scores for each potential site of between 0 and 1. The Australian Research Centre for Urban Ecology dataset of 7,716 publicly owned sites was used as a starting point. From these a selection was made of sites within 20 km of the Botanical Gardens, at least 5 ha in size, in the eastern suburbs, and eliminating areas already subject to intensive use, with no water, closer than 200 m to housing or with incompatible vegetation (e.g. heath). 12 site visits were made with systematic data collection and multi-variate analysis used to develop recommendations on preferred sites and site modification needed to improve the prospects of successful campsite establishment. A table is provided explaining the weighting factors used.

Results
The Task Force examined factors believed to affect campsite establishment, and community concerns, and reduced the 7,716 sites to a subset of 41 using criteria of size, vegetation layers, overstorey height, understorey character, aspect, microclimate, proximity to water and to the Botanical Gardens, foraging radius, adjacent human uses, distance to nearest housing, schools and hospitals, buffer zone size and

recreational use of potential sites. These varied from 3.4 to 20.7 km from the Botanical Gardens, varying from 6 to 266 hectares, and are spread over 11 Local Government areas: 9 in Manningham, 6 in Banyule, 5 each in Darebin and Boroondara, 4 in Nillumbik. Most are along the Yarra River, northeast of the Gardens. Choice was narrowed to a cluster of 17 sites with similarities to Fern Gully. Analysis of aerial photographs reduced the choice to 14, all in the Middle Yarra, from Yarra Bend to Banyule Flats, and consideration of intensity of recreational use eliminated 3 more, reducing the final list to 11, comprising segments of larger reserves. Climatic data from available stations show they are all very similar. Four sites were deleted as too intensively used. Fern Gully does not resemble any vegetation community in Melbourne, with its closed canopy of Lillypilly and figs, and a mix of palms, Norfolk Island and other pines, poplars and Kauri, with a dense understorey of tree ferns. Final weightings for all criteria used are supplied in the report. Sensitivity analysis showed the rankings were robust against possible measurement errors. The final 11 sites were ranked into three groups, in terms of assessed potential for success, A, B and C. The top four sites were unchanged despite large changes in weightings: Wilson Reserve, Willsmere, Yarra Bend (Galatea Pt) and Burke Rd West, all less than 10 km from the Gardens. Burke Rd West is Crown land, so immediately available for the project, while the other three have other management authorities, Parks Victoria or municipal councils. At all sites a holding facility (cages for captive animals) were planned for and costed.

Discussion
The approach had many uncertainties, most of which can only be removed by actual trialling of a site. None of the sites matched the advantages of Fern Gully, so all would need some modification, of ground layer dampness for example, and simultaneous effort to deter flying-foxes from continuing to use Fern gully: a carrot-and-stick approach.

Conclusion
The A group of 4 sites were consistently superior to other groups and should definitely be given priority consideration. The relocation project should be managed in a way that generates information to further improve decision-making. Objectives are clearly defined and success easily measurable, there is a range of optional sites and reasonable assurance of success with well-designed experiments to reduce uncertainty deriving from lack of research into factors affecting the flying-foxes' own choice of campsites. A list of ways to attract flying-foxes to a site was prepared: site characteristics, captive bats, guano, recorded sounds, scent-marked branches etc., combined with some deterrence at the Gardens. Community/Stakeholder issues identified included minimising any impact on the animals' foraging range, avoiding areas intensively used by humans, minimal probability of disease transmission to humans as only a small proportion of bats are known to carry dangerous viruses and transmission direct to humans has occurred only among regular bat-handlers, and any site would have a far smaller visitation rate than the Botanical Gardens, at which no cases of harm have been recorded. A risk assessment framework was outlined, and a list of 21 references appended.

Appendices
The Terms of Reference, lists of members of Steering Committee, Reference Group and Task Force and their meeting dates are supplied, with descriptions of the various Ecological Vegetation Classes found in the short list of preferred sites along with 18 site assessment reports. The vegetation quality assessment for Wilson Reserve Site B (the preferred option – now called Horseshoe Bend) says that the "general impression is that the site has great potential – it has dense understorey and is in a remote area, a long way from houses. It has willows along the river, lots of weeds and doesn't look like it is well cherished!"

This report was presented to the Banyule Environment Advisory Committee (a subcommittee of Banyule Council) in October, at a meeting attended by several local conservation groups in addition to the regular members. It later went to Council, along with the Proposal – the next document described below.

Proposal for the establishment of a Grey-headed Flying-fox campsite at Horseshoe Bend – Report to Banyule Council, November 2001

This is a 16-page document, expanding on the risk assessment outline in the Task Force report.

Environmental issues
Starting from the Task Force report, the document proposes establishing a cage facility at Horseshoe Bend to hold up to 200 flying-foxes, with some on-site works to make the area more attractive to the animals, such as water-misters, use of recorded sounds from Fern Gully campsite, leaf litter and other plant matter taken from Fern Gully and some revegetation with local provenanced species. Minor track maintenance and a temporary boat mooring would also be required. The goal is to establish a permanent campsite of <2 hectares, in the hope of attracting 500 flying-foxes in the first 3 years and 2000 over the longer term, with an added migratory component of another 6000 at the autumn peak, in a loop of the Yarra River opposite Horseshoe Billabong, on the south boundary of Ivanhoe Golf Course. The area is about 5 ha overall, within which two potential areas for cages were identified.

Flora at the site at present is very degraded and rather than detrimental impacts, considerable benefits are expected. David Cheal assessed the flora as having no significant flora and few native species at all, over 75% of species having been lost. Other than River Red Gums and Silver Wattles, the area is mainly covered by noxious weeds, with no evident weed control under way, and little evidence of recreational use. The project would much improve the conservation value of the area. Cam Beardsell did a fauna assessment and found few species in the site, mainly Bell Miners. Most fauna of any significance occupies the nearby billabong area, and detrimental impact from the project is unlikely, either on the presence or calls of birds. The only significant fauna species occurring locally is the Grey-headed Flying-fox. Site improvements should make the area attractive to a wider range of species. It is unlikely to impact on animal migration along the Yarra wildlife corridor, and bird life is expected to continue uninterrupted.

Property values, as in South Yarra near the Gardens, and in Sydney and Brisbane, are unlikely to be affected as the site is far from housing and buffered by open spaces. The colony is likely to be audible only from nearby walking tracks, but less loud than noise from the nearby freeway. Major noise emission is at evening flyout, and is likely to be undetectable at nearby properties, as is the scent. A discussion of lyssavirus and Hendra virus concluded that there is no concern about disease transmission to humans, especially as the Botanical Gardens has 2 million visitors a year, with no reports of harm, nor from similar colonies in Sydney and Brisbane. Foraging range, and intensity of foraging at currently used sites, of Melbourne's flying-foxes is not expected to alter at all, as the proposed new site is more central to their current feeding range than the Botanical Gardens. Accessibility to the site can easily be managed as the peninsula has a fairly narrow neck. Viewing of evening flyouts could be arranged from a nearby footbridge.

Extension
Meetings had been conducted with Banyule Council and its subcommittees, local stakeholders (volunteer conservation groups, orchardists, adjacent golf courses, local ward Councillors), and an extension program conducted, by letterbox drops (1,100 households) and 2 public information sessions for which large information display boards and thousands of fact sheets were produced. There have been press conferences, a site visit for the media, statewide television, radio and newspaper coverage, several media releases, interviews with local newspapers, all reports have been available on the NRE website along with executive summaries, and a dedicated email address was set up for correspondence and public responses. Under 45 responses were received, most of them form letters from Animals Australia focusing on animal welfare issues. Other letters were about equally for and against. The email address received 3 emails, all supportive.

Management
Initial planning of works include creation of an access track (to be rehabilitated later), weed removal and revegetation undertaken at the very degraded site dominated by weeds, temporary enclosures set up to hold 20 to 100 flying-foxes, a water tank, an irrigation system for managing understorey humidity, free feeding stations to attract free-flying animals, and some power supply to operate generators and

pumps, a temporary boat mooring and some temporary chain-mesh fencing to protect the animals from vandalism, with a private security firm patrolling. Organised site inspections for interest groups might be arranged. The project is to be jointly managed by NRE, Melbourne Zoo and the Botanical Gardens. NRE has appointed a project manager, the Zoo will manage the captive colony. A budget of $900,000 has been allocated for the 3-year trial. Planning permits are to be obtained.

Recurrent
At conclusion of the 3-year trial, all temporary structures are to be removed, but monitoring efforts will continue. Ongoing site-management arrangements are to be negotiated with Banyule Council.

Legal issues
The State of Victoria will assume all legal liability for the project.

In the build-up to presentation of this document to a meeting of Banyule Council, a Draft Management Plan was prepared by consultants Robin Crocker & Associates and EDGe Environmental Design, and public response period of a month from 11 December was provided for.

Draft Horseshoe Bend Management Plan

This document is of 23 pages. The introduction recapitulates the background already dealt with in the previous papers. Issues arising during preparation were grouped into three categories: scientific/technical, community/council, and management.

A Vision is set out, that "by 2005, a successful roosting site for the Grey-headed Flying-fox has been established at Horseshoe Bend with minimal impacts on local flora and fauna and on gardens and orchards in the district", and "the project is recognised as a model in effective wildlife management involving local community, conservation groups, Banyule City Council and government agencies." A set of principles is listed, of which the two major ones involve protecting the Botanical Gardens from damage and conserving the flying-fox population in Victoria. Four key goals are listed, being to establish the campsite, increase community understanding and support, enhance environmental values of Horseshoe Bend and monitor and manage potential impacts.

Seventeen Management Actions are derived from these key goals, and an implementation plan set out in a table, with priority ratings (14 of them rated as Very High), responsibility allocations and lists of stakeholders. The actions are to clarify roles and responsibilities, arrange for vehicle access, restrict public access, ensure safe use of the shared (bicycle and pedestrian) path running along the north edge of the Bend; erect enclosures to Zoo designs and security fencing, provide facilities for the flying-foxes, introduce captive flying-foxes with daily management of this group, monitor their health and prepare contingency plans for dealing with fire and flood; release any remaining captive animals on completion of the trial and remove all structures. Ongoing information on the trial is to be provided via the media, briefings and other means, the local community is to be involved in revegetation and monitoring. Vegetation management is to be undertaken to improve the habitat, and extended to adjacent bushland. A monitoring program is to be implemented to assess impacts on the surrounding area, and on Yarra Valley orchardists and any needed remedial strategies developed, and signs warning people not to handle flying-foxes are to be erected. EDGe contributed a detailed site map showing location of cages and tracks.

As Michonne van Rees, NRE Executive Director Parks, Flora and Fauna, states in her foreword, "the plan builds on detailed scientific investigation by a range of experts and on a cooperative approach by State government agencies, Banyule City Council and the local community. The trial is of considerable importance, attracting national and international interest."

Still hanging by a claw: a prolonged squawk from The Old Bent Bat

Len Martin
Department of Physiology and Pharmacology, The University of Queensland, Qld 4072.
Leonard.Martin@mailbox.uq.edu.au

Perhaps too-long-a-squawk, but there are reasons, not least of which is recent action from the Deep North to REACTIVATE THE GRID - hence the extended S&M section below. Yes folks, it's been THAT sort of year, with TOBB wearing out claws slashing at the forces-of-evil-and-powers-of-darkness, screeching, menacing with his few remaining teeth, as well as dumping on said forces from a great height. A year of good and bad news, but for once perhaps, the good outweighs the bad.

First the news that the ABS has conferred ***Honorary Life Membership*** on ***Les Hall***. Well done, I can't think of someone more deserving of the honour than Les, or a nicer bloke to receive it. When I stumbled, at an advanced age, into flying-fox research, Les, a Senior Tutor in Anatomy at UQ, was already one of "The Grand Old Men" of Australian Bat Research. Nevertheless, he made me very welcome, and we have been mates ever since. Les has made huge contributions to bat research and conservation in Australia and internationally. He has been helpful and caring to so many colleagues, research and undergraduate students and, of course, FF carers, among which, Brisbane-based Orphan Native Animals Rear and Release Program features large. Les's unstinting support, and regular attendance at ONARR's AGMs, gave that group confidence in their own scientific worth. Les has always believed in dialogue between FF conservationists and fruit growers, and one outstanding achievement was his organisation of ***The First National Flying Fox Symposium***, at UQ, August 1986, - attended by fruit growers as well as scientists and conservationists. The Coffs Harbour banana growers, envisaging possible physical confrontation with conservationists, included among themselves an ex-professional boxer - just in case! As it turned out, both sides got on well and learnt much from each other. To my mind, Les played a huge part in getting the QLD bureaucracy to establish the QLD Flying-fox Consultative Committee, and over the years he made numerous contributions to it. It is a pity that said FF committee appears to have made little or no acknowledgement of Les's contributions.

Les made many court appearances as an expert witness on conservation issues. For this reason, although a devoted conservationist, he kept a low profile as a "greeny". But he certainly felt the issues strongly. Indeed it was his dismay and vehement comments on learning of the Goss government's support for Port Hinchinbrook that induced a colleague to run "The Scientist's" campaign which led the then Federal Environment Minister, Senator Faulkner, to halt the development, albeit only temporarily [with said colleague being sued for defamation by the delightful Mr Williams]. Les played a major role in getting Ipswich Council and QLD NPWS to establish a conservation reserve for the Woodend FF colony, and Les served on the management committee for many years. Alas, the Woodend colony, like many other urban flying-fox camps in Queensland may be under threat of "being moved". The issue of "moving" flying-fox camps is the theme of Les's contribution to last year's Sydney Grey-headed FF workshop - soon to appear in print. Do read it. Since there will be an official ABS eulogy for Les, I will stop here... except for, "good onya mate, thanks for all you have done, enjoy a long and productive retirement from the joys of academia, oh yes, and now you are free, remember that 1991 manuscript on *Flying-fox populations in crisis in southeast Queensland?* Perhaps*.....?* ".

And now a sad bit. I have always pushed for recognition of the scientific contributions of FF carers, so when I read the following passage about Darwin I decided to include it here - it comes from Janet Browne's ***biography of Darwin***, *Voyaging*. *"He asked... his father's coachman for his opinion on dogs, and Thomas Eyton for his views on owls and pigs. He made... his cousin struggle with a deluge of farmyard questions of all shapes and sizes. He struck up a correspondence with his Uncle Jos about Staffordshire worms .... Darwin elaborated this way of proceeding into one of the most distinctive aspects of his life's work. When seeking information on any new topic, he learned to go straight to the breeders and gardeners, the zookeepers, Highland ghillies, and pigeon fanciers of Victorian Britain, who possessed great practical expertise.... Being a gentleman - being able to use his social position to draw out material from people rarely considered scientific authorities in their own right-was important. His notebooks began bulging with details methodically appropriated from a world of expertise normally kept separate from high science".* I trust that the message is clear. But what of the sad bit? The quote is in ***Stephen Jay Gould***'s *"Penultimate Reflections in Natural History - The Lying*

Stones of Marrakech" and I was on the final essay the day his death, at age sixty, from cancer, was announced - much sadness that such a mind should be shut down too soon. SJG was a quirky b*gger: a palaeontologist by trade, specialising in snails; a great evolution theorist and proponent of Darwin. He was also a brilliant essayist on biology, evolution, baseball... - essays to enjoy, essays on the human condition, essays to make you think and reconsider - a great humanist. I recommend them to you.

Flying Fox Information and Conservation Network FF carers remain the foundation of FFICN, and the annual Conference *[10th-11th August 2002, NPWS Training Centre, Woody Head, NSW, details from <jayelle@tpg.com.au>]* remains a major forum for carers to share information and have a good time. In my agreeing to facilitate FFICN cyber-communication, the FFICN cyber-network expanded to include people devoted to FFs, but who do not rear or rehabilitate. Thus, matters promulgated have gone well beyond FF care and included some which have generated some intra-FFICN friction. TOBB pleads guilty to interpolating his own brand of bitter-and-twistedness which has, perhaps, not helped. Nonetheless, I believe cyberFFICN is useful for spreading information among those who care for FFs in the broadest sense. It has certainly helped me prepare submissions and expert-witness testimony. If any of you have concerns as to how cyberFFICN is run, do not hesitate to screech at TOBB. Any one wishing to join, email *<Leonard.Martin@mailbox.uq.edu.au>,* but include background details or a reference.

FFICN meetings do discuss more than just rearing and rehabilitation. Thus, in 2001, Carole West presented a timely paper about FF camps threatened by housing developments in NSW. Timely, because many recent FFICN cyber-postings have concerned "movement", or proposed "movement" of roosting FFs from various sites in QLD. For "movement" read ***forced removal of flying-foxes from roost sites*** by disturbance, noise and smoke. To list a few I know of: Mareeba, Charters Towers, Esk, Samford Valley, Woodend, Boyne River. The last, involving Little-reds and Blacks in mangroves, has been going on for some years [information available on *<http://home.iprimus.com.au/gonbatty/index.html>*] and it is the "Battle of the Boyne" that has generated friction <u>within</u> the pro-FF community. This battle epitomises so many problems involving FF roosts near urban developments - even when FFs have been roosting there long before humans arrived: I must admit getting into my most bitter-and-twisted mood when I hear of ***FFs being forceably removed from <u>mangroves</u>***!

Les Hall and I remember confronting the Woodend anti-FF brigade when we were trying to establish the conservation reserve - the intense anger and hatred - and that was <u>before</u> the advent of *Hendra* and *Lyssa.* I hesitate to envisage current attitudes among the Boyne antis. There <u>is</u> QLD legislation which makes unlicenced disturbance of FF camps illegal. But extreme, intense anti-FF-hatred, whether induced by threat to property values, possible disease, input from fruit-growers, bat-shit, smell, noise, soiling of cars/ washing etc., must put great pressure on local NPWS to grant permits to move the animals. Attempted "movement" must only be carried out by specified procedures in the presence of a NPWS officer. However, ***antis often illegally harass the animals***. The pros, understandably, get incensed because of failure to prosecute and the appearance of an all-too-great-a-willingness of NPWS to grant permits, or to grant them retrospectively. And so it goes on: accusation, counter-accusation and ill-feeling within OUR ranks! I know how the front-line pros feel, I share their views about the antis [I've made THAT plain enough times in cyberspace]. But I also understand the pressures on NPWS - the frustrations they must feel. They have to live in the community too - and they also have pressures from higher up, the rules governing independent action and comment etc. And, lets face it, NPWS is underfunded, understaffed and simply hasn't the resources to adequately police/ enforce existing legislation. Perhaps there could be ***Honorary Voluntary Rangers*** with appropriate powers? I doubt it.

There is concern that active opposition to forced removal of FFs is counter-productive, in that it might put "the public" off-side and compromise acceptance of other (perhaps more important) strategies for FF conservation - eg., banning of orchard electrocution grids. Perhaps, to best convince people of the need to conserve FFs, we should restrict our activities to education and scientific research. Not unreasonable. However, the responses of the Victorian Environment Minister and Melbourne Botanical Gardens, the continuing QLD land clearing in the Murray-Darling catchment, and the views expressed below by a QLD fruit-grower, do make me a <u>little</u> sceptical of the likely success of education and scientific research in convincing people to change views and practices. Also, I am not sure that the urban roosts issue IS unimportant. Increasing numbers of FFs are found in urban areas and it may well be that, ***with continuing widespread land clearing, urban areas increasingly provide essential***

food resources. Les Hall recently told me of a new maternity camp of Little-reds on the Noosa River. He suggested this novel southern location for birthing results from land-clearing around traditional central QLD roost-sites.

One must question, the long-term effectiveness of forced removal of FFs from a chosen roost-site, particularly when that site is long-established. Les does so in his forthcoming article in the proceedings of a workshop on managing GHFF published by the Royal Zoological Society of NSW. Forced removal has become very fashionable - Maclean, RMBG, Charters Towers, Mareeba, Esk - but does it work? FFs have returned to Esk. They have not returned to their island roost at Mareeba, perhaps because after licenced "movement" of the FFs, there was "movement" of the roost trees *[allegedly the local council declared the area a "bat-free zone"]*. Today another old bat told me that the humanoids of Charters Towers are "up in arms" about a newly-arrived roost of Little-reds, presumably with pregnant and lactating females. Is this arrival in CT at birthing time a new phenomenon? Does it spring from the same causes as the Noosa camp? One wonders how QLD NPWS will react, particularly since Little-reds are not considered to be endangered. One also wonders what QLD NPWS's "thresh-hold" criteria are for issuing permits, and for prosecuting illegal disturbance of FF roosts? How will QLD NPWS manage to police this situation? ***Clearly it is time for the ABS to formulate a policy on an increasingly widespread and, to me, extremely dubious practice.***

Some good news. The ***Grey-headed flying-fox has been declared vulnerable***, by both NSW and Federal authorities. Last week the Feds declared the ***Spectacled flying-fox vulnerable***. We await determination on these species in QLD - the scientific committee is currently considering evidence. Within the last eighteen months there have been ***four successful court cases about orchard FF electrocution grids***, and QLD NPWS now refuses to issue damage mitigation permits for their use.

On 17 October 2001, we received a ***favourable judgement in Booth v Bosworth*** *[later we were awarded costs].* The judgement banned use of the 6.4km electrocution grid, but did not require it to be dismantled. The judgement was made on the basis that, ***"continued operation of the Grid is likely to have a significant impact on the world heritage values of the Wet Tropics World Heritage Area"*** *[and not, as reported incorrectly by A. Hodge in The Australian of 21-05-02, because the judge, "ruled the use of electrical grids over fruit crops was excessively cruel...". The full judgement in Booth v Bosworth [2001] FCA 1453 by Justice Branson is at <http://www.federalcourt.gov.au/judgments/judgmts.html>].* The judgement was based on evidence that ***continuing use of the grid would cause a significant decline in population numbers of Spectacled flying-foxes***. Key data included Carol Booth and Allen McIlwee's counts of dead bats on the grid, Olivia Whybird's estimate of the size of the total population of spectacled flying-foxes, and my "back-calculation" of the size of population put at risk by the level of culling in the Bosworth orchard *[NB. carers' data on breeding season/ age-at-first-breeding aided calculations]*. Long before that judgement was handed down, ***QLD NPWS stopped issuing damage mitigation permits for electrocution grids***. Apparently, QLD RSPCA inspected the grids, deemed them "inhumane", and let QLD NPWS know that they would prosecute. I do not know the basis of the RSPCA's classification.

In September QLD NPWS, asked me to be an expert witness in a test-case, brought against them in Rockhampton, by a ***fruit-grower appealing the decision not to issue damage mitigation permits for electrocution grids***. The FFs involved were *P. alecto* and *P. scapulatus*. My primary brief was to comment on likely effects of grids on population numbers, but I was also asked to comment on any other aspect. For the record, here is some of my "population" testimony. "*Black and Little-red flying-foxes extend over a large range... However, there are no scientific estimates of population size based on meaningful censuses that would justify Dr …[X]'s statement that, "there are very likely to be more than a million individuals of each of the two species". In the USA, the Passenger Pigeon was present in "large numbers" only shortly before the species became extinct. While there may be no evidence that the above flying-fox populations are in decline, there is also no evidence that they are not in decline. On the balance of probabilities, it is likely that these populations are in decline. Thus, despite assertions by Dr …[X], which I counter below, neither the Black flying-fox or the Little-red flying-fox has any greater or more rapid reproductive potential than Grey-headed and Spectacled flying-foxes... both of which have recently been declared to be vulnerable on the basis of strong scientific evidence of population decline. Also... Black and Little-red flying-foxes are exposed to the same pressures that are thought to contribute to the decline of Grey-headed and Spectacled flying-fox populations, viz. habitat destruction and loss of natural food sources, disturbance and destruction of roost sites, orchard culling by shooting, poisoning and electrocution. The effects of such factors on population decline are additive and, over*

time, cumulative. Since the home-range of flying-foxes can extend over many hundreds of kilometres, expansion of range does not necessarily mean expansion of numbers, or need be dependent on such. Thus the observed expansion over recent decades of the Black flying-fox into areas previously occupied exclusively by the Grey-headed may reflect no more than occupation of sites vacated as the Grey-headed flying-fox population contracts, with gradual movement south of Black flying-foxes from northern "source" populations. The expansion might well reflect a better exploitation of available resources by Black flying-foxes, but does not require the species to possess any reproductive advantage over Grey-headed flying-foxes...

Clearly, killing 75 Black flying-foxes... even year after year, would have negligible effect. However, the effects of this one grid cannot be taken in isolation... I understand that there are 5 such grids in the Rockhampton area, and a possible 150 in Queensland. While damage mitigation permits, may be issued for small numbers of animals... there is no guarantee that the numbers actually killed will fall within that limit. Actual numbers killed may well be many times the permitted number. For example, in Carol Booth v Rohan Bosworth - Federal Court Application Q163/00, the grower was granted a damage mitigation permit for 500 Spectacled flying-foxes, yet the number counted as killed over four nights was 1510, and the total number killed over an eight week electrocution period was calculated at 21,000 - 23,000... suppose that each grid operator requests a damage mitigation permit to kill 100 bats, not an unreasonable number. If 150 grids kill only their permitted quota, that totals 15,000 bats. It is likely that approximately 50% of those killed (7,500) are females - though the proportion could well be more. If that number of females constitutes 10% of a population of females with a "natural" mortality of 20%, then the total population shifted from steady-state into rapid decline would be 75,000. If the actual kill is, on average, more than the licenced number, the size of female population that is put into rapid decline goes up accordingly:- 150,000, 300,000 and 600,000, if growers exceed their quota by 2-fold, 4-fold and 8-fold respectively. If the actual male:female ratio in the population is 1:1 then the theoretical populations put into decline by orchard electrocutions are respectively 300,000, 600,000 and 1,200,000... continuing culling of flying-foxes by orchard electrocution grids is not sustainable and is likely to cause population declines of such magnitude as could lead to... extinctions".

While preparing this evidence, a ***NSW RSPCA*** officer asked me to be an expert witness in a ***Cruelty/Aggravated Cruelty case being brought against two NSW North Coast fruit-growers who,*** I understand, ***had killed Black and Grey-headed FFs on an orchard electrocution grid***. I was surprised because I had long understood that such grids were illegal in NSW. I discussed this with a near-by-FF-friendly-fruit-grower [the one who had dobbed me in to the RSPCA!]. He knew of various grids that had been operating locally and expressed expletive-deleted contempt at the failure of NPWS to prosecute *[note, this is hearsay evidence not admissible in court].* The RSPCA officer said that it was difficult to get anyone to give evidence on pain. However, TOBB had the advantage of being familiar with the physiology of pain, and knowing FFs and carers experienced with FFs killed and injured on power-lines! Meanwhile, in Rockhampton, ***an opposition expert raised the issue of cruelty***. While discounting the possibility that grids were "cruel" [growers insist they are humane in that they kill FFs "instantly"] he argued that fruit-growing is an agricultural enterprise, and that society tolerates a degree of cruelty in agriculture when it is beneficial *[he cited mulesing of sheep as an example]*. Thus the benefits of electrocution grids might well outweigh any "borderline" cruelty *[at this point I had not satisfied myself as to just how cruel the grids might be]*. However, if the grids were ineffective?.....

Was there ***evidence that grids are ineffective <u>in protecting fruit</u>, (as opposed to killing FFs)***? There was plenty: some from the Bosworth case *[substantial fruit losses over previous years despite use of grids; failure of grids to deter FFs, as evidenced by the large numbers that continued to be killed though grids had been on for weeks; likely damage from birds];* some from the Rockhampton case *[geometry of the grid, likely damage from birds]*; some from the QLD DPI publication *To Net or not to Net [geometry of the grids; likely damage from birds; opinions of growers]*. The DPI publication repeatedly refers to "Bird and bat netting", cites examples of major damage by birds, describes the ***complete effectiveness of properly erected exclusion netting in preventing bird and FF damage,*** as against the partial effectiveness of electrocution grids and the ineffectiveness of drape netting *[data/ opinions from fruit-growers]*. After reviewing all this material, it remains unclear to me how lychee growers distinguish or quantify damage caused by FFs from that caused by birds *[which are not killed/repelled by the grids]*.

But it is the geometry and spacing of electrocution grid-lines that is the most damning aspect to anyone familiar with the aerial and sensory abilities of FFs. ***Hands up all those who envisage the grids as being like exclusion netting, and <u>enclosing</u> an orchard.*** They are not. The 6.4km Bosworth electrocution grid comprises 14 ***vertical arrays of parallel horizontal wires running between 4 and 9***

metres above ground - just like a very high paddock fence, and ***spaced ~100 metres apart!*** But there is more. Thus, in the Rockhampton case, a grower states that, *"Since 1994 we have spent approximately $9,100 on protective netting to drape over the lychee trees... approximately one month prior to harvest and then removed at the end of the season... The nets offer reasonable protection from attacks by small numbers of flying-foxes, but are unsatisfactory for an attack by a large number of flying-foxes. The reasons for this is that the lychee fruit hang on the exterior of the canopy of the tree and as the net sits immediately over the tree,* ***flying-foxes and rainbow lorikeets can simply land on the tree and attack/eat the fruit through the net"*** [my emphases]***.***

Yet this same grower argues strongly for a permit to operate a ***single*** 9.3-metre-high electrocution grid-line, of the type described above, *"approximately 200 metres long* ***in a straight line through the middle of****... a lychee orchard with the dimensions of approximately 300 metres long and 80 metres wide."*. One must ask, given the behaviour of the FFs with respect to trees under nets, ***how a single grid line in the middle of the orchard could protect the surrounding trees or deter FFs from them*** and similarly, ***how grid-lines spaced 100 metres apart protect the trees in between?***

One must therefore question whether the primary purpose of such electrocution grids is to protect the crops or simply to kill flying-foxes?

Was there evidence that ***grids are not humane in that they do not kill FFs instantly and painlessly, and that a proportion of animals survive such "electrocution", severely injured and in pain***? Plenty. Direct evidence came from a video-recording accepted as evidence in Booth v Bosworth which shows a moribund FF, on the ground under the grid. This animal had clearly been there for some time - almost certainly more than a day and was feebly moving its head ears and thumb claw. The recording also shows an adult bat flapping and screaming on the live grid for 8 seconds before breaking free and flying to the ground. This was described in the Rockhampton and NSW RSPCA cases. If was also self-evident that electrocution of female FFs in the breeding season could lead to painful injury to young carried by such females, followed by a slow death by starvation - the fate of suckling young left in the creche by electrocuted mothers.

It was also important to establish that the ***grids do not kill FFs humanely*** that ***electrocution grids do not kill FFs instantly or painlessly.*** This needed lengthy treatment. Description of FF anatomy and sensory physiology preceded a description of pain, as experienced by humans, *"Pain is the word given to the conscious sensation experienced... when body tissues are stimulated by a noxious factor, ie. are damaged in some way. Damage can be caused by external factors - mechanical, chemical, thermal, electrical, or by internal factors - ischaemia, inflammation, pressure, distension. All readers of this report will have experienced pain in some form or other: the intense lingering pain of a sharp blow to the shin; the sharp pain of a cut, or needleprick to a finger; the intense pain of an abdominal "stitch"; the different intense pain of extremely cold fingers; the (agonising?) pain of an intense muscle cramp; the (agonising?) pain which accompanies every breath in pleurisy; the nauseating disorienting pain of a bad headache; the pain of a twisted joint, of a broken limb; the dull, upsetting continuing ache of bone pain; the continuing unrelenting pain of arthritis;* ***the shocking pain of an electric current; the intense, continuing, and upsetting pain of even quite small burns or scalds****... People, in speaking of a "good" death, have in their mind's eye a death without pain. None of us wish for the prolonged, unrelenting deep pain suffered by some cancer patients, pain that despite palliative care and modern analgesics (pain-killers) causes such patients to call on God to end their misery.* ***I make this point in relation to what I describe below, namely flying-foxes carrying gross electrical-burn injuries to wings and limbs, even electrocauterised amputations, consequent upon their contact with an electrified cable or wire, and surviving for hours, even days, without any palliative treatment.*** *Here are some of the words humans associate with pain: discomforting, distressing, suffering, hurt, anguish, agony, torment, excruciating, torture, hell, and so forth. In relation to discussion of the alleged cruelty/ aggravated cruelty of electrocution and electrocutive burns, one may note that: humans envisage(d) the ultimate fate of the wrongdoer to be the eternal fires of hell; witches and heretics were put to death by fire; mediaeval torture frequently involved fire; modern torture allegedly involves burns and electric shocks.* ***I emphasise... the pain of burns and burning, because so many injuries suffered by flying-foxes are burns, albeit produced electrically...*** *In the normal individual, the sense of pain has adaptive value, in that it warns that tissue damage is occurring. In being conscious of the pain, the individual recognises the circumstance of the damage, and learns to avoid those circumstances".*

Then followed an account of the physiology of pain, ending with, "*Although humans routinely euthanase injured domestic animals to "put them out of their misery" and many humans believe intuitively that "animals feel*

pain like us", it is unlikely that it will ever be possible to "prove" that non-human mammals perceive pain qualitatively in the same way as humans, or to the same level of intensity. Nevertheless a body of objectively verifiable knowledge supports the view that all mammals perceive pain in essentially the same way. Thus the chemical and cellular (neuronal) basis of pain generation and perception is essentially the same in all mammals, and specific noxious stimuli elicit the same suite of measurable physiologic and behavioural responses in a wide variety of species. ***It also seems that for "pain" to be of adaptive value it is essential that it be a consciously perceived sensation. Only thus can an individual animal recognise and remember the circumstances of the pain, and take the appropriate action to avoid them in the future.*** *Thus, the accepted scientific view is that all mammals perceive pain in essentially the same way and to the same degree as humans. The National Health and Medical Research Council's guidelines for experiments on animals are predicated on this view, as is the AVMAP report on animal euthanasia, and... the NSW PREVENTION OF CRUELTY TO ANIMALS ACT".*

In considering likely effects of grids on FFs, the ***American Veterinary Medical Association Panel on Euthanasia (AVMAP) report*** was immediately relevant. It concluded that electrocution was not-acceptable as a method of euthanasia of small mammals, for reasons described below. In testimony, I noted that, *"that the AVMAP does not explicitly mention the pain caused by passage of an electric current through the body, nor do they raise the issue of burns to body tissues where an electric current enters and leaves the body. Presumably this is because the apparatus used for electrocutive euthanasia distributes the current over wide areas at the entry and exit points, so obviating tissue damage... In contrast,* ***the current flow at the points of contact between the living tissues of a flying-fox and the 1.6mm diameter wire typically used in orchard electrocution grids is of an intensity that may be likened to that at the tip of an electric-arc welding rod****. Certainly the wounds found on flying-foxes electrocuted on the substantially-larger-diameter 240v and 415v electric power-supply cables are consistent with this, comprising as they do deep burns, even to the bone, on the fore-arms, thumbs and hind-limbs (sometimes the hind-claws are fused together); large areas of wing-membrane burnt away with much of that remaining - crisped, brittle and crumbling. A proportion of animals with such wounds are found below or near powerlines - still alive".* Various carers will recognise the sources of this summary.

In evaluating methods of euthanasia, the AVMAP used several criteria including: ability to induce loss of consciousness and death without causing pain, and the time required to induce unconsciousness. In relation to electrocution, the AVMAP states that, *"Electrocution, using alternating current, as a form of euthanasia... induces death by cardiac fibrillation, which causes cerebral hypoxia... However, animals do not lose consciousness for 10 to 30 seconds or more after onset of cardiac fibrillation... It is imperative that animals be unconscious before being electrocuted... Therefore, euthanasia by electrocution must be a two-step procedure. First, an animal must be rendered unconscious by any acceptable means, including electrical stunning... If electrical stunning is used,* ***the electrical current must pass through the brain****"* [my emphasis]. It will be clear to anyone familiar with the size, shape and flight characteristics of FFs that it would be well nigh impossible for an animal to collide with two grid-wires spaced 25-30cm apart (Rigden *et al.,* 2000) in such a way that current would pass <u>through</u> the brain, ie., from one side of the head to the other.

The AVMAP continued, *"****Electrocution... may not result in death in small animals (<5kg) because ventricular fibrillation and circulatory collapse do not always persist after cessation of current flow****... Electrical stunning and euthanasia by electrocution require special skills and equipment that will assure passage of sufficient current through the brain to induce unconsciousness followed by electrically induced cardiac fibrillation...* ***Techniques that apply electric current from head to tail or head to foot are unacceptable****... "Experiments in dogs have shown the necessity of directing the electrical current through the brain in order to induce rapid loss of consciousness...* ***when electricity passes only between fore- and hindlimbs or neck and feet, it causes the heart to fibrillate but does not induce sudden unconsciousness****.. For electrical stunning of any animal, an apparatus that applies electrodes to opposite sides of the head, or in another way directs electrical current immediately through the brain, is necessary to induce rapid unconsciousness"* [my emphases]. Yes, FFs are <5kg and the geometry of their flight versus that of the grid-wires ensures that the most common route of the current will be through wings, feet, body, and that contact will very likely be repeatedly broken and lead to prolonged but intermittent passages of current-flow - a long, painful process with no guarantee of death at the end when a FF breaks free and falls to the ground, as in the video-recording *[In testimony this was spelt out in great detail, so as there could be no doubt].* I also pointed out that, *"For the first few weeks of life, neonatal flying-foxes are carried everywhere by the mother. They grip firmly to the mothers abdominal skin by their well-developed horny hind-claws, and are attached firmly to one or other of the axillary nipples by strongly recurved milk teeth... In this position the neonates are unlikely to receive a major electric current flow resulting in... death. It is also likely that, as neonates, they are more resistant to anoxia than older animals. Be that as it may, it is an observed fact that, while a... relatively small proportion of adult*

flying-foxes survive "electrocution", in the sense of remaining alive... afterwards, the majority of suckling young found on dead electrocuted mothers (on or below power lines) are alive. Furthermore, most are relatively unhurt... Others are found with mild-to-severe electrical burns to the mouth and throat... A minority are found alive but with severe internal and external electrocutive injuries". What do growers do about live young on electrocuted mothers?

My conclusions, *[in both cases]* were, *"That... **electrocution grids do not kill flying-foxes rapidly, instantly or painlessly... that a significant number of animals suffer gross electrical-burn injuries from the grids, yet survive for hours or days...** [that] given that... grids are relatively ineffective in protecting fruit crops, compared with wholly-effective non-lethal systems such as netting, then the grids must be considered as unacceptably inhumane"*, and *"There is no doubt... given the grids' relative ineffectiveness in protecting fruit, that in relation to the NSW Prevention of Cruelty to Animals Act... **operation of a grid results in multiple uncontrolled acts of cruelty**: multiple in that many bats may be affected; uncontrolled in... that when a grid is switched on, there is no control on the number of bats which may be affected; acts of cruelty, in that as a consequence, animals are unreasonably and unjustifiably mutilated, maimed, terrified, exposed to excessive (electrical) heat and inflicted with pain... By similar reasoning I conclude that operation of a grid results in **multiple uncontrolled acts of aggravated cruelty**, in that its operation will result in the death or serious disablement of multiple animals, some being so severely injured or in such a physical condition that it is cruel to keep them alive".*

And the results? ***The Rockhampton appeal was dropped*** on the Friday before the Monday the case was due to be heard. Our solicitor indicated that the appellants, having seen our side's evidence, decided not to go ahead because they didn't want it in the public eye. The following Thursday ***the accused in the RSPCA case pleaded guilty***. I understand that they were not fined and that no conviction was recorded - *[I don't have the details because the RSPCA solicitors never did send me details!]* but, ***The Precedent had been set!*** Subsequently, NSW NPWS prosecuted these same growers for the same electrocutions (harming threatened species?). Again they pleaded guilty. The magistrate considered the offences to be "more serious than the RSPCA charges", and recorded convictions and imposed fines - $1000 plus costs, totalled $2370 each. Big Deal you may cry but, again, ***A Precedent had been set.***. So, reason had prevailed and all was right with the world.

Alas no. The Australian 13/04/02 carried an ad *[which I did not see until 07/05/02]* which read, *"Pursuant to section 93(1) of the Environment Protection and Biodiversity Conservation Act... ("EPBC Act") members of the public are invited to comment on **an application... to allow the electrocution of, at most, 5,500 Spectacled flying-fox by the proponent on his lychee orchard located at Kennedy, North Queensland...** for the November/December 2002 harvesting season... The proponent has prepared preliminary information... Members of the public are invited to give the proponent comments... Comments must be received in writing, by 5.00pm on 14 May 2002... relevant information will be available for viewing at..."*. Oh spit, no time to get a submission in... but I did thanks to: *[Reinhold Muller for copy of ad (May 7), Gary Bresson for the "relevant information" (May 8) and Carol Booth for her submission and background information, eg., irrelevance of "cruelty" to EPBC Act]*. The proponent argued the economic necessity for the grid, contended that the bats killed did not come from the World Heritage Area, misrepresented data presented in Booth v Bosworth, asserted that, *"the number of females taken by the electric grids is in the vicinity of 10%"* and questioned estimates of total population size. My 15 page submission *[plus copy to Environment Australia, express mail May 13]* countered these and other points, using material like that in the present squawk. Apropos cruelty, I pointed out that, *"while the issue of cruelty to animals is not covered specifically by the Environment Protection and Biodiversity Conservation Act 1999, the proposed action would almost certainly constitute multiple acts of cruelty and of aggravated cruelty against indigenous fauna of the Wet Tropics World Heritage area viz., Spectacled flying-foxes... I draw attention to the **successful prosecution** by the NSW RSPCA, in December 2001, under the NSW Prevention of Cruelty to Animals Act... of two fruit growers using flying-fox electrocution grids".* ***It is because of the Bosworth proposal and the grower's comments quoted below that the cruelty of grids needs to be publicised -*** hence the length of this squawk.

This extract from *QLD Fruit and Vegetable News February 2002* shows how scientific research ("*emotional, theoretical drivel*"*?*) can fall on deaf ears. "*GRID LOSS THREATENS LIVELIHOODS BEWARE. You could be the next victim of **terrorism from environmental extremists with their international push** to ban all damage mitigation permits for all wildlife. The interests of individuals, business enterprises or even local communities would unlikely take precedence over the national interest in matters of national environmental significance. Conservationist Carol Booth took orchardist Rohan Bosworth to court and won by using the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) and the international World Heritage Convention to*

gain an injunction to stop Rohan from using his electric grid system to protect his lychee crops from fruit bats. The court ruled his grid "has, or will have, or is likely to have, a significant impact on the world heritage values"... the RSPCA, as well as EPA's Director General James Purtill... classify grids as inhumane with no prior consultation with industry... Qld Parks and Wildlife Service (QPWS) declared grid systems illegal and stopped the issue of damage mitigation permits for their use, despite no viable alternative methods. Even QPWS admit the current alternative methods being researched will not work in the wet tropics and yet electric grids, properly installed and maintained, are humane! As usual, public servants and politicians jumped to the tune of the ***environmental extremists, who are terrorising legitimate businesses****... We have legally installed an electric grid system in our orchard. This was* ***to protect our crops from flying-foxes by killing fruit bats instantly****. The RSPCA compromises its integrity by sanctioning the use of 1080 and myxomatosis (two of the most horrific deaths imaginable), as well as ignoring... speared dugong dying slowly. How can the RSPCA claim electric grid systems are inhumane? How do the RSPCA's heads sleep at night after making such discriminatory decisions?... Beattie... was "coming to the rescue" of the fruit industry by putting up $20,000 for 20 ultrasonic deterrent units... $20,000 for a multi-million industry - what a joke, except it is not funny... By the time the paperwork was sorted out between government departments, the units arrived too late for us - the flying-foxes had already been - we lost our entire lychee crop...* ***As it suddenly became illegal to turn on our humane electric grid system, our income for the next year has been stolen by World Heritage fruit bats****... Every day... it is the same - more businesses gone to the wall - more people losing jobs. The Flying Fox Consultative Committee, which is stacked 11:5 against farmers, is another joke. There are nine governmental and two environmental representatives. Of the five grower representatives, only one is from Far North Queensland....The DPI economist with the "To Net Or Not To Net" workshops wrote a report that nets were not the most viable alternative and that grids were the most economic method for most growers. This report should be made public and not kept hidden in DPI's files. The DPI had the preconceived idea that netting was the only way to go. Queensland cannot afford to have a major contributor of jobs and export earnings, the fruit industry, to be destroyed! All community members need to be contributors to the management of flying-fox mitigation, with a cooperative, un-biased, realistic and practical approach, with resolution based on fact...* ***Environmental extremists*** *talk only about exclusion netting. But exclusion netting is no different to clearing the land* **[sic]** *and environmentalists have stopped that... how would you get the bats off the top of an exclusion net covering at least 1000 trees? Fruit bats need to drop to fly, so they will die on top of the net...* ***We are under constant scrutiny and surveillance by environmental extremists.*** *Many growers have placed "No Trespassing" signs on their properties but does this legally protect them?...* ***Farmers... and the community in general, need to become more jointly involved in environmental issues in all its forms...*** *We need to place practical, logical ideas into the system - not* ***emotional, theoretical drivel*** *that drives the system for bureaucrats who sit on polished seats in air-conditioned offices in cities... Dick Yardley, lychee orchardist, Miriwinni, Far N.Qld".*

Okay, so we may chortle over the "*extremist*" terminology, the malapropisms, the conspiracy theories and the just-plain-b*llshit, but this bloke is hurting, and he is the sort of bloke that we must try to get on side. If I were a grower with crops being ravaged by FFFFFlying-foxes, I could easily share his feelings and attitudes. THAT is why I persistently argue that, ***if the community wishes FFs to be protected, then it must help the fruit-growers*** with, for example non-means-tested netting subsidies.

Nevertheless, that letter and the Bosworth action sound a warning. The grids remain in place, intact. Growers continue to assert that grids are effective and humane - note also the reference to "*surveillance by environmental extremists"* and *"No Trespassing signs"* above - and may be tempted to use them. Who will police the grids? Who can guarantee that grids will <u>not</u> be used? How strongly will the law be enforced, offenders prosecuted? ***What is ABS policy on all this?***

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Acknowledgement: I thank my literary adviser for reading and criticising this article, and in particular for toning down my language - this time I've taken your advice, thank you ***Kay***.

Bat Boxes

Frank Box

The Australian Nestbox Company, 81 Haig St, Gordon Park 4031. ozbox@powerup.com.au

In reference to Terry Reardon's article in the last Newsletter:

About a year ago I came up with a similar design with dimensions based on the British design by Stebbings and Walsh. At the time I was trying to come up with something that would make it easier for Monika Rhodes to do the monitoring of her 70 odd boxes (still at the planning stage at that time). The idea was that the hinged base would be fitted with an eyebolt, and an extendable rod could be used to open the base from the ground. She would then have to climb only if bats were present. I built about 6 of them, but the consensus from a number of bat workers seemed to be that it was not a good idea, for the following reasons:

1. I used a double-ball, brass catch to secure the base, and this made a loud snap as it was opened and closed. Without being up there to seal the exit, the thinking was that the bats would bolt.

2. Inspecting the box (on a ladder) from beneath was considered to be more difficult than from above, due to one's position on the ladder. Similarly, extracting bats through a bottom opening would be more difficult. I think that both of these concerns have validity.

3. The opening in the base of the box is smaller than the cross-sectional area of the box, due to the open base hanging down. Unless the box is increased in size to compensate, extracting bats is harder than if the lid were removed.

4. It might be harder to close the base without any of the bats getting injured.

These concerns were never tested as the concept was abandoned, but the original idea of ground-based monitoring is still worthwhile.

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– News and Announcements –

Les Hall Awarded Life Membership of the ABS

Greg Ford (with significant contribution from Greg Richards)

At the Society's recent AGM in Cairns, one eminent member was nominated for Life Membership of the ABS - Dr Lesley S. Hall. The nomination received a unanimous and resounding vote of 'yes' from all assembled at the meeting.

Congratulations, Les! The ABS applauds your lifetime of commitment.

I can think of no-one more deserving of such recognition from the Society, for Les Hall has contributed a lifetime to research on and the conservation of bats throughout Australia and internationally. He has, no doubt, inspired many students and colleagues over the years to pursue his passion. And who better to pay tribute to Les than one such colleague. I asked a couple of people to provide some anecdotes or words of accolade that I could combine into this article. The result was the following tribute from Greg Richards:

> I first met Les Hall in 1968 during my first day with CSIRO as a junior technical assistant. Les was doing histology on bits and pieces of rabbits from the arid zone, and cutting up things was always part of his working life until his retirement in 2002. In fact, the histology and development of bandicoot pouch young was the subject of his 1988 PhD thesis.
>
> Les was solely responsible for my interest in bats, which began when I first tagged along on one of his trips, just to enjoy a caving experience. He showed me the interesting things about a Miniopterus that he held, the first bat I had ever seen at close quarters, and as a super-salesman had me hooked for life on these fantastic animals. Those early days were great because bats were a 'family thing', involving weekend barbeques with the wife and kids at caves or old mines, banding thousands of bats and having a few beers, a great lifestyle.
>
> I was regularly out in the desert on rabbit work, and Les would come on trips to do microclimate work on burrows. Les was terrific at getting equipment for bat projects out of CSIRO's rabbit funding, so the fact that he used the burrow gear in caves was of course purely coincidental. Without harping too much on the old days, I was fortunate to be the student in a crowd of great teachers like Les, Johnsie McKean, Bill Price, Andy Spate and Elery Hamilton-Smith … I was very lucky.
>
> Les moved to Brisbane and joined the University of Queensland after receiving his degree in 1974 from what is now Canberra University. At the UQ he was able to pursue his bat research with a much greater blessing than in the CSIRO days, and from this institute his output was quite phenomenal. Not only did he write a huge number of papers on bats, but he was equally productive with work on other mammals. I don't know how he fitted it all in, especially since he would chat for ages to anyone who phoned him about bats. Les always gave his time to anyone, and sometimes I would see him so overloaded that a normal person would break, but he always took it in his stride.
>
> Les produced an extremely good crop of students, so we are left with a great legacy of people to whom he transferred knowledge, and guided in the ways to think about bats and to study them. Here is the list of people:
>
> PhD Patrina Birt (flying-foxes), Ilse Brieze (dolphins), Lesley Gibson (bilbies), Nancy Irwin (tube-nosed bats), Shan Lloyd (musky rat-kangaroos), Nicki Markus (flying-foxes), Chris Pavey (rhinolophid bats), Martin Rhodes (flight morphometrics), Martin Schulz (golden-tipped bats), Mohd. Abdullah Tajuddin (Borneo fruit bats), Jessica Worthington-Wilmer (ghost bats)
> MSc Sue Churchill (orange leafnosed bats), Steve Hamilton (New Guinea fruit bats)
>
> …and then add to that a myriad of honours students that is too long to list.

This is quite an achievement, and when you then add a total of approximately 130 refereed publications (including two books), there is no doubt that Les has made a significant contribution to our knowledge of bats in Australia. I don't think anyone could match this output, nor would there be any bat researcher that has not quoted his papers in their own publications. No wonder he now enjoys retirement so much!

As my mentor and colleague, Les and I have done many trips throughout Australia and internationally. All of these trips have a funny story, but there are a few that stand out. Our work in Torres Strait (4 trips) was difficult but made pleasurable because he is so good to work with in the field. On Moa Island we were nearly trampled in a derelict mine by a huge pig, mistnetted Father Wapau at St Pauls (who freaked out because he thought he was trapped in a spider web), and nearly crashed in a light plane on Boigu Island due to my insistence that we escape the place even though the airstrip was waterlogged.

It was on one of these trips that we discovered the new Torresian Flying Fox (*Pteropus banakrisi*), which will be formally described after much trial and tribulation in the next Australian Zoologist. To see this little flying fox in the field yielded great pleasure and wonderment, and it was Les's involvement that led to our naming it after a famous local hunter and warrior, Mr Bana Kris. This way, the local community would be involved directly with the species, encouraging its conservation and protection. Les always thinks this way, constantly working on PR and the good side of bats, and promoting the public awareness of their vital role in ecosystem services.

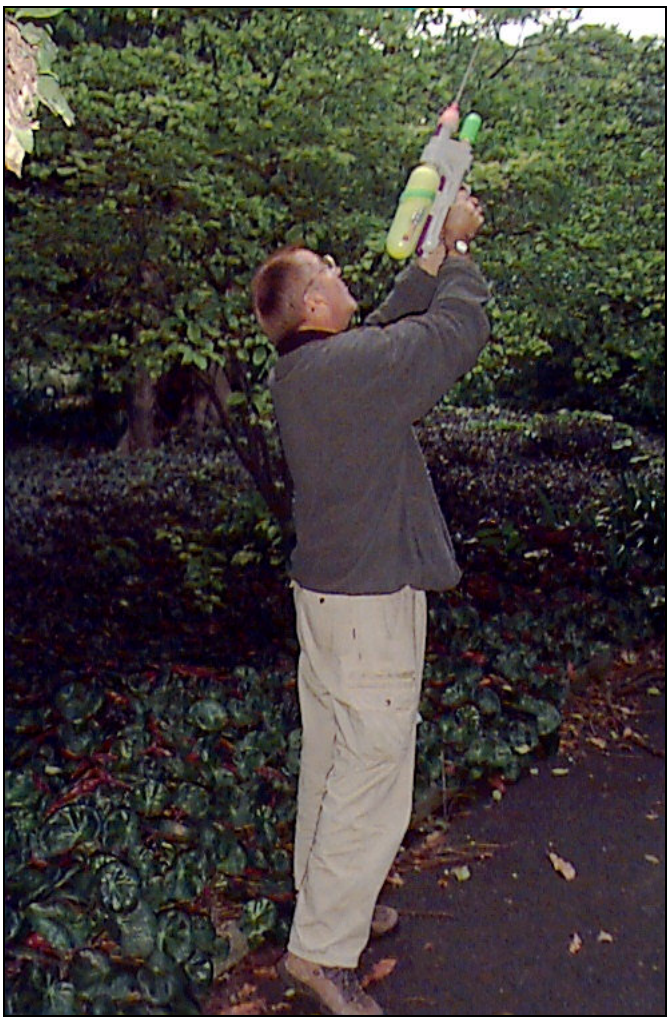
I have tagged along with Les on several of his trips to Borneo, a part of the world that sits firmly in his heart. On the first trip he introduced me to the Old Fata Hotel (yes, pronounced with an "r" after the first "a") – dirt cheap he said, you can get a room for a pittance. Take it from me, it was so cheap and nasty that they supplied thongs to wear in the shower to reduce the extent of tinea that you were guaranteed to catch, but there was cut a notch out of the sole to discourage you from stealing them. For a while we couldn't work out why all of the other guests, mostly female, were so friendly, until we discovered that the nightclub on the corner was a pick up joint for hookers who lived at the Fata. Thank heavens the New Fata was more straightforward!

I have always done battle with Les about the choice of hotels when we travelled. At each city or town in India he followed the Lonely Planet list from bottom to top, whereas I went in reverse order, and somehow we met in the middle. In India he chose a hotel that the LP said had a great view of the Taj Mahal from the rooftop. The fact that you had to lock the door with your own padlock and tie your luggage together with a bike chain was enough as it was, but when I saw a pig booted out of the foyer one day that really topped things off.

Les is a great adventurer to many exotic parts of the world. He is famous for his face featuring on the massive 'crowd scene' TV screen at Sea World in San Diego, and then deliberately placing a finger in a nostril, causing 6000 Americans to groan in unison – such is his sense of humour! He is obviously as game as they come and has had me in more dangerous places than I care to remember. The mere aroma of bat guano and chattering noises in a cave or mine is enough for Les to risk any obstacles or precipices, and his lack of fear of heights (totally opposite to me) has made us a good team in the field.

I take this opportunity to thank Les for his help with my career with bats, as well as numerous others in Australia and overseas. He is a constant mentor, he is always happy to share knowledge and resources, and is very deserving of life membership of the Australasian Bat Society.

April 2002



Les Hall

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Australian Mammal Society 48th Scientific Meeting and Annual General Meeting

Chris Grant
cmgr@deakin.edu.au

Deakin University, Warrnambool Campus, 10-12 July 2002

The 48th Scientific and Annual General Meeting of the Australian Mammal Society will be held at Deakin University, Warrnambool Campus, from Wednesday 10 July to Friday 12 July 2002. Conference welcome and registration will be held on the evening of 9 July, and the Annual General Meeting of the society will be held on the afternoon of Wednesday 10 July. An excursion on Thursday 11 July will include whale watching then visiting a choice of parks in a volcanic landscape. Visit the website for more details:
www.australianmammals.org.au

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***** For Sale!!! ONLY $20 *****

The Australasian Bat Society's first Occasional Publication!!

Reprint of the 'Australasian Bat Research News' Numbers 1-13 (1964-74).

This reprinted series of ABRN, edited by Elery Hamilton-Smith, gives a wonderful insight into some of the early bat research conducted in Australia. Highly recommended reading, essential addition to any bat library!!

But hurry …half have already been sold at the recent bat conference… only $20 inc P&H so order now, contact Terry Reardon, c/- South Australian Museum, North Terrace Adelaide SA 5000.
Ph (08) 82077460 w or (08) 83892358 h or email reardon.terry@saugov.sa.gov.au

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News From The North

Olivia Whybird
Phoniscus Environmental Services, PO Box 9, Millaa Millaa Qld 4886. bats@austarnet.com.au

Thank you to all who attended the ABS conference Cairns 2002 for your patience and understanding. I hope you all had a great time.

It is now official that it is the driest year in FNQ for 88 years. We have had some rain though, the first termite fly of the wet season came only a week after the conference (five months later than usual). The bats and geckos had a feast.

After the conference I became really enthusiastic about being more proactive about bat management. However one of our battos returned from a trip further north with the news of a mine containing 4 or 5 species (3 with rare and threatened status) that was about to be bulldozed, and an application to Environment Australia to electrocute 5,500 Spectacled Flying-foxes under the EPBC act went out for public comment. So who has the time for being proactive? On a more positive note, Chris's PhD is very near completion.

The Cairns Branch of WPSQ has started a study on the distribution the paralysis ticks across the landscape - netting 5 ticks and 5 mites in the first 18 samples. We are currently re-writing the flying-fox camp bio-physical description forms with help from the comments made by those who attended the flying-fox camp study field trip. We have also been able to contract a botanist to assist us. The collection of flying-fox scats at the Gordonvale Spectacled flying-fox camp is also continuing.

I am hoping to continue my work on the sexual dimorphism of *Hipposiderous semoni* if anyone has location, sonar or morphometric data on this species they would be most welcome to e-mail me (bats@austarnet.com.au). See you all soon.

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News from Charters Towers

Sandy Cooper
scooperted@bigpond.com

There had always been a small (~>1000) camp of Black Flying-foxes *P. alecto* in the park, which no one had particularly noticed, as they were fairly quiet and avoided detection. Very early last year this colony was 'visited' by ~ 3-4000 Little Red Flying-foxes *P. scapulatus*, and then over the next few weeks the number increased, dramatically, as they settled in as a breeding colony. I suggested to NP&W that if they were going to be 'moved-on' it had better happen NOW before we had red babies and mating blacks. The council applied for the permit, but didn't complete the paper-work, so no permit was applied for or received. By June the number had swelled even further and peaked, as a resident colony, by September, to approximately 10 000. With more juvenile births, this swelled even further and by then the whole town was 'up-in-arms' at these little red creatures. Public forums and meetings demanded that they be moved or shot - but get rid of them. As a lone Bat person, I had an up-hill battle against the odds, and really appreciated the support I got from some Townsville carers - mostly John and Dominique.

In the middle of this uproar, 'my' blacks were starting to deliver their own young, and unfortunately got involved in the public attempts to 'remove' the bats. By now, most of the red babies were 'dining-out' with their parents. Many adult blacks were killed, either in the park (highly illegal) or on their nightly forays for food - they didn't return, and their babies were left behind. To compound the problem an itinerant colony of reds ~5-7000 decided to join their relatives for a couple of weeks, and at that point nearly every tree in the park had some form of 'bat-life' in it. As the reds were so numerous, their sheer weight broke many large limbs - crashing down into the park with great force.

By now the bat (and my) popularity was at an all time low. I became 'very popular' with everyone in town, as I was seen in the park early every day (I live 20 mins drive out of town) scouring the ground under the trees, and picking up the exhausted babies that had simply 'dropped' out of the trees. After work I repeated the trip to collect those that had fallen during the day. I can guarantee there was one dead for each live one I collected. Some days I collected up to 20 babies, and then after some on-the-spot training, the NP&W workers also collected the babes for me. The carers in Townsville made several trips to the Towers to collect babies to pass on to other carers, as far away as GinGin and Cairns. I also made several trips to Townsville to pass on babies.

Out of the 293 I collected in 5 weeks, 287 had survived (which is nearly more than I did!). To all bat lovers, the finite test to love and patience is rising at 5am to start bottle feeding 40+ baby bats, packing the really small ones into cages for a day with me, at work. The others were left with a multitude of drip feeders in numerous ‘playpen’ style cages, bought for the occasion. Then, into the park and the heartbreaking collection of more babies while trying not to look at the babies that were beyond help. Throughout the day stealing frantic moments to feed the collected babies and the 'wee' ones that I had with me (up to 40 some days). Home after another frantic search for more babies, to feed the swelling numbers of infants, before feeding a husband and the rest of my animal family. Then, feeding again, and have a quick cuppa, before starting to feed again, finishing by ~ 1am, exhausted!

I managed to convince all parties not to start ‘moving’ either colony (red or black) until the daily jaunts to the park became a juvenile relocation exercise - putting the larger babies back in the trees, (most of the infants were flying). The permit was finally approved when the last of the black babies had joined the nightly foray for food (late January, 2002). We have been left with a resident colony of ~600 - 800 blacks, who, despite being ‘moved’ every morning for many weeks (until the permit ran out) doggedly returned 'home'. There is no further permit to be issued for their removal for a long time! It was an experience I basically enjoyed - my idea of heaven used to be being surrounded by baby bats - but I have moved onto the idea that pure pleasure is having a few babies - preferably not more than 6, at a time! Still, we will see what the coming season will bring - hopefully no reds!

Below are two newsclippings provided by Sandy about this issue.

Letters to the Editor

Correspondents should include their full name and address and a contact telephone number for verification. Letters will not be considered for publication where verification is not possible. Letters may be edited.

Phone 4787 1511 Fax 4787 3037
Email: miner@nqn.newsltd.com.au

New tourist attraction

THE Charters Towers City councillors must have rocks in their heads for wanting to move the colony of flying-foxes that is currently occupying Lissner Park.

I spent the night at the Lissner pub last weekend and found the experience totally amazing.

Where else does one get to observe a colony of this size from the comfort of one's hotel room?

Flying foxes are extraordinary animals: they are flying mammals, hang upside down, have an sharp sense of smell, great night vision and are very intelligent and social.

Why not use the animals brief visit as an opportunity to attract tourists, specially European travellers who cannot get enough of Australian wildlife?

The Sydney Botanic Gardens receive countless visitors who come specially to see their flying fox colony and the flying fox tours on the Brisbane River are also very popular.

Granted the colony is smelly and noisy.

So why isn't the council a bit more creative and able to see the potential to put its dying town on the tourist map?

Why isn't the pub proudly advertising its proximity to this extraordinary wildlife experience rather than being apologetic about it?

DOMINIQUE THIRIET
19 Sixth Avenue
South Townsville

Looking at priorities

THE last 12 months has been akin to living in a bad dream or watching a pathetic surreal black comedy performed before you.

In this so called age of enlightenment we have witnessed what damage can be inflicted by crazy legislation that puts bat welfare above the well being of Queenslanders.

However you look at the Nature Conservation Act 1992 there is no logic, rationality and commonsense to be found.

It discriminates against people in favour of plague proportion non-endangered species of bats.

We are protected by law against noise, obnoxious smells and the spreading of disease by human beings but not flying foxes.

Bats in large numbers have been considered pests since time immemorial with culling and relocation adequately dealing with the problem.

With bats being promoted above homo sapiens to the top of the Queensland scale all the old norms disappear.

The bats now reign supreme while the embattled sub-species of unimportant humans are subjected to health deterioration, excessive noise and unbelievable vile smells plus a long list of social and economic side issues.

Politicians are the servants of the people and this goes for bureaucrats too.

The bats do not vote, angry people do.

Peter Beattie's representative in Charters Towers has made no public statements about this problem.

The usually vocal self promotions from this source have been absent.

The mood of citizens at the public meeting left no doubt of what is thought of this idiotic legislation and the way the government and the wildlife people are handling it.

Brighten your corner, Christine, or you can kiss your seat goodbye.

KEITH SIEMON
Plummer Street
Charters Towers

Balancing the argument

I WOULD like to express a different opinion about the flying foxes currently roosting in the trees in Lissner Park.

As a person who wants to see them gone, as much as anyone else, please don't think I am a Greenie who cares nothing about the human local residents.

However, as I am apparently the only person in this fair city who is immunised against the lyssavirus, I have born the brunt of the infant rescue that has happened since their adoption of our park.

I was collecting 10-12 bottle babies twice a day, with excellent backup from some of the park council workers and the local national park's personnel, I am now only receiving the really tiny babies that would not survive without care and the more mature babies are being replaced in the trees to join their mums.

I realise it is an invasion that is definitely not popular, but due to the clearing of forage trees from more remote areas, the little red flying foxes have been forced to find suitable roosts within 40km of feeding grounds — our park fitted the bill.

If they had been moved on earlier this year, before they had babies, there would have been minimal problems associated with the colony.

The involvement of the resident black flying foxes has complicated the matter, as their babies are born after the reds.

To move the colony too soon will result in many babies, possibly hundreds, being left in the trees and needing rescue and care.

It is not simply a case of finding where the parents have gone and taking them to the colony — it won't work.

The cost involved for the feed mounts up to $45 a week and travelling to and from Townsville, whilst shared between myself and the Townsville carers, still works out at about $30 a trip. This is not the action of dim-witted Greenies, but people who actually care about ill-placed animals who are in the park by accident, not design.

SANDY COOPER
scooperted@bigpond.com

Member replies

LETTERS to the editor should be concise and clearly typed or neatly hand written. Correspondents should include their full name and address and a contact telephone number for verification. Letters will not be considered for publication where verification is not possible. Letters may be edited.

Phone 4787 1511 Fax 4787 3037
Email: miner@nqn.newsltd.com.au

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ENOUGH is enough.

I have purposely kept a low profile over the bat issue in Lissner Park, because it is essentially an issue between council and Parks and Wildlife.

However the litany of rumour, untruths, half-truths and buck-passing, much of which has been engineered by those who have never been guilty of helping a little old lady across the street in their whole life, must be answered.

At present we have three weeks of Parliament.

That is where I am.

That is what I was elected to do in February this year.

In a way it is fortunate I have been in Brisbane because this has enabled more contact with the minister than would have otherwise been possible, but this electorate is 15.5 per cent of Queensland, larger than Victoria and at over 250,000 sq km, has more than 30 communities in it.

They all demand and deserve my time.

Moranbah had a similar problem earlier this year.

They didn't grandstand in the media, work up crowds to fever point and try to disguise their own inefficiencies by buck-passing.

They did what a local council is elected to do — dealt with it.

The Charters Towers City Council has never written to me to ask for my help.

One brave councillor did approach me and it was very pleasing to communicate the good news late last Friday evening that this permit had been granted.

I commend that councillor but council has never formally asked me for help and I have been never invited to any meetings — about flying foxes or any other matter — good or bad.

It is disappointing that council, who were warned early this year about the emerging situation, did not see fit to return the forms, made available, until the first week in November.

Had the required action been taken earlier we would not be in this situation now.

Without an application it is almost impossible to start the process in motion.

It is interesting to note that inner-city Melbourne has had a similar problem for around three years and still haven't been able to deal with it because the Federal Government won't allow the colony to be moved.

We may be close to solving our problem.

I take on board all comments made and agree with most of them.

I am desperately sorry for people who have had their lives disrupted, feel sick because of the stench, are unable to sleep because of the noise or have had their businesses virtually destroyed by the presence of the flying foxes.

Which brings me to a question.

When the flying foxes are moved, where will they go?

Would one of the local primary schools be better than the park?

We will have little control over where they come down.

Let me be quite clear, whilst I most certainly do believe we need to use our resources in a responsible and sustainable way, I am no tree or bunny-hugger.

Just as the Premier is on record as saying people are more important than dingoes, I am of the firm view that people, especially children, are more important than flying foxes and share some people's view that this is a serious health issue.

I have put a strong case to the Premier's office and had a number of meetings with the minister as well as follow-up ones in an effort to move the issue along.

Because we now have an application, we also have a permit for partial removal of the flying foxes.

I also have a promise from Minister Dean Wells that he will come personally to Charters Towers during the summer break to look at the situation first-hand.

The minister will obviously have to consult with his department but I am hopeful of a good response.

Some very vocal people seem to think I have been slow to act on the issue but this is not the case.

The fact is that I was getting on with my job to secure a common-sense solution before going public rather than being a media show-pony.

Don't worry, there are many to tell me how to do my job and I always know where to go because I get told often.

At the same time, those who denigrate Premier Peter Beattie in the media and/or abuse my staff, are doing little to help, because it is only by working together that we will achieve positive outcomes and a real solution to our problem.

I will continue to work hard to produce good results for the electorate.

I wish you all a happy Christmas and, hopefully, a bat free new year.

CHRISTINE SCOTT
MP, Member for
Charters Towers

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News from FAWNA

Meredith Ryan
President, FAWNA (NSW) Inc. www.fawna.org.au *mezaryan@nor.com.au*

FAWNA (For Australian Wildlife Needing Aid), based on NSW's mid north coast, received a rescue call in the Hastings lga for an injured Black Flying-fox *Pteropus alecto* in March 2002. A very healthy male suffering an open fracture was found near a sporting field and was euthanased. This was the first *P. alecto* brought to FAWNA's attention in the Hastings area. The closest known flying-fox camp to Wauchope is at Brombin on the banks of the Pappinbarra River (6520048N 466070E), a short distance from where it flows into the Hastings River. A visit to the Brombin camp showed no signs of *P. alecto*, however the inspection showed healthy populations of *P. poliocephalus* of mixed ages and sexes, with lots of frenetic activity in an endeavour to ensure the perpetuation of this Vulnerable species. If the pattern of the last three years is followed it is expected that this camp will decamp to northern climes within the next week or so (late April), returning just before the birthing season later this year. I live just 2 km as the bat flies, and 5 km as the river flows, upstream of the camp and shall certainly miss my dusktime tipple on the verandah watching for fly-out.

Excerpts from a newspaper article:

FAWNA issues warning as flying-foxes caught
(HASTINGS GAZETTE, Thursday November 8, 2001)

- FAWNA's Flying-fox co-ordinator (Hastings), Meredith Ryan has been devastated by the number of flying-foxes coming to grief in fruit tree netting.
- The four day old flying-fox (below) didn't have a chance once its wings were entangled in a fishing net that had been thrown loosely over a tree in Lake Cathie to deter birds.
- On Sunday alone she travelled to Lake Cathie for a live mother and dead baby, to Port Macquarie for a live baby and dead mother and to Slippery Creek for a live pregnant adult in fruit tree netting.
- The species was declared Vulnerable under NSW's Threatened Species Conservation Act earlier this year and FAWNA requests householders to ensure netting on fruit trees is securely fastened to the tree trunk or the ground to ensure that flying-foxes can't become entangled.

Below is a newspaper clipping of FAWNA's successes with the local power authority insulating powerlines that were responsible for FF electrocution deaths:

local news

WINGHAM CHRONICLE
December 19, 2001

Safe and sound

Country Energy to the rescue

COUNTRY Energy has come to the rescue of Wingham's favourite flying residents, whose lives were being put at risk on their nightly food hunts.

Country Energy has altered cabling of power lines and erected a new power pole to avoid the risk of electrocution to flying foxes on a property near Wingham.

Lindsay Mitchell, owner of a property at The Bight, approached FAWNA officials earlier this year with concerns that 20 grey-headed flying foxes had been caught on the lines and killed this season.

The animals are regular visitors to the property because a large Moreton Bay Fig tree near the powerlines was attracting large numbers during the fruiting season.

Flying foxes that attempted to roost on the lines and then stretch their wings were quickly electrocuted when they brushed another line.

The problem was a serious one for the local flying fox colony, considering the property is just 1.5 kilometres from the Wingham Brush.

Because the grey-headed flying fox is listed as a vulnerable species on the Threatened Species Conservation Act, FAWNA took the concerns to Country Energy.

Finding a solution was not an easy one, considering that the problem area was a 50 metre section consisting of four power lines between two posts.

In the end, the answer was to insulate the wires and then twist them together to form one line only.

This will mean that the flying foxes can roost on the line without the risk of electrocution by touching an-

NOW PROTECTED: Country Energy's efforts will help ensure the safety of Wingham's flying fox colony.

was also erected to accommodate the new single line.

Mr Mitchell was pleased to report that the flying foxes returned to using the tree soon after the work was completed.

FAWNA president Meredith Ryan said it was great to see Country Energy taking such steps to protect the colony.

She said powerlines were a major hazard for flying foxes and while she would prefer to see all lines put underground eventually, the effort made at The Bight to find a feasible solution was an encouraging step.

She said it was important that the grey-headed flying fox was protected, especially considering there has been a 30 percent decline its population over the last 10 years.

"That is the type of figures that extinction comes from."

(*The bit folded under at the bottom should read:*
"....touching another line. A new power pole was also erected...." – *ed*)

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Little Red Squash

Amanda Boardman
batsan@ceinternet.com.au Amanda.Boardman@npws.nsw.gov.au

A call came to FAWNA (For Australian Wildlife Needing Aid) via NSW National Parks and Wildlife Service about a couple of flying-foxes trapped in a fallen tree in Wingham Brush Nature Reserve. At the time (March 2002) Wingham Brush had an estimated 100,000 plus flying-foxes in residence. Of these, approximately 50,000 were little red flying-foxes, *Pteropus scapulatus,* and the remainder grey-headed flying-foxes, *Pteropus poliocephalus,* the usual inhabitants.

The little red flying-foxes had chosen to roost in a tree that had subsequently snapped about four metres above ground level, dragging with it the animals, and a tangled mass of cockspur and assorted vines, and blocking one of the main walking trails through Wingham Brush.

Initial inspection showed several trapped little reds. One juvenile female, still living, had been impaled through the wing membrane and pinned to the ground by a 7cm diameter branch. There appeared to be hundreds of shining eyes peering out of the vegetation. It was difficult to decide where to start. A chainsaw and tree loppers were used to extract the animals. They were trapped by every part of their anatomy – some by as little as a wing tip and others squashed flat but still alive. Untangling parts of anatomy on the presumption that a single bat would be freed often turned out to be several bats tangled together with the rescuer trying to match up the legs of one with the body of another. A number of the little reds were impaled by cockspur thorns – the human rescuers were also granted this pleasure.

The rescue operation took three humans approximately three hours to complete, resulting in 43 animals removed from under and among the tangled vegetation. Ten animals were dead, one, unable to fly, escaped out of reach and two were close to death in a high inaccessible position. Of the 30 remaining little reds, 22 were females, 19 of them visibly pregnant. One aborted and three died during transportation, and five were euthanased due to extensive injuries. The animals were in excellent condition with many weighing around 500g. Their fur was thick and lustrous and their sternums well covered. Most of the adult bats were weighed and measured (after death). The females were dissected and the foetuses removed (also weighed and measured), much to the delight of the local fly population as some of the bodies had been lying in the sun for several days.

Over the next week one or two died each day. Interestingly, many of these had no visible injuries and had been marked for re-release. Four more animals aborted.

Of the 22 little reds remaining post rescue, nine remain alive at the time of writing. Four are pregnant, two have aborted and the rest are males. The visiting colony has now departed, so the remaining animals, if and when suitable for release, will have to wait for the next visit by little reds.

This ‘natural pruning’ of the forest canopy, caused by the little red flying-foxes’ habit of hanging in large clusters, occurs on a fairly regular basis, bringing the bush regenerators much stress and anguish. It would be interesting to know how often this phenomenon occurs and whether there is any impact on the overall population. The canopy seems to recover quite well.

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Biography – AmandaBoardman

Meredith Ryan
President, FAWNA (NSW) Inc. www.fawna.org.au *mezaryan@nor.com.au*

Amanda is FAWNA's Senior flying-fox and bat co-ordinator and has been a bat rescuer and rehabilitator for almost 13 years. For the past 12 years she has been tireless in educating the community about the importance of Australia's fauna and the relationship between human activities and our biodiversity through school visits and public events. She has been ably assisted by Clive and Charlotte, NPWS-approved education grey-headed flying-foxes, and some young flying-foxes-in-training. Clive and Charlotte were orphans and hand-reared before there was widespread understanding of the special release protocols that needed to be followed for these colony animals.

In Amanda's spare time she is studying for a BSc degree and works part time as a Discovery Ranger for NSW National Parks and Wildlife Service in the Manning (Taree) area. She is an ABS member. Amanda's work in wildlife rehabilitation and community education is an example of the role rehab organisations can play in spreading the message of fauna and habitat conservation. Amanda is a valued FAWNA member and one who has, by her example, encouraged many others to undertake the often thankless and costly, but nevertheless rewarding, task of flying-fox and bat rehabilitation.

The best epithet I can use to describe Amanda is "*For all creatures great and small*".

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News from Australian Speleological Federation and Newcastle and Hunter Valley Speleological Society

Jodie Rutledge
Newcastle and Hunter Valley Speleological Society, Secretary. Jodie@rutco.com.au

The Australian Speleological Federation Inc have just been registered as an Environmental Organisation here in Australia. Members are often involved with projects concerned with the preservation, rehabilitation and documentation of karst environments. Information on the Australian Speleological Federation can be found at:
www.caves.org.au

Last May, members of the Newcastle and Hunter Valley Speleological Society (an ASF Club) visited "Barry Cave" on private property up near Nundle, NSW. Nundle is in the Tamworth region. We came across around 500 *Miniopterus schreibersii* (large or common bentwing bats) in the entrance chamber and around 200 *Rhinolophus megaphyllus* (eastern horseshoe bats) in an upper chamber, just above the entrance chamber. The interest for members of the ABS is that some of the bats had silver tags with numbers. We could not see close enough to read them but we think it was the horseshoe bats with the tags. We would love to hear of any projects going on with cave dwelling bats in the Hunter region, as we have come across tagged bats in the past and would love to know who we can report the sightings to. For further information about Barry Cave or the NHVSS please visit our web site:
www.nhvss.org.au

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News from the University of the Third Age

Molly Crawford
crawford@nor.com.au

In our Northern Rivers area of NSW, we have a very active U3A - University of the 3rd Age. Our branch has about 600 paid up members. I run a course called Nature/Nurture. We meet every other Wed. Last week (*early April – ed*), I invited Robyn Gough, whom I am sure you will know, to come and talk to us about her Wildlife caring. She brought Nelson, the 14 year old blind Black Flying-fox with her. After an initial hesitation, it was surprising how soon the gathering of 23 oldies warmed to the visitor, and were soon touching and stroking. Robyn gave a very informative talk. I threw in a few items, telling them about the Conference I had attended here at our Southern Cross Uni, with field outings to Bunjalung N.P. and to the Richmond Range, and all the delightful little microbats I saw. I told them about my favourite small bat, the Yellow-bellied Sheath-tailed Bat that Jeff Simmons was caring for when I lived up in Yeppoon. I also told them a little about our battle to save bat caves on Mt Etna. Then Robyn finished by showing some slides of bats. Both Robyn and I spoke about the efforts being made by Jeff Simmons to have the Electricity Authorities widen the distance between power lines so that the electrocution of Flying-foxes would occur less frequently. It was an excellent session, and made people think.

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Website for the 'Bat Echolocation Symposium and Tutorial' held in Austin, Texas, April 2002.

Lindy Lumsden
Lindy.Lumsden@nre.vic.gov.au

Robert Barclay altered me to this symposium and its website. The symposium had invited papers from all the big names in the bat echolocation world, covering topics such as …….. The website contains abstracts only, with full proceedings to follow later.

http://www.batcon.org/home/echosym/echo02prog.pdf

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– Recent literature –

Compiled by Greg Ford and Kyle Armstrong

Due to the large size of the newsletter, a comprehensive list of recent literature is not able to be presented. Most of those below are from *Ovid* (between August – December 2001) with some additions from Brad Law and others. The next *Newsletter* will contain mostly 2002 literature. There should be something below for everyone.

Acoustics and neurology

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White, E.P. and Gehrt, S.D. (2001). Effects of recording media on echolocation data from broadband bat detectors. *Wildlife Society Bulletin* 29(3): 974-978.

Ecology, biogeography and conservation

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