The Australasian Bat Society Newsletter

Number 11 October 1998

Photo: Lindy Lumsden

INSTRUCTIONS TO CONTRIBUTORS

The *Australasian Bat Society Newsletter* will accept contributions for several sections of the Newsletter. There are two deadlines each year: 21 February for the March issue, and 21 August for the September 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:

For Scientific Articles:

- Hard copy manuscripts should be posted to the Newsletter Editor at the address below.
- Electronic copy manuscripts should be submitted in plain text (ASCII) form on an IBM format 3½" floppy disk to the above address, or as an e-mail attachment, to the Newsletter Editor.
- Manuscripts should be submitted in clear, concise English and free from typographical and spelling errors.
- 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).
- 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 or BMP image files. Tables should be in a format suitable for reproduction on a single page.
- Manuscripts 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*.

For News, Notes, Notices, Art etc.:

Hard copy should be posted to the Newsletter Editor at the address below. Electronic copy should be submitted in plain text (ASCII) form on an IBM format 3½" floppy disk to the address below, or as an e-mail attachment to the Newsletter Editor. Manuscripts should be submitted in clear, concise English, and free from typographical and spelling errors. Art in the form of line drawings and other monochromatic media may also be submitted. Some black and white photographs can be reproduced in the *Newsletter* after scanning and digital editing (consult the Editor for advice).

Special notes for electronic submission:

Although electronic submission is strongly encouraged, there are a few ground rules. Plain text (ASCII) is by far the best format to eliminate system/software compatibility problems, and can easily be sent as part of the body of an e-mail message. This is the most *convenient* way for me to receive text generated on an Amiga or Macintosh. If attaching formatted DOS/Windows files to e-mail, please remember to tell me what word processing package has generated the file. My system can decode UU, MIME and BinHex attachments. If none of this makes sense, please ask for advice from your local computer guru, system administrator or Internet service provider (ISP).

President

Bruce Thomson
QNPWS
Dept. of Environment
Toowoomba Qld 4350
ph: 07 46398324
fax: 07 4639 4524
bruce.thomson@env.qld.gov.au

Secretary

Peggy Eby
12 Ashley St
Waverley NSW 2024
ph/fax:
02 93876134
p.eby@ozemail.au

Newsletter Editor

Nicola Markus
Dept. of Veterinary Pathobiology
University of Queensland
St Lucia Qld 4072
ph: 07 33652544
fax: 07 33651355
n.markus@mailbox.uq.edu.au

Editorial

Yes, folks, here it is, the post-Brazil conference issue of the ABS newsletter. That's not to rub in that I have just returned from a very adventurous break in South-America to fulfill my new editorial duties on this illustrious publication. The position of editor was bestowed upon me during the last ABS conference in Rockhampton and I feel honored to have been offered the opportunity to facilitate communication amongst the membership of the ABS and the greater bat community.

Firstly, let me say thank you to my predecessor Lawrie Conole who gave this newsletter its current format and whose commitment has made it a regular feature on the bat news-front. I hope to continue this tradition in a similar vein, with few changes to the format and a twice-yearly publication schedule. And, despite the lack of response to this issues' discussion topic on the harvesting of flying-foxes, I will continue to encourage constructive input by members to topical debate. Only active discussion can help to solve the issues which threaten bats and to strengthen the support structure of the ABS.

The last annual general meeting of the ABS saw the election of a new Executive to represent its broad membership. The new Executive, as indeed the old one, consists of some very experienced old battoes who were promptly hit with a broadside of issues to deal with. As I am sure all of them would agree, there have been few dull moments since Rocky! As many of you will know, these are challenging times for the ABS and the Australian bat-support community as a whole. No sooner had the ABS execs settled into their new duties than the serious issue of flying-fox management erupted anew in northern New South Wales. This forced us to address the formation of firm policies to represent the members of the ABS and the interests of the bats in accordance with our mission statement. Not an easy task, but one which has generated much animated discussion amongst the execs and will no doubt continue to do so for some time to come.

Thank you to all contributors to this, my first, edition of the newsletter. The contributions reflect the activities of the ABS executive (eg: Peggy Eby's article on p.16, Bruce Thomson's presidents report, p. 4) and its members (conference reports, news and research articles) at the present time. At the recent 11th International Bat Research Conference in Brasilia it once again became apparent how popular newsletters are internationally, and that the ABS newsletter provides information far beyond the realms of Australasia. With this in mind, let's utilize it as an active forum for discussion and support the bats which rely on our research and communication for their long-term survival.

Nicki Markus
Editor

_____ ^V^ ^V^ ^V^ _____

President's Report

As I write this report, just over four months have elapsed since we held our highly successful *Eighth Australasian Bat Conference* in Rockhampton and once again, I feel that on behalf of the ABS I should extend my heartfelt thanks to the organisers of the conference for their wonderful work in making it all happen - to David Gee, Mary McCabe and Dianne Vavryn.

This particular Conference and AGM marked a turning point in the development of the ABS with agreement reached to incorporate the Society. We shouldn't underestimate the amount of work that Terry Reardon put into researching and developing the ABS constitution and in promoting amongst members the virtues of incorporation. Thanks to his tireless efforts and foresight, we now have a solid basis for the further development of the Society. As some will already know, we did indeed become incorporated some weeks after the AGM and I believe that we all owe Terry and other members who assisted him, an enormous debt of gratitude. Without their efforts, we might never have achieved that wonderful goal.

There is no doubt in my mind that members want to see the ABS assume a higher profile in conservation issues and particularly those 'on-ground' actions which directly result in the conservation of species. The spontaneous applause which erupted from everyone as Glenn Hoye flicked to his slide of the new concrete bridge at Stockton Creek near Morisset, complete with *Myotis* roost-site timbers from the previous bridge installed atop, said more about the power of this type of conservation management than any number of words could.

Since then, members have been involved in the successful gating of at least one old mine in northern Queensland to protect a number of horseshoe and leaf-nose bat species, and preliminary work has been conducted on a second site. This latter site will have some interpretive signage to explain why it has been necessary to protect bats and limit access by visitors. The sign displays our newly revamped ABS logo, (which has been altered by having our name fully spelt out) alongside those of the Queensland Department of Environment and the local land manager, the Rosalie Shire Council. I think this is the first time that we will have used our logo on-site at a completed conservation project. Hopefully our work will be done by the end of this year.

Members have also been involved in a major undertaking to census the entire population of Grey-headed Flying-foxes. This is a truly remarkable feat which was only made possible through the collaborative efforts of a large number of dedicated people. Greg Richards will be discussing this in more detail in the following pages.

It's good to see that so many members are now involving themselves in conservation issues and projects and I hope this trend will continue. Some of the issues that members have confronted have been difficult and controversial and have taken a great deal of time and effort. Remember that one of the functions of the Executive is to help members with their conservation work and so don't hesitate to contact them.

Other ABS activities have been making steady progress and in this newsletter we will be proposing a process to facilitate the formulation of ABS position or policy papers on key issues. As many would realise, we are often faced with situations where a quick response is needed from the Society to address various bat conservation issues, and it is often difficult to do this when our Executive are geographically spread and not always in the office. It is even more difficult to canvass the views of other members! The process of policy formulation will provide everyone with an opportunity to participate, and when completed, the position papers will give everyone a much better understanding of these issues and the stance that we intend to adopt in each case.

As a non-profit Society we are able to register with the Australian Taxation Office Gift Register so that donations to the Society are eligible for 100% tax deductibility. Some minor changes to our Constitution are required to enable this and we also require some nominations for people to be responsible for the management of this fund. The job shouldn't be particularly arduous and so anyone who is interested should contact Peggy Eby. A more detailed account of the process is provided by Peggy in this newsletter.

Other issues that the Executive are currently working on include a policy for the receipt and expenditure of ABS funds, website development and the official appointment of our subcommittees.

So, a busy time ahead, but I am looking forward to continuing our work with the help of our members. Until the next newsletter.....be batty!

Bruce Thomson
President

Help protect our Muntapa Tunnel bats

This historic tunnel has been fenced to protect the winter roosting site of up to 8,000 bent-wing bats, *Miniopterus schreibersii*.

On summer nights, these small bats move large distances in their hunt for insects. During winter they feed only occasionally and spend most of their time sleeping.. If disturbed, valuable energy is lost and the bats may not survive the winter months. Please do not disturb. Keep your voice to a whisper when in this area.

The tunnel gates are open in summer when most of the bats have moved to their breeding caves. These may be up to 80km away.

Department of Environment

ROSALIE SHIRE COUNCIL

Security fencing provided by Gryffin Pty. Ltd. (02) 9907 3041

Reports

8th Australasian Bat Conference, 1998
'Bats Are Beneficial'
ROCKHAMPTON

The 8th Australasian Bat Conference has now sadly been and gone. So we thought we would inform those of you who were unlucky not to attend what a great time they missed!

The main organisers were David Gee, Mary McCabe and Dianne Vavryn assisted by family and friends who were invaluable and without whom the conference would not have run as smoothly.

The Conference venue was at the Central Queensland University Centre for Land and Water Resource Management, with field trips into the local area.

The one hundred and thirty-one delegates came from throughout Australia, Borneo, Canada, Malaysia, England and USA and included research scientists, zoologists, biologists, academics, professional and environmental consultants, health professionals, students, bat Carers, and those devoted to conservation and management.

The 47 Papers and 17 Posters presented covered a wide range of subjects including echolocation, flying-fox ecology and conservation, flying-fox management, bats and disease, nutrition and energetics, foraging and flight behaviour, distribution and habitat utilisation, roosting ecology, habitat restoration and mine rehabilitation.

The Wednesday field trips included Cammoo Caves, dinner at The Caves Country Pub and the capture and viewing of eight Ghost Bats in the Johansen's cave car park.

The Australasian Bat Society Annual General Meeting was held underground in the Cathedral Cave at Olsen's Capricorn Caves on the Thursday night. This was a spectacular venue with vaulted ceilings and thousands of bats flying overhead, and the AGM was followed by the conference dinner held in the function area outside. Activities during the evening ranged from a slide show of Bat Cleft, competition for the best-dressed-in-batty-memorabilia and a fun quiz.

It was decided at the AGM that future conferences would be the responsibility of the Society. Elery Hamilton-smith was given Life Membership of the Society and recognition was given to the late Dick Allison. A special award - the Bat Conservation International Award - was presented to Glenn Hoye for the best conservation paper presented at the conference. Through his efforts, Glenn had managed to preserve roosting habitat for bats in a bridge that was being replaced with a new structure. This was achieved by incorporating components of the old bridge that provided roosting habitat into the new bridges' structure.

The conference attendees were very happy with many aspects of the conference, with positive remarks on the venue, food, papers, field trips, efficiency and friendly atmosphere. With the generous support of sponsors (Pacific Lime, Capelec, Titley Electronics, Central Queensland University and Bacardi rum) and locals we were able to keep the conference on budget and made well over $2500 which will be forwarded to the Society for use on bat related projects. In addition, we were able to provide approximately $2000 to get the next conference started.

On behalf of the organisers of the conference, I would like to thank everyone who attended and helped make this a conference that will be hard to beat. We wish the next organisers well and look forward to attending the next conference in 2000.

David Gee, Dianne Vavryn & Mary McCabe
(Organisers of the 8th Australasian Bat Conference, 1998)

> Photo of AGM here <

Terry Reardon (Vice President), Bruce Thomson (President) and Peggy Eby (Secretary) and Les Hall at an amusing point in the AGM at Olsen's Caves

_____ ^V^ ^V^ ^V^ _____

The Bat Conservation International Award
for
Best Conservation Paper
presented at the
8th Australasian Bat Society Conference, 1998

Glenn Hoye was the inaugural recipient of the Bat Conservation International award for the best conservation paper presented at the 1998 Australasian Bat Society Conference.

In his talk, Glenn related a rather complex exercise involving a colony of Southern Myotis (*Myotis macropus*) that were resident in a bridge destined for destruction and consequent replacement. The original bridge was a timber construction, primarily made of logs as its supportive structure, with a bitumen roadway over the top. The local council had the task of replacing it with a much stronger concrete structure and Glenn was called in as a consultant when a colony of bats was found. One of the impressive factors was that Glenn had just a few days to act before the bridge was to be demolished, and this initial inspection revealed the colony of threatened *Myotis*.

Glenn related the tasks ahead, which included capturing and banding the colony to assess the full complement, and to then radio-track individuals to ascertain the presence of alternative roosts. Once he knew that they had an alternative home, he allowed the demolition of the bridge to commence, as he progressively excluded the colony from the many splits in timbers in which they were resident.

The panel of five judges (which excluded myself) was most impressed with not only his ability to get the council and contractors to cooperative with his research program, but his coup in ensuring that the timbers that the bats used as a roost were incorporated in the new construction. His most impressive slide was one of the fresh new concrete bridge spanning a lovely river, and the contrast of the very old, split logs combined with the supporting structure.

The judging panel's decision was unanimous - that Glenn be presented with the inaugural BCI award. Considering the large number and quality of the other conservation papers, Glenn's achievement was no mean feat, and BCI is pleased to offer this mark of encouragement for people who put their heart and soul into the bat conservation effort.

Greg Richards
Scientific Advisory Board
Bat Conservation International Inc.

_____ **^V^ ^V^ ^V^** _____

Resolving issues of flying-foxes in urban areas: summary of a workshop held at the 8th Australasian Bat Conference

The object of this workshop was to survey recent experiences in managing conflict at flying-fox roosts in urban areas and to develop recommendations for managing future conflict.

Background:

The diverse coastal vegetation of eastern Australia supports a constant presence of Grey-headed, Black and Spectacled Flying-foxes and regular influxes of Little Red Flying-foxes. This geographic area is also experiencing rapid growth in human population. State planning authorities predict that by the year 2020 the population of south-east Queensland will have trebled and that of north-east NSW will be twice the current levels. The accompanying shift in land use will impact flying-foxes by reducing natural food resources and by interfering with roost sites. In particular, the numbers of roosts immediately adjacent to urban and rural residential development will increase as buffers of forest are cleared for development. This scenario is expected to produce more frequent conflict between flying-foxes and humans and to introduce new sites of conflict.

A number of conference delegates had experience in dealing with difficult human - flying-fox interactions and the workshop provided a forum for exchanging ideas. Interested people were then invited to attend a further meeting to develop a set of recommendations for action by the ABS. A number of principles were identified during the meeting. Recurring themes were: the need for effective communications with affected people, the value of community education programs and the need to assess different methods for managing roosts. Finally, the meeting identified a need for the ABS to support people involved in negotiations at problem sites by providing resource material and a forum for exchanging information. It was recommended that the ABS establish a sub-committee to co-ordinate this work.

It was recommended that the sub-committee:

I. organise and administer a register of known roost sites, and

   A. use the information to identify roosts likely to be affected by development;

II. notify local planning authorities (usually local government) of sites of potential conflict, and

   A. provide information on the difficulties experienced at other sites to highlight the need for pro-active planning,
   B. encourage the development of local environmental plans for roosts and buffer zones around roosts,
   C. lobby the NSW and Qld governments to introduce state-wide planning instruments for flying-fox roosts,
   D. investigate Council buy-back programs (Green levies);

III. develop a grassroots interpretation and education program which

A. provides a forum or structure for communication and education
B. highlights the ecological importance of the animals
C. draws on public health information from state government authorities
D. uses education animals to reach the wider community;

IV. produce resource material for people involved in negotiations over problem roosts which draws on past experience. The meeting identified the following points as important:

A. reduce polarisation between stakeholders,
B. involve people from outside the local area in negotiations,
C. move to common ground to reduce conflict and increase support,
D. provide affected people with a release from frustration,
E. use one-on-one meetings or conversations,
F. recognise and appreciate the position of affected people,
G. after establishing rapport, highlight a positive view of the animals, including their ecological benefits,
H. draw support from public health authorities,
I. provide educational material to the community;

V. compile histories of disturbance at various roosts to assess the efficacy of different techniques.

Peggy Eby and Peter Howard

_____ **^V^ ^V^ ^V^** _____

Summary of the Bats and Forests Workshop at Rockhampton, 1998

Canadian Overview

To begin the workshop, we summarized the main points that arose from the Bat Forest Workshop held in late 1995 in Victoria, Canada (Barclay and Brigham, 1996). At that meeting of university and government scientists, foresters and forest industry representatives, various consistent features of the way bats interact with forest ecosystems emerged. First and foremost, relative to their size, bats have large home ranges and thus use the landscape (and are likely to be affected by disturbance) at a larger scale than might have been expected. Accordingly, they link distant habitats and may indicate changes at the landscape level more readily than other similarly sized, but less mobile animals.

Regarding roost requirements, many species of forest-dwelling bats, in many types of forest, rely on old, tall trees in uncluttered spaces to provide diurnal roosts. Older forest

stands thus provide more roosting opportunities than do younger stands and as a result harvesting of older stands is likely to negatively effect bat populations. Specific types of cavities used by bats as roosts differ between species (e.g. behind bark, in holes in the trunk or major limbs). However, a consistent finding is that individuals regularly move between roosts. Colonies do not remain together as a cohesive unit, as anticipated from studies on bats living in caves or buildings. Again, this means that the scale at which forests are managed with bats in mind must be larger than previously believed. An important area for future research will be to determine why individuals move roosts and what density of potential roost trees is required to maintain bat populations.

With regards to foraging requirements, older forest stands again tend to be used by insectivorous bats more than younger stands. Much of this difference relates to the presence of gaps and natural openings in older stands. Bats forage extensively along the edges of these openings, as well as openings created by forest harvesting. Thus logging may alter the foraging activity patterns of bats resident in forests, and may even create new foraging opportunities. However, few bats forage in the middle of large openings and thus the nature of the harvesting and size of cut-blocks is important. Future research must determine how bats respond to varying levels of harvesting (clearcuts to thinning), and what the longer-term effects are.

Australian Overview

Next, we discussed the key points in the review by Law (1996) of the Australian literature on bats in forests and the potential impacts of forestry practices. It concluded that much of the current evidence relating to impacts on bats was contradictory due largely to their mobility and long life span (Fenton 1997). However, there was a clear case for stating that logging will impact on the species richness and activity of insectivorous bats when forest structural complexity and the number of available roosting hollows are reduced. For the Megachiroptera, identification and protection of camp-sites in State Forests is relatively straightforward, although the required zone of protection around a camp is not yet settled. Currently a 50 m buffer is applied around a camp. Larger buffer areas have been proposed as part of the review being undertaken for the Regional Forest Agreement (RFA) process. As rainforest is no longer logged in Australia, the main issue for the Megachiroptera relates to the effects of logging on nectar and pollen production in sclerophyll forests (see below).

Directions for Further Research

Targeted research is obviously needed to focus on the areas that will improve the management of bats. Law (1996) suggested a number of areas worthy of pursuit, although this is by no means a complete list:

Which species are most sensitive to logging? It is clear that logging reduces the abundance of critical resources such as tree hollows and that this will negatively affect bats. However, from a population perspective we need to know where the threshold lies at which populations of different species begin to decline. Logging practices and intensities

vary with region, so this will need to be considered when determining the sensitivity of a species to a particular regime of disturbance.

Which current management prescriptions for bats are effective? In 1996, NPWS and SFNSW negotiated agreed Conservation Protocols and Pre-logging Survey Guidelines for threatened species occurring in State Forests. These will also be refined during the current RFA process. Few of prescriptions have been formally tested to determine their effectiveness.

Are bats sensitive to fragmentation of forest areas? Conservation measures in timber production forests rely to a large extent on strips and patches of retained forest, surrounded by large areas of logged forest. While we have information that some bats successfully use riparian areas (e.g. Lunney et al. 1988), we know little about the extent to which logged areas are used for roosting or foraging (but see Law and Anderson 1998 ABS Abstract).

Are bats useful as indicators of "forest health", and how should their populations be monitored? There is a growing need to be able to test whether the various logging practices used in different regions are ecologically sustainable. Indicators are sensitive species that provide an early warning mechanism that something is not right within an ecosystem. Australian forestry agencies have embraced the "Montreal Process", which includes monitoring populations of representative species. Which species to monitor and how this will be done is yet to be decided.

What age do important nectar and pollen producing trees begin to flower prolifically? Law, Mackowski, Schoer and Tweedie are currently writing up a study that was designed in the 1980s in part to answer this question. The study involved collecting data on the flowering phenology on 20 species of myrtaceous plants from northern NSW. Twenty-three sites were monitored monthly over 10 years. The study clearly demonstrated the unpredictable flowering patterns of eucalypts. However, little evidence was found to indicate logging reduced flowering levels. Retained trees in sites disturbed by logging and regrowth trees with a dbh in the 10-40 cm size class continued to flower at similar levels to large trees and undisturbed sites (Law et al. unpubl. data). Nectar and pollen production were not measured in that study, so research designed to compare their production under different management histories would provide valuable information.

Outcomes of the Workshop

Discussion during the workshop (the last event of the conference!) tended to be wide-ranging. It was suggested that we need to know more about the importance of the ecological roles that bats play in forested ecosystems, whether that be as insect predators, or as pollinators and seed dispersers. Others suggested that a major goal must be the continued education of the general public as to the importance of bats in all ecosystems. Without public support and awareness, it was felt that other efforts would be difficult.

One practical suggestion that received general support involved the preparation of an Australasian Bat Society Position Statement that outlines issues relating to forests and bats. Similar position statements have been produced by the Ecological Society of Australia (ESA), covering issues such as The Clearance of Native Vegetation and The Use of Fire in Ecosystem Management. A position statement on bats and forests would be available for use by the Society President, in media releases and other processes such as RFAs. The Statement could include issues such as a summary of current knowledge, specific recommendations for the management of bats and priorities for further research.

The formulation of such a statement would require a Coordinator and perhaps a sub-committee to consider the relevant issues. Once prepared, a draft statement could be published in the newsletter for comment by Society members. How should the Society take the plunge and accept such a document? The ESA requires a vote at their AGM. The ABS could follow this lead and vote at the 9th Conference in the year 2000. As this seems a long way off, alternative suggestions would be appreciated.

Any further practical suggestions about this approach (e.g. does the Society think this is a good idea or perhaps you have a better suggestion?) should be forwarded to the Society President and Brad Law (mailto:bradl@ironbark.forest.nsw.gov.au)

References

Barclay, R.M.R. and R.M. Brigham (eds.). (1996) Bats and Forests: Proceedings of the Bats and Forests Workshop, October 1995, Victoria, B.C. Canada, B.C. Ministry of Forests, Victoria, Canada.

Fenton, M..B. (1997) Science and the conservation of bats. *J. Mamm*. **78**, 1-14.

Law, B.S. (1996) The ecology of bats in south-east Australian forests and potential impacts of forestry practices: a review. *Pac. Conserv. Biol*. **2**, 363-74.

Lunney D., Barker J., Priddel D. and O'Connell M. (1988) Roost selection by Gould's long-eared bat, *Nyctophilus gouldi* Thomas (Chiroptera: Vespertilionidae), in logged forest on the south coast of New South Wales. *Aust. Wildl. Res*. **15**, 375-84.

Robert Barclay[1] and Brad Law[2]

[1] Dept of Biological Sciences, University of Calgary, AB Canada, T2N 1N4
[2] Forest Research and Development Division, State Forests of NSW, PO Box 100, NSW 2119

^V^ ^V^ ^V^

11th International Bat Research Conference Pirenopolis, Brazil

The 11th IBRC was this year held on August 2-6 in Pirenopolis, Brazil. By virtue of its location as well as its content, the conference was an enormous success and served to strongly reinforce the international bonds of the bat community. Participants from all corners of the globe presented 146 technical papers and posters on all aspects of bat research, education, management and conservation. As is the custom, special emphasis was given to local issues of the host country. In Brazil, this included vampire bat research and the management of rabies in South-America where cattle and humans are frequently affected by the bat-transmitted strains of the disease.

The conference venue, located about two hours from Brazil's purpose-built capital, Brasilia, was a luxurious five-star resort in a picturesque town famous for its silver trade. Cobbled streets and friendly locals characterized Pirenopolis and provided a leisurely background for the conference. This created a relaxed atmosphere amongst international delegates and stimulated lively discussions, both formal and informal, on bat issues worldwide.

Conference organizers Jader Marinho-Filho, Wilson Uieda and Ludmilla Aguiar and a crew of students ensured that all went smoothly and that occasional hitches with slide projectors were rectified immediately. Spoken papers were presented in the form of plenary symposia during morning sessions and in three concurrently run afternoon sessions to accommodate all contributions. Simultaneous translators ensured that delegates from all countries were able to understand papers presented in Spanish, English and Portuguese and that language barriers with our hosts were minimized. Workshop topics dealt with the vampire bat, *Desmodus rotundus*, and bat conservation, and the latter resulted in the positive proposal of a Bat Action Plan for Plant-visiting bats.

Australian and New Zealand members of the ABS (see photo below) enthusiastically participated in all sessions and social activities and maximized the opportunity to catch up with distant colleagues. Many also took the opportunity before and after the conference to explore parts of this vast continent and some of its breath-taking features - the Pantanal in Brazil, Machu Pichu in Peru, the Andes, the Amazon, the jungle and Iguassu Falls left indelible impressions to remember forever.

A convincing presentation by Tom Kunz at the conclusion of the official proceedings was followed by a majority vote in favor of Kuala Lumpur, Malaysia, as the venue for the next IBRC in 2001 or 2002. As always, the benefits to host countries far surpass the duration of the conference, as local issues are highlighted and researchers are further united in their efforts. This has undoubtedly been the case for Brazil, as all delegates left with a vastly increased awareness of the issues of vampire bat management and conservation faced in this part of the world. So let's do the same for Malaysia and see you in K.L.!!

N.M.

> Photo of conference delegates here <

Standing: Andrew Gunnell, Lindy Lumsden, Jane Sedgeley, Patrina Birt, Lyn and David Titley; Crouching: Colin O'Donnell, Nicki Markus; Hanging: Nancy Irwin and Kerryn Parry-Jones.

_____ **^V^ ^V^ ^V^** _____

Equine morbillivirus (EMV) and Australian bat lyssavirus (ABL) research undertaken by the Queensland Department of Primary Industries (QDPI) Animal Research Institute (ARI)

Subsequent to the outbreak of a previously undescribed disease in horses in 1994, the initial focus of the ARI virology research group was on identifying the natural host of the causative virus, EMV. We subsequently also became involved in ABL research following discovery of this virus by NSW colleagues in 1996. As the QDPI project enters it's third and final year of research, an overview of our progress to date may be of interest.

EMV

We have demonstrated that infection with this virus is geographically widespread in flying-foxes in Australia, and that isolates of the virus from flying-foxes (referred to as bat paramyxovirus) are indistinguishable from those isolates from horses. We have also identified antibodies to EMV in *Pteropus* and *Dobsonia* species in Papua New Guinea.

The virus doesn't appear to cause serious disease in flying-foxes; those from which virus has been isolated have appeared clinically normal. Our finding of similar antibody prevalences in both wild-caught flying-foxes and rescued 'sick' flying-foxes lends further support to this contention. While there appears to be some species-dependent and age-dependent variability, the crude EMV antibody prevalence in flying-foxes is moderately high (>25%). No evidence of infection has been found in any other species tested.

ABL

While infection with ABL is also geographically widespread in flying-foxes in Australia, the prevalence of disease (the proportion of animals with disease) is low in the wild-caught population (<5%). However, because *this* virus *does* cause clinical disease in bats, the prevalence in 'rescued' sick and injured flying-foxes can be very much higher (as high as 15% in one species), and the prevalence in 'rescued' *Saccolaimus flaviventris* is 60%. So, importantly, from a human health perspective, 'sick' bats represent a significantly higher risk of exposure.

ABL has been found in all age classes of flying-foxes. We recently identified the disease in an in-care orphan flying-fox. The animal was clinically normal and healthy in the six weeks preceding the development of progressive neurological signs. The clinical course lasted over a week and ended in the animal's death. It would seem prudent that any sign of neurological disease in bats of any age or species, regardless of length of time in care, be treated with suspicion and caution, and professional advice sought.

The group, led by Peter Young, continues to research the comparative virology (Kim Halpin), pathology (Janine Barrett) and epidemiology (Hume Field) of both viruses.

Hume Field, QDPI - Animal Research Institute, Locked Bag 4, Moorooka 4105

_____ ^V^ ^V^ ^V^ _____

Listing of ABS Inc. on Environment Australia's Register of Environmental Organisations

Now that the ABS is incorporated, we are eligible to apply to the Australian Taxation Office to have donations of money or property be tax deductible. Environment Australia administers the process of conferring tax deductibility status on societies such as ours through their Register of Environmental Organisations. The Register was set up to assist the Australian Taxation Office in vetting the growing number of environmental organisations. All organisations which are entered on the Register are eligible to receive

tax deductible donations under item 6.1.1. subsection 30-55(1) of the *Income Tax Assessment Act 1997*... a jolly bit of reading for those so inclined!

As one might expect, there are a number of hoops to negotiate in the process of listing ... and members of the ABS will need to become involved. The purpose of this report is to explain the requirements and process of listing, and to foreshadow the relevant motions that will be put at our next AGM.

The requirements for registration are:

1. the society must be incorporated;
2. the principal purpose of the society must be protecting the environment;
3. the society must maintain a public fund for receiving and distributing the money and any interest that accrues from the donations;
4. the money must be used only for the principal purpose of the society;
5. no "profits" of the fund must be paid to members (*this does not mean that members cannot receive money from the fund to pursue the objectives of the society - only that they cannot benefit from any surplus*);
6. the constitution must specify that the society is non-profit;
7. the society cannot act as a conduit for donations to another society;
8. there must be rules for winding up the fund in keeping with the wind up clause in the constitution of the ABS;
9. the society must issue receipts for donations to the fund (*donations less than $2 are not tax deductible*);
10. the society must provide an annual report of the financial activities of the fund to the EA;
11. the society must have at least 50 financial members at all times.

The ABS meets all of these requirements.

The public fund:

Tax deductible donations must be made by subscription to a public fund authorised under the constitution of the ABS and administered by a committee. The fund must have an official name, a separate bank account and be a distinct entity.

The committee must comprise at least three persons, the majority of whom are deemed "responsible persons" under the terms of the *Income Tax Assessment Act*. According to the Act these persons must have a degree of responsibility to the community at large. Examples the ATO gives of responsible persons include:

> J.P.'s, church authorities, trustees or board members of a school or college, judges, members of the clergy, solicitors, doctors (not PhD's), registered accountants, persons holding elected office, directors of large public companies, headmasters/mistresses, senior academics (professors, deans, etc.), people with honours (OBE and the like), and "high profile people generally".

We need to find at least two people who meet these criteria and are prepared to sit on our Gift Fund committee.

We also need to amend the constitution to introduce clauses which establish the fund. So, a motion will be put at the AGM next autumn to add the following clauses to the constitution:

> "The Society may set up a gift fund to be known as the Australasian Bat Society Gift Fund, for the specific purpose of furthering the aims and objectives of the Society.
> The Australasian Bat Society Gift Fund must comply with subdivision 30-E of the *Income Assessment Act 1997*."

Subdivision 30-E requires the fund to operate under a prescribed set of rules. These rules need not be included in the constitution, they may instead take the form of a resolution of the Society. So a second motion will be put at the AGM to adopt the following set of rules for the ABS Gift Fund. These rules comply with the requirements of the *Income Tax Assessment Act*.

1. The purpose of the Fund is to support the environmental objects of the Society.
2. The Fund will be used only to support the environmental purposes of the Society.
3. Members of the general public are to be invited to make gifts of money or property to the Fund for the environmental purposes of the Society.
4. Money from interest on donations, income derived from donated property, and money from the realisation of such property are to be deposited into the Fund.
5. The Fund must not receive any other money or property, including corporate sponsorship money; and gifts to it are to be kept separate from other funds of the Society.
6. A separate bank account is to be opened to deposit money donated to the Fund, including interest accruing thereon.
7. Receipts are to be issued in the name of the Fund and proper accounting records and procedures are to be kept and used for the Fund.
8. The Fund will be operated on a non-profit basis. None of the money or property accumulated by the Fund will be distributed to members of the Society apart from proper remuneration.
9. In the event of the winding up of the Fund, any surplus assets are to be transferred to another fund with similar objectives that is on the Register of Environmental Organisations.
10. The Fund will be administered by a committee of management of no fewer than three persons. The committee will be appointed by the Executive Committee of the Society. A majority of the members of the committee are required to have the requisite degree of responsibility to the general community, that is, persons who, because of their tenure of some public office or their position in the community, have a degree of responsibility to the community as a whole as distinct from obligations solely in regard to the environmental objectives of the Society.
11. Any changes to the membership of the committee of management of the Fund are to be advised to the Department of the Environment within a reasonable time following the making of the changes.
12. Any changes to the Rules of the Fund are to be advised to the Department of the Environment within a reasonable time following the making of the changes.
13. Statistical data about gifts to the Fund during the financial year will be provided to the Department of the Environment within four months after the end of the financial year and in the form required by the Department.

There it is. Once the membership passes the amendment and the resolution, it is a reasonably straightforward process for the ABS to be listed on the Register of Environmental Organisations. Our biggest obstacle will be to find the committee

members - and we are looking for volunteers. Committee members need not be financial members of the ABS, although we are looking to keep the majority control of the committee within the ABS. Clearly, the inaugural committee will be responsible for setting up processes for operating the Fund. It would be helpful if at least one committee member had some experience in this area.

Anyone interested themselves or with suggestions for committee members - or if you have any questions - please contact me:

Peggy Eby ph/fax: 02 9387 6134 email: **peby@ozemail.com.au**

_____ **^V^ ^V^ ^V^** _____

Contacts/NetWork/News

• Isolates of Polychromophilus Parasites Needed

I am working at the Center for Disease Control with Dr. Altaf A. Lal in a project on molecular systematics and evolution of haemosporina. I am looking for colleagues working on bats that may be interested in obtaining isolates of their blood parasites belonging to the genus Polychromophilus. The parasites have been almost ignored in the literature and we have very few references of them. They have been found in several localities worldwide. We only need 2 or 3 isolates. Given the lack of appropriate literature we may be able to identify them first only to the genus level. If you are aware of colleagues working with bats that could be interested in collecting this kind of material please let us know.

My address is:
Dr. Ananias A. Escalante c/o Dr. Altaf A. Lal
Division of Parasitic Diseases
Centers for Disease Control and Prevention
Mail Stop F-12
4770 Buford Hwy., Chamblee, GA 30340, USA
E-mail: abe1@cdc.gov <mailto:**abe1@cdc.gov**> ;
aescalan@reacciun.ve <mailto:aescalan@reacciun.ve>
and aal1@cdc.gov<mailto:aal1@cdc.gov>

Please notice that the user name is abe(one) in the first address provided. Please send it with copy to Dr. Lal aal1@cdc.gov <mailto:aal1@cdc.gov>, the user name is al(one). I have a field project in South America and I may not be here to promptly answer a message. We are very interested in getting these samples. We will appreciate any suggestion that you can provide us with.

- **Request for Information**

Review of bat ecology and conservation in semi-arid and arid regions of Australia

I am currently undertaking a review on aspects of the distribution, ecology and conservation of Microchiropteran bats in semi-arid and arid regions. This review forms part of my MSc research, and I am intending to submit the review for publication in an Australian scientific journal.

The emphasis of the review is on the eastern Australian region, as this is where my MSc research is situated (see Project Update in this edition of the ABS Newsletter). However, to give the topic a sound and fair treatment, I will also consider information from other arid/semi-arid regions, both in Australia and elsewhere.

I am seeking information from the depths of your filing cabinets, hard-drives, and human memory storage compartments that may add to the relatively scant published literature on this subject. I have gathered a range of reports and papers on bats and other fauna surveys for western NSW, Victoria and Queensland, but there must surely be much more knowledge available than this literature indicates.

The following topics are of particular interest to me:

- new or strange distribution records from the interior regions
- habitat preferences/roosting requirements
- known and potential threats to bats/habitats/conservation status
- potential taxonomic problems relating to distribution/conservation (oh no … not *Mormopterus* again)

I would welcome personal opinion, as well as fact, from those with experience in semi-arid and arid lands, particularly with regard to conservation status and threats to survival of microbats. Your thoughts (and overwhelming encouragement) on the value of this review are also most welcome!

Please send comments and info. to:

Greg Ford OR Email: **fordg@mail.connect.usq.edu.au**
P.O. Box 1744
Toowoomba Qld 4350

• Fieldwork in Brisbane/Toowoomba

Interested in field work on bats in western Queensland? Can you get to Toowoomba or Brisbane under your own steam? Are you looking for something to do in late October and early November this year, or in February 1999?

If you answered yes to all of these questions, then I'd like to hear from you ASAP!

I am looking for a couple of people to assist with trapping, Anabat detecting and maybe light-tagging observations on microbats at Idalia National Park at the times mentioned above. I will provide transport from Toowoomba to Idalia and back as well as food and accomodation.

Each field trip is scheduled to last 10-12 days and will include camping out, flies, mozzies, heat and probably a few storms (wet roads). But contrast that with the unrivaled beauty of Idalia's rugged semi-arid wilderness, the chance to see spectacular fauna like Bridled Nailtail and Yellow-footed Rockwallabies in the wild, not to mention a vast array of arid-zone birds and of course some beautiful bats!!!!

If this has got your pulse racing, then get on the phone now, or email me for more information on your free pass to a holiday that you wont forget!

Greg Ford, University of Southern Queensland, Toowoomba
Email: mailto: **fordg@mail.connect.usq.edu.au**
Phone: 07 4638 0315

• The Rehabilitation of the Noble Island Mine

Olivia Whybird and Chris Clague have compiled a grant application for a Coast Care Grant to place a bat gate on the Noble Island Mine. The island is located about 125 km NNW of Cooktown with the only realistic access being by water. The proposal involves members of the Society and a representative of Queensland Mines and Energy to travel to the island and spend a week trialing a bat gate on the mines main adit and removing industrial waste from the island. The adit contains a population of *Taphozous australis* and an extensive period of gating trials has been proposed based on the adjustable trial gate designed by Paul Graham of the Queensland Department of Mines and Energy. The removal of industrial waste will involve the Oxy-Acetylene cutting of a tractor, caravan and other metal waste into 25kg parcels which will then have to be manually carried ~2km to a point suitable for barge pickup. This will be a labour intensive and time consuming activity. Natural re-vegetation will be allowed to occur at the site. Once a trial gate has been found to be suitable for both bats and the prevention of access by the public, a galvanised steel gate will be constructed on site and cemented into place. Interpretative signage will also be constructed and prominently fixed at the site. The works will be

monitored by Department of Environment and Heritage Rangers on regular "Far Northern Marine Park Monitoring" trips.

This does seem like a plea for volunteers but please be aware that the work on the Island will be strenuous and skills such as welding would be a great asset. Also note that volunteers will have to make their own way to Cairns. Another reminder is that this is just an application which may not be successful, so these proposed works may not be funded.

If you are interested in assisting with the waste removal and bat-gating or in details of the application to Coast Care for funding please contact Chris Clague (**c.clague@vthrc.uq.edu.au**).

• *Nyctimene* Tissue/ Feeding observations required

Nancy Irwin from the University of Queensland's zoology department needs any kind of tissue from *Nyctimene* for genetic analysis of their taxonomy. She is also interested in anecdotal observations of *Nyctimene* feeding habits and will credit all contributors with co-authorship in any resulting papers.

If anyone who is netting *Nyctimene* and is able to use a wing-punch would like to contribute, please contact Nancy for instructions and materials at the Dept. of Zoology, University of Queensland, St. Lucia 4072 or at **nirwin@zoology.uq.edu.au**

• AUSTRALIAN MUSEUM BAT EXHIBITION June-October 1999

The Australian Museum, Sydney, is in the process of developing an exhibition about bats for June 6-October 31, 1999. The Museum Project Team developing the exhibition plan consists of Tim Sullivan (Executive Officer and Chair), Trish McDonald (Education), Sandy Ingleby (Science), Aaron Maiestri (Exhibitions), Sue McKindlay (Community Relations) and Sue Hand (Science Content Consultant).

To date, five qualitative and quantitative surveys of audience interest in a bat exhibition (and knowledge about bats) have been undertaken by various groups supervised by the Museum's Evaluation Co-ordinator, Linda Kelly. This audience research and evaluation indicates that the audience most interested in an exhibition about bats will be children under 12 years old and their parents.

The detailed audience evaluation research has allowed the Project Team to develop an exhibition plan that we believe will more than satisfy our target audience and stimulate more public interest in bats. All kinds of interpretative strategies will be used in the exhibition including computer interactives, video, puzzles, possibly some virtual reality

interactives, theatre, etc., etc. We hope to be able to incorporate into the display some of the wonderful video footage available for foreign bats (e.g., flying, roosting, feeding, birthing, grooming, etc.). Does anyone out there have the equivalent quality footage of Ozzie bats??

One of the clearest messages from the survey results is that people want to see live bats in the exhibition (79% of those surveyed). They want to become more familiar with bats. As a result of this information, one central theme of the exhibition is "to get up-close and personal with bats".

The possibility of displaying live bats at the Museum is something the Team has been investigating (grappling with), and welcomes the advice and comments of members of the Australasian Bat Society on this issue. At this stage we are looking hard at Grey-headed Flying-foxes, and possibly a species of *Nyctophilus*, as display animals. We have nominated these species because grey-headeds are large enough for visitors to easily see (and are infamous in the Sydney area), and a *Nyctophilus* species because these microbats have been successfully kept in captivity for several months at a time and, we understand, even trained to take mealworms on cue.

Because of public health issues, we intend to keep bats and humans well separated. We presume because of health risks that we will not be able to have carers exhibit bats during the exhibition, a very great pity. If anyone has advice to the contrary we would be delighted to hear from you.

To include live bats in the Museum exhibition is a decision that greatly affects the design and planning of the whole shebang, and so we look forward to hearing from you ASAP! We hope we can count on the support and advice of the ABS.

Sue Hand can be contacted on **s.hand@unsw.edu.au** or 02 9344 8704 phone/fax.

For information about the upcoming bat exhibition visit the Museum's web page at http://www.austmus.gov.au.

_____ **^V^ ^V^ ^V^** _____

Research Articles and Reviews

On the Insectivorous Bats of Semi-arid Central-Western Queensland: A Project Update Including Notes on Species Distributions and Habitat Conservation

Greg Ford, Department of Biological and Physical Sciences
University of Southern Queensland, Toowoomba
Email: fordg@mail.connect.usq.edu.au

Those of you who were at the 8th Australasian bat conference in Rockhampton, and who managed to get up early after the conference dinner, may remember me talking about the bat community at Idalia National Park in central-western Queensland. Well, this note presents a brief outline of my Master of Science project, which is looking at habitat use and seasonal activity of microbats at Idalia.

The project was initiated after the discovery of a diverse bat fauna at Idalia (Young & Ford in prep.), including new species distribution records (Young & Ford 1998), and was spurred on by the realisation that relatively little ecological information has been published on the bats of semi-arid and arid regions (see request for information in this edition of the ABS newsletter). Queensland, in particular, has received very little attention with regard to bats in the western areas; the few vertebrate fauna surveys reported (McEvoy and Kirkpatrick 1971, McGreevy 1987, McFarland 1992) put little emphasis on surveying bats.

The main aim of this project is to investigate spatial and temporal patterns of habitat use by Microchiropteran bats in a semi-arid area. The hypotheses being tested in this study are:

The species composition of the bat community is related to the structural characteristics of vegetation communities;
Bat species composition and bat abundance in various habitats change on a seasonal basis; and
Habitat use by bats is affected by changes in the availability of surface water.

The project will involve surveying bats by echolocation call detection (Anabat) and various trapping techniques across a range of vegetation communities at Idalia. The difficulty of finding suitable trapping sites in some vegetation types has lead me to rely on remote Anabat detection as the major sampling technique. Trapping will supplement the Anabat data and provide an opportunity to record reference calls for captured bats.

At the time of writing (June), the project has been running for only 5 months, with two preliminary field trips conducted to select and stratify sampling sites, test equipment and establish a reference call library for the Anabat work.

Some interesting findings from these trips and earlier work (Young & Ford 1998, Young & Ford in prep.) include:

Bat abundance, particularly in riparian habitats, seems to be strongly influenced by the availability of surface water throughout the Park. During the 1995 work (Young & Ford in prep.) large numbers of bats were caught at one waterhole (hundreds in one night), but when the same waterhole was trapped in February this year, less than 30 bats were trapped in two nights (G. Ford unpublished data). During 1995, the region was in the grip of drought, and surface water was particularly scarce, being limited to only a few deep holes and dams. In early 1998, however, recent rainfall had caused flows in most creeks and gullies, and nearly every depression and claypan contained some water. This observation raises a number of important questions. It is logical for the bats to disperse during favourable seasonal conditions, but do their main roosting sites remain in the riparian areas? Do they roost in greater numbers in the riparian areas during drought, or do they simply fly further to drink? If bats (like many other wildlife species) are so heavily reliant on a few large permanent waterholes during drought, what impacts may be caused by domestic livestock that also often rely on these water resources in dry times? Does trampling, silting and fouling of these waterholes by cattle, for example, reduce the water quality to a point where bats are no longer able to utilise the waterhole for much-needed drinking water? Does the increased pressure of livestock use in riparian zones reduce the recruitment of future hollow-bearing river redgums and other eucalypts? Will there be any bat roosts in these areas in 100 years?

Surveys by Anabat and trapping at Idalia have revealed a number of species that have not previously been reported for the region. Young & Ford (1998) described a significant range extension for the little forest bat *Vespadelus vulturnus*, which continues to be a significant component of the bat community at Idalia. Gould's long-eared bat *Nyctophilus gouldi* has also been recorded in the park (Young & Ford in prep., Ford unpublished data), its presence there representing an extension of several hundred kilometres to the west of its known range (Van Dyck & Longmore 1990). The chocolate-wattled bat *Chalinolobus morio* was identified from a single Anabat sequence recorded in April this year (Ford unpublished data), but confirmation of its presence is needed from more recordings and trapping. If *C. morio* is at Idalia, this may represent another range extension for a species, which seems to have a disjunct distribution across the continent (Tidemann 1995). *Vespadelus finlaysoni* has been found at Idalia, sharing caves with the common sheathtail bat *Taphozous georgianus*. While *V. finlaysoni* is known from other parts of western Queensland (Department of Environment unpublished data), its occurrence at Idalia probably represents a new easterly limit to its distribution.

If you would like to know more about this project, or are interested in participating in the field work, please don't hesitate to contact me via Email or snailmail (see details above). There is also a web page for the project, which contains a more detailed background, study location details, species list, selected bibliography, stunning photographs, and links to a number of other bat pages and related resources.

Web address: http://www.usq.edu.au/users/lebrocq/bathome.htm

References

McEvoy, J.S. and Kirkpatrick, T.H. (1971). Mammals and birds of the Booringa Shire, Queensland. Qld. *J. Agric. Anim. Sc*. **28**, 167-178.

McFarland, D. (1992). Fauna of the Channel Country Biogeographic Region, South West Queensland. Unpublished internal report, Queensland Department of Environment and Heritage, Brisbane.

McGreevy, D. G. (1987). Mammals, birds, reptiles and amphibians of the Bulloo Shire, Queensland. Qld. *J. Agric. Anim*. Sc. **44**, 75-93.

Tidemann, C.R. (1995). Chocolate Wattled Bat *Chalinolobus morio*. In The Mammals of Australia, ed. by R. Strahan, Auatralian Museum/Reed Books, Sydney.

Van Dyck, S.M. and Longmore, N.W. (1991). The Mammal Records. In An Atlas of Queensland's Frogs, Reptiles, Birds and Mammals, ed. by G.J. Ingram & R.J. Raven, Queensland Museum, Brisbane.

Young, R. A. and Ford, G. I. (1998). Range extension of the little forest bat *Vespadelus vulturnus* (Chiroptera: Vespertilionidae) into a semi arid area of central Queensland, Australia. *Aust. Zool*. **30**, 392-397.

Young, R.A. and Ford, G.I. (in prep.) The bat community of Idalia National Park in semi-arid central-western Queensland. *Wildl. Res*.

_____ **^V^ ^V^ ^V^** _____

Estimating the Grey-headed Flying-Fox Population: an Example of Community Involvement in Bat Conservation

Greg Richards, Peggy Eby and Kerryn Parry-Jones

Listing the Grey-headed Flying-fox (*Pteropus poliocephalus*) as Vulnerable in the national Bat Action Plan caused, as expected, a certain amount of political controversy when it was proposed at the June 1997 workshop. This situation was exacerbated when submissions were made to the NSW Scientific Committee to list this species as Vulnerable under the NSW Threatened Species Conservation Act 1995, mainly because declines were suspected to have been most significant in that state.

It became obvious that hard data was needed to establish the current population level, and whether a decline in numbers could be verified. This led to a group of us coordinating a major exercise in NSW involving volunteers, mainly to meet this objective but to also assess several counting methods.

A count was conducted in early July 1998. Apart from fulfilling our objectives, the operation itself was one of the most heartening that we have been involved with, not so much because of the results but because of the terrific input from volunteers in carer organisations. Over 100 people were involved for a weekend - what an effort!

A network of people was established to initially check flying-fox camps for the presence or absence of animals, with the view to then co-ordinating people to estimate numbers at those that were occupied. A weekend was allocated in advance to obtain estimates over two days, and groups of volunteers visited camps on each day. During the day the species composition of every camp was estimated, as was its sex and age structure. Prior to dusk people were positioned to count each fly-out line from each camp, and in as many situations as possible two observers counted the same fly-out to obtain an estimate of error.

Video filming was attempted where possible as another method to calibrate the accuracy of some of the fly-out counts. Day counts were also conducted using line transects to correlate tree diameter with numbers of bats in the canopy.

Researchers in Queensland and Victoria contributed information from their studies so that an estimate of the national population was possible. Counts were conducted at the same time in Queensland where Patrina Birt had been monitoring the size of camps for many months. The size of the population in the Melbourne Botanic Gardens (the only known camp in Victoria at the time) was also estimated. By combining data from all three states, we estimated the total population of the Grey-headed Flying-fox to be 360,000, with 80,000 of these being resident in NSW at the time of the count.

This was a most disturbing result, particularly when compared to an earlier assessment of population size. Peggy Eby, Carole Palmer and Kerryn Parry-Jones were studying Grey-headed Flying-foxes in NSW in the late 1980's. They assessed the sizes of known camps throughout the state in early March 1989 and estimated total numbers to be in the order of 520,000. Why is there a reduction of over 30%, or a difference of 160,000 between estimates? Where have they all gone? How can you not find 160,000 flying-foxes? Considering that around 5% of the total population may disperse and roost individually during winter, the figures simply don't gel, unless there has been a real decline as we suspect.

Arguments for listing Grey-headed Flying-foxes as Vulnerable in the Bat Action Plan and under NSW legislation have been based on IUCN Criteria A which requires "an observed, estimated, inferred or suspected reduction of at least 20% over 10 years". The information from the count firmly supports those arguments and should help to resolve any issues about the listing of the Grey-headed Flying-fox as Vulnerable in either Commonwealth or State legislation.

Although we came up with such a frightful result from a conservation point of view, the highlight of the survey was the teamwork involved. Over 100 volunteers gave time and dollars to do this exercise, and the data sheets indicate great diligence and effort. Where would we be without the well organised and dedicated network of carers ..... thank you everyone ..... and what a fine example of positive conservation outcomes from the united efforts of the Australasian Bat Society members.

We will be conducting further counts in NSW over the next few months and are looking for more assistance. We expect an increase in the numbers of camps that the animals use and will need additional people throughout the state. If you would like to get involved please contact :

Linda Collins	02 4294 1096	(Linda.Collins@bigpond.com)
Peggy Eby	02 9387 6134	(peby@ozemail.com.au)
Patrina Birt	07 3365 2544	(s023082@student.uq.edu.au)
Greg Richards	02 6253 2050	(batman@dynamite.com.au)

_____ **^V^ ^V^ ^V^** _____

Microchiroptera in Urban, Rural and Forest Areas of Southern NSW

Indre Kirsten and Nicholas I. Klomp
Charles Sturt University, POBox 789, Albury NSW 2640
e-mail: ikirst01@teis.mur.csu.edu.au

This honours project focused on insectivorous Microchiroptera in urban and rural areas and results were compared to data collected in the forest. The study was conducted in southern NSW, the forest and rural areas were part of the Hume shire and the urban area was the City of Albury.

Species diversity in each area

Harp trapping and bat detectors revealed that the species composition of the rural and forest areas was the same, with 11 species detected in both area (*N. australis, M. planiceps* long penis and eastern form, *S. balstoni*, *C. gouldii*, *C. morio*, *V. vulturnus, V. regulus*, *V. darlingtoni*, *N. gouldi* and *N. geoffroyi*). However, in the urban area (which included urban parks and nature strips) *S. balstoni* and *N. gouldi* were not detected, despite having traps erected at a dam. However, calls of *Nyctophilus* spp. were recorded and it was not possible to distinguish the calls of *N. gouldi* and *N. geoffroyi*.

Community comparison using a portable bat detector

The bat activity and community diversity was compared among the urban, rural and forest areas. A portable bat detector was used to record bat passes (two or more pulses separated by at least three seconds from conspecific calls). In each of the three areas, a total of 41 random transects were walked, which amounted to a survey time of 1230 minutes and an approximate distance of 62 km in each of the three areas.

Bat activity

The bat activity in forest was greatest, and the activity in the rural area surpassed that of the urban area. A species-by-species analysis revealed that the high bat activity in the forest could be attributed to a few species (the *Vespadelus* species, *Chalinolobus morio* and *Nyctinomus australis*), although the activity levels of some species (*Chalinolobus gouldii*, *Mormopterus planiceps* long penis form and *Vespadelus darlingtoni*) were not significantly different between the three areas. Bats often foraged at illuminated sites, which accounted for a large proportion of the activity encountered in the urban area.

Species diversity per transect

The species diversity per transect was lowest in the urban area (mean = 2). The diversity per transect in the rural area (mean = 4) was significantly lower than in the forest (mean = 5). The species diversity per area may not be a good measure to document the effect of habitat modification, given that 11 species were present in both rural and forest areas, which said little about the underlying process of species distribution. The significantly lower species diversity per transect suggests that in urban and rural areas large proportions of the landscapes cater for a selected few species, which were generally species adapted to forage in uncluttered spaces. Meanwhile, remnant vegetation provided important habitats for a different suite of clutter tolerant species, thereby effectively increasing the species diversity of the rural and urban areas, possibly due to an increase in spatial heterogeneity.

Radio-tracking female *C. gouldii*

Radiotelemetry was used to determine the home range of 13 female *C. gouldii*. The tracking commenced after the youngsters had been weaned. Of the 13 females radio-tracked, four were captured in rural and forest areas and five in the urban area of Albury. All radio-tracked *C. gouldii* that were captured outside the urban area visited the urban area to forage at illuminated sites, where multi-specific feeding aggregations occurred.

For *C. gouldii*, home range estimates of 95 - 4279 ha (average 698 ha) were calculated using the 100% Minimum Convex Polygon Method. The 80% Adaptive Kernel Method resulted in an average home range size of 698 ha, range 768 - 2799 ha. A positive correlation between the size of the home range and the number of fixes was detected for both the methods used to calculate the home range. The home ranges overlapped and the females spent most of their foraging time in low-land areas which are heavily modified for human use. The longest distance traveled from a known roost was 4.6 km, although one female probably flew at least 13.6 km from a roost site to forage. *C. gouldii* was capable of sustained flight at 7.9 ms^{-1} (28.4 km/hr) over several kilometres (4 - 10 km). *C. gouldii* appears to use two foraging strategies: cursorial foraging and foraging at specific locations.

Six roosts occurred in dead sections of mature eucalypts located in rural and urban areas, with two roost occurring in one tree. The tree holes occurred in three *Eucalyptus* species, whose combined average DBH was 81 cm. The average height of the roost trees was 17 m and the average height of the hollows was 9 m. Only one sub-adult was found to roost within a building and another roosted in a dead sapling. Like other studies, this suggests that mature hollow-bearing trees are important roost sites for *C. gouldii* (Lumsden *et al.* 1994). Urban and rural planning should ensure the persistence of hollow-bearing trees in space and time.

Foraging Community

The radio-tracked *C. gouldii* often foraged at illuminated sites in town (eg. around mercury-vapour street lights and powerful spot lights), although they roosted in forest, rural and urban areas. The radio-tracked individuals often spent the whole night foraging at an illuminated hot spot, where bat activity was high with more than 50 bat passes recorded in 5 minutes. Other species that consistently foraged at these hot spots were *N. australis*, *M. planiceps* long penis and less often *M. planiceps* eastern form. The sono-morphic attributes of this foraging bat assemblage suited foraging in open spaces, which is consistent with overseas findings (Rydell & Racey 1995; Gaisler *et al.* 1998). Furthermore, all these species were tolerant of artificial illumination and did not appear to differentiate between naturally or artificially occurring aggregations of insects.

Most foraging aggregations which formed at lights occurred at high-pressure mercury-vapour lamps or security spot lights. While, none occurred at the sodium-vapour lamps (yellow/orange light), which are more energy efficient than the mercury-vapour lamps. Most lights which supported foraging hot spots were located at the edge of town or near remnant vegetation. Interestingly, bats have retained some flexibility, because feeding aggregations also formed at flood lights of playing fields and tennis courts, which were not on every night. When the lights were off, little or no activity was recorded. Thus, some trigger must allow bats to detect the aggregations of disorientated insects, similarly to finding ephemeral insect aggregations which occur naturally.

This study, highlighted the importance of remnant vegetation in rural and urban areas. Not only did they provide roost sites but also foraging sites for species adapted to forage in cluttered habitats (thereby increasing the diversity of bats in these modified systems). Bats are potential insect controllers and are one of the few native mammalian species to use urban and rural areas. Urban and rural planning should consider the habitat requirements of bats.

References

Gaisler, J., Zukal, J., Rehak, Z., Homolka, M. (1998) Habitat preference and flight activity of bats in a city. *Journal of Zoology* **244**: 439-445.

Lumsden, L.F., Bennett, A.F., Silins, J.E., Krasna, S.P. (1994) *Fauna in a Remnant Vegetation - Farmland Mosaic: Movements, Roosts and Foraging Ecology of Bats*. A report to the Australian Nature Conservation Agency. Department of Conservation and Natural Resources, Victoria.

Rydell, J., and Racey, P. A. (1995) Street lamps and the feeding ecology of insectivorous bats, **in** Racey, P.A., Swift, S.M. (eds) *Ecology, Evolution and Behaviour of Bats.* Symposia of the Zoological Society of London, No 67. Oxford University Press, Oxford, pp. 291-301.

_____ ^V^ ^V^ ^V^ _____

Methods of Sampling Forest Bats and Bat Activity Above the Ground

O.J. Whybird
Vision, Touch & Hearing Research Centre, Dept. of Physiology, The University of Queensland, St. Lucia, QLD, Australia, 4072.
Present Address: P.O. Box 9, Millaa Millaa, QLD, 4886.

The physical location of harp traps and mist nets is known to affect the success of bat capture as placement is typically at ground level, in flyways such as forest tracks, or over narrow water bodies such as streams and dams (Tidemann & Woodside 1978; Gardner et al. 1989). This approach has an obvious bias towards sampling bats which fly between the ground and about two metres above it. In an attempt to offset this problem, mist nets have been placed in the forest canopy in several studies, but this procedure tends to be time consuming and very labour intensive (Kunz & Kurta 1988) although Gaskell (1984) and Cosson (1989) have reported success in using canopy netting for the capture of the Megachiroptera. In Malaysia for example, Francis (1994) found that capture rates for the Megachiroptera in netting the rainforest sub-canopy were up to 100 times higher compared to ground level. Here canopy netting appears to be biased towards the capture of Megachiroptera, most likely as a result of the poor detection of the nets by vision, and the inability to use echolocation. Some effort has been made catch high flying microchiropteran bats using nets raised on pulleys in relatively open areas (Coles & Lumsden 1992) and over streams in the forest (Gardner et al. 1989), as well as monitoring activity level at different heights above the ground (Kutt 1993).

Here I describe some of my initial efforts to capture and monitor bats in tropical rainforest and tackle the problem of vertical stratification. The general study area was located in upland rainforest and I tried several approaches at one site in particular, situated on a disused logging track on private property just south of the township of Millaa Millaa in north Queensland. The track had a width of about 3m on the ground and was relatively clear of overgrowth up to an estimated canopy height of 23 m.

To sample bats in the forest strata, I relied on canopy lines to raise capture/monitoring equipment above the ground. An arrow was fired over the highest tree branch overhanging the track, with tracer line (40 lb nylon fishing line) attached to the shaft. After the nylon line had been fired successfully over the chosen branch, it was replaced by a stronger line to haul up and suspend equipment.

Two novel bat capture methods were attempted, a vertical array of 4 harp traps suspended in the track and alternatively a vertically orientated mist net, both suspended via a pulley system. Finally, I sampled bat activity at the site by monitoring echolocation calls whilst standing on the ground with a hand held bat detector, and also by raising the bat detector microphone to pre-determined heights above the ground using a pulley system. Each sampling method was tried for at least two nights under standardised weather conditions (18-22°C, no wind) and the effort was spread over several months to minimise disturbance of normal bat activity at the site.

In the vertical array, each trap was a custom design, based on Tidemann & Woodside (1978), with a potential catching area of 2.88 m^2 (1.5 m x 1.92 m) per trap. To encourage bats to fly through the catch area, rather than through the surrounding vegetation, trawler netting was hung between each trap to act as a barrier (Fig. 1). Despite this effort and the traditional advantage of using harp traps because they can be left unattended (compared to mist nets), the vertical array of four traps yielded very disappointing results. As a result of three trap-array nights, a total of 5 individual bats were caught. With a single exception, these bats were caught in the bottom trap standing on the ground: one female post lactating *Hipposideros diadema* and three *Nyctophilus bifax* (a lactating female and two juvenile males). The only bat trapped 'above the ground' was an adult male *Vespadelus pumilus*, found in the uppermost trap at a height of 9.4 - 11.5 m. For comparison, general trapping in the area using single traps on the ground at four other sites, yielded an average of 5.5 bats/trap/night comprising five species (*H. diadema*, *Miniopterus australis*, *N. bifax*, *Rhinolophus megaphyllus*, *V. pumilus*).

In the next approach, a standard four shelf mist net (2.7 m high x 9.1 m wide, 25 mm mesh) was modified by removing existing shelf-lines, and replacing them perpendicular to the original orientation as described by Munn (1991) and used by Francis (1994) to capture Megachiroptera. This modification allowed the net to be hung vertically in the narrow track, with nine horizontal shelves, using a pole (2.8m wide) at the top for rigidity, and then hauled into the canopy using a pulley system. The net was spread out by using guy ropes attached to the lower corner and also half way up on each side, giving a potential catching height up to 9.2m above the ground.

The result of 5 'vertical' net hours over one night captured 8 individuals of three species at various heights determined by their place of entanglement in the netting (Table 1). Unfortunately, on three subsequent nights using this type of net, no additional bats were captured.

Table 1: Bats caught in the 'vertical' net

Species	**Height caught (m)**	**Sex**	**Condition**
Hipposideros diadema	1.8	F	post lactation
Nyctophilus bifax	6.5, 7.0	F, M	juvenile
Nyctophilus bifax	1.5, 1.6, 2.5	3F	post lactation
Nyctophilus bifax	1.5	F	lactating
Rhinolophus megaphyllus	1.6	F	pregnant

From the one successful evening, Table 1 shows that only three individuals were caught at or above the height of a "standard" mist net and these captures ranged between 2.5m to 7m for the species *N. bifax*.

During these attempts to capture bats, it became obvious that the vertical array of traps represented a very large obstacle for bats to fly towards, easily detected by echolocation and offering relatively confined 'windows' to fly through. The array also proved very cumbersome to erect and position correctly. It also became apparent that bats were flying up to the traps (and the vertical net) and largely avoiding it (see below), although captures were made.

To try to resolve the problems with these vertical trapping and netting methods, I used a bat detector (Ultra Sound Advice, Model S-25) at the site to monitor echolocation calls and gauge activity level. Calls were recorded onto a cassette recorder (Sony Walkman WM-D6C) for later analysis. Initially, over the nights when the vertical net was used, I counted bat passes at the net totalling between 151 to 185 passes over a 180 min sample period just after dusk. Similarly on another night at the same site, with no nets or traps present, I recorded 45 passes in a 45 min sample period, confirming an activity level at this site between 0.84 - 1.02 passes/min in the early evening. Careful observation with a red filtered spotlight, as well as listening to the bat detector, revealed that up to 55% of passes near the net (61 out of 110) came from bats actively avoiding it, although a few were captured as described above. My sampling of bat activity at ground level was done by scanning in all directions with the detector hand held, and thus I recorded all possible bats using echolocation within the limits of detector sensitivity at that site. Obviously this includes bats flying at unknown elevations but typical of ground based ultrasound surveys.

Finally, I decided to use the pulley system to raise the bat detector microphone above the ground at pre-determined heights. In order to maintain control over detector output for tape recording, the microphone and headstage assembly were separated from the main body of the detector by a 35m extension cable without affecting performance (Whybird 1996). The microphone and headstage were placed at the end of a special cylindrical housing, attached to the end of the pulley rope and hauled up. This 'canopy microphone' was held in a horizontal position by counterbalancing the housing, and it was aimed along the track. Calibrated markings on the microphone extension lead were used to ensure that the canopy microphone was raised to a predetermined height above the ground.

Table 2: Activity of bats in the rainforest strata detected by echolocation calls.

forest stratum	height (m)		total	passes	
	stratum	mic	passes	per min	species
canopy	23-13	18	80 (82)	0.89	Hd, Ma, Nb, Vp
sub canopy	13-4	9.5	49 (55)	0.54	Hd, Ma, Nb,Vp, Rm, Nr*
ground	4-0	2.5	62 (68)	0.69	Ma, Nb, Rm, Nr*

Key: Hd *Hipposideros diadema*; Ma *Miniopterus australis*; Nb *Nyctophilus bifax*
Rm *Rhinolophus megaphyllus*; Vp *Vespadelus pumilus*
*Nr *Nyctimene robinsoni* (detected visually and by audible flight call)

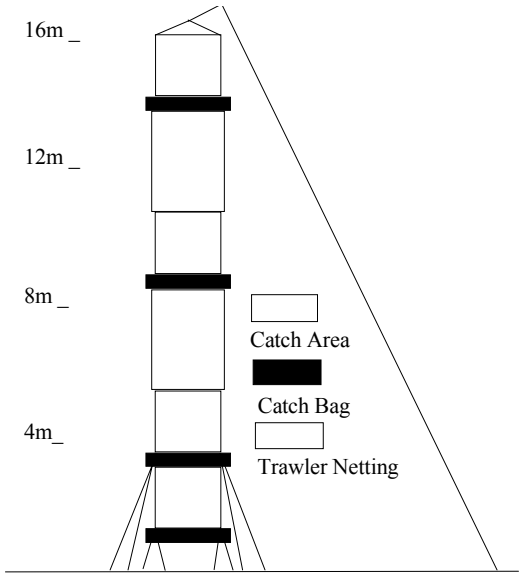
In Table 2, the rainforest site was divided into the vertical strata of ground, sub canopy and canopy. The maximum height of each stratum was estimated by triangulation and then the canopy microphone assembly was positioned in the middle of each zone as best as possible. The absolute maximum height of the canopy microphone was limited by the position of the pulley supported by the highest available tree branch. Sampling of bat activity was carried out for a total of 90 min over two nights. Figures shown as total passes represent sonar (all sonar, visual and audible bat observations in brackets).

The results show that 4 - 6 bat species can be reliably detected in the rainforest and at heights up to the canopy level. The highest overall activity at this site was found in the canopy (0.89 passes per min) at levels comparable to that determined by sampling on the ground and scanning the environment (described above). The canopy level was dominated by the presence of *M. australis* (88% of passes). Meanwhile in the sub canopy, activity level of three echolocating species (*M. australis*, *Vespadelus pumilus*, *N. bifax*) was fairly even, ranging between 18-30% for all the passes, although activity was reduced to 0.59 passes per min. *Nyctimene robinsoni* seemed quite active in this stratum accounting for 18% of the passes, and based on detection of audible flight calls through the audio (voice comments) track of the bat detector. At ground level, bat activity increased again to 0.69 passes per min but here *R. megaphyllus* was most active (76% of passes) and *N. bifax* had a similar activity level (19% of passes) to the sub canopy.

The results of my initial attempts to examine vertical stratification by forest bats are confined to their use of a track in rainforest for practical reasons. By the use of harp traps and mist nets arranged vertically, as I have described, it is possible to trap bats but there seems to be a natural bias towards captures relative close to the ground, essentially at the same level as conventional trapping is carried out. An occasional high elevation capture is possible but my overall impression is that a vertical bank of harp traps is an effective barrier and even a vertically orientated mist net is readily detected by echolocating bats and avoided. In contrast, the use of a canopy microphone on a pulley system would seem to offer an excellent way to monitor the possible vertical stratification of bats in a forest. My preliminary findings suggest that microchiropteran bats can utilise the entire forest strata. Kutt (1993) found that in the Lowland regrowth forest of East Gippsland, Victoria,

a ground level bat detector recorded the same species that were recorded at 12m plus several others, concluding that detectors set at ground level may be adequate for species inventories in forests with a fairly open canopy. In this study within a denser forest type, the species composition varied between those recorded at ground level and with the canopy microphone (set in the canopy, sub canopy and ground layer). Although ground based sonar survey methods record good levels of bat activity, positioning a microphone at varying heights between ground and canopy provides a viable method of finding at which level species may prefer to fly and forage in a forest.

Figure 1. The Vertical Array of Harp Traps



References

Coles, R.B. and Lumsden, L. (1992) *Report on the survey of bats in the Heathlands area of Cape York*. Cape York Peninsula Scientific Expedition 1992.

Cosson, J-F. (1995) Captures of *Myonycteris torquata* (Chiroptera: Pteropodidae) in forest canopy in South Cameroon. *Biotropica* **27**(3):395-396.

Francis, C.M. (1989) A comparison of mist nets and two designs of harp traps for capturing bats. *J. Mamm.* **70**(4):865-870.

Francis, C.M. (1994) Vertical stratification of fruit bats (Pteropodidae) in lowland dipterocarp rainforest in Malaysia. *J. Trop. Ecol*. **10**: 523-530.

Gardner, J.E., Garner, J.D. and Hofmann, J.E. (1989) A portable mist netting system for capturing bats with emphasis on *Myotis sodalis* (Indian Bat) *Bat Res. News* **30**(1):1-8.

Gaskell, B.H. (1984) Flying fruit-bat faunas of the upper canopy in two paleaotropical rain-forests. *Tropical Rainforest: The Leeds Symposium* (Poster abstract) pp 303.

Kunz, T.H. and Kurta, A. (1988) A comparison of mist nets and ultrasonic detectors for monitoring flight activity of bats. *J. Mamm*. **56**: 907-911.

Kutt A (1993) Notes on recording reference sequences of bat echolocationcalls and bat activity at different heights. Aust. Bat Society Newsletter **2**: 16-23

Munn, C.A. (1991) Tropical canopy netting and shooting lines over tall trees. *J. Field Ornithol*. **62**(4): 454-463.

Tidemann, C.R. and D.P. Woodside (1978) A collapsible bat trap and comparison of results obtained with the trap and with mist nets. *Aust. Wildl. Res*. **5**: 355-362.

Whybird, O.J. (1996) *An Investigation into the Vertical Stratification of the Chiroptera in Tropical Queensland Rainforest*. University of Queensland Honours Thesis.

^V^ ^V^ ^V^

Letters

Observations of Bats Active Soon After Sunset

On Saturday April 18th 1998 I observed 2 bats active from about 7 minutes after sunset at Glennalta, a suburb of Adelaide. It was a warm dry April evening (about 18 degrees Celsius all night) following a pleasant warm day in which lots of flying ants were observed, and this was followed by continuous rain (about 45 mm) on April 19th. I had been working outside most of the day and was cleaning up just on sunset with ample light for good colour vision, when I saw the 2 bats. I immediately checked the time inside (5:55 pm, with sunset at about 5:48 pm) and then went outside again with my wife as a second observer, and watched the 2 bats circling over an area of 3-4 houses.

I did not have a bat-detector handy, but the bats were probably Gould's Wattled Bat, *Chalinolobus gouldii*, which is the most common species near my house in the summer. This is the earliest I have seen such bats active after sunset. Around 60 previous observations in the area (Glennalta and the adjoining Belair National Park) over every month of the year first detected bats in the evening (about equal numbers of observations on *C. gouldii* and *Vespadelus darlingtoni*) on average 29 minutes after sunset (16-46 minutes range).

Perhaps some of the readers can suggest the reason for such early activity after sunset - Maritza de Oliveira's new book on the Anabat system notes that high bat activity may be correlated with warm temperatures and atmospheric pressure changes on the previous night .

Ken Sanderson

School of Biological Sciences
Flinders University of South Australia
GPO Box 2100
Adelaide
South Australia 5001

e-mail bikjs@cc.flinders.edu.au
Voice 61 8 201 2790
Fax 61 8 201 3015

Recent Literature

Compiled by N. Markus - n.markus@mailbox.uq.edu.au

- Bartels, W., Law, B.S. and Geiser, G. 1998. Daily torpor and energetics in a tropical mammal, the northern blossom-bat *Macroglossus minimus* (Megachiroptera): impact on distribution range? *Journal of Comparative Physiology & Biochemistry* **168**: 233-39

- Birt, P., Markus, N., Collins, L. and Hall, L. 1998. Urban Flying-foxes. *Australia Nature*, Spring 1998: 54-59

- Coburn, D.K. & Geiser, G.F. 1998. Seasonal changes in energetics and torpor patterns in the subtropical blossom-bat *Syconycteris australis* (Megachiroptera). *Oecologia* **113** (4): 467-473

- Geiser, G.F. 1998. Cool Bats. *Australia Nature*. Winter 1998: 56-63

- Hall, L.S. & Abdullah, T. 1998. Bagging Bats in Borneo. *Geo Australasia*, June 1998

- Hand, S. 1998. *Xenorhinus*, a new genus of old world leaf-nosed bats (Microchiroptera: Hipposideridae) from the Australian Miocene. *Journal of Vertebrate Palaeontology* **18** (2): 430-439

- Hosken, D.J. 1998. Sperm fertility and skewed paternity during sperm competition in the Australian long-eared bat, *Nyctophilus geoffroyi* (Chiroptera: Verspertillionidae). *J. Zool., Lond*. **245**: 93-100

- Hosken, D.J. 1997. Reproduction and the female reproductive cycle of *Nyctophilus geoffroyi* and *N. major* (Chiroptera: Verspertilionidae) from south-western Australia. *Australian Journal of Zoology* **45** (5): 489-504

- Law, B.S., Anderson J., and Chidel, M. 1998. A survey of bats of the south-west slopes region of NSW and suggestions for the improvements of survey techniques. *Australian Zoologist* **30**: 467-79

- Pavey, C.R. & Burwell, C.J. 1998. Bat predation on eared moths: a test of the allotonic frequency hypothesis. *OIKOS* **81** (1): 143-151

_____ **^V^ ^V^ ^V^** _____

AUSTRALASIAN BAT SOCIETY

MEMBERSHIP APPLICATION/RENEWAL FORM

The Australasian Bat Society was conceived at the 4th Australian Bat Research Conference (Brisbane 1991) and was formalised in the following year. The ABS unites people with a common interest in this unique fauna. Whether they be researchers, naturalists, foster-carers or fruitgrowers, everyone benefits from our unification. By presenting a united front to assist the resolution of conservation problems, or to lobby politicians, or simply spread the good word to the public, the goals of the ABS are conveyed more efficiently than through individual effort. Arranging the Australasian Bat Conference is another role of the ABS.

Communication is promoted through a bi-annual newsletter, where research news and notes, simple snippets or vexatious viewpoints are expounded. Should a conservation 'emergency' arise, members will be advised through a 1-2 page news sheet. We also have a web page on the Internet - http://batcall.csu.edu.au/batcall/abs/welcome.htm

Further information on membership can be obtained from the Membership Secretary: **Lindy Lumsden, PO Box 137, Heidelberg, Victoria 3084**. **E-mail <L.Lumsden@nre.vic.gov.au>.**

MEMBERSHIP APPLICATION/RENEWAL FOR THE AUSTRALASIAN BAT SOCIETY

I wish to become a member/renew membership of the Australasian Bat Society. I declare that I subscribe to the Aim and Objectives of the Society and, in the event of my admission, agree to be bound by the Rules of the Society.

Name: ..... Title: .....

Address:.....

.....

State ..... Postcode ..... Country .....

Phone: ( ) ..... Fax: ( ) .....

Email address: .....

I qualify for membership at the following rate (circle):

Standard ($A30) ***Student, Unemployed or Retired ($A20)*** ***Institutions ($A50)***

Outside the Australasian Region ($A40) ***Institutions Outside the Australasian Region ($A60)***

Signed .....

Please forward a cheque or money order in Australian currency to the ABS Membership Secretary (address above).

Table of Contents