
The Australasian Bat Society Newsletter

Number 19

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- Instructions for contributors -

The *Australasian Bat Society Newsletter* will accept contributions under one of the following two sections, Research Papers, and all other articles or notes. There are two deadlines each year: **21st March** for the April issue, and **21st October** for the November issue. The Editor reserves the right to hold over contributions for subsequent issues of the *Newsletter*, and meeting the deadline is not a guarantee of immediate publication.

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

For consistency, the following guidelines should be followed:

- Emailed electronic copy of manuscripts or articles, sent as an attachment, is the preferred method of submission. Manuscripts can also be sent on 3½" floppy disk preferably in IBM format. Faxed and hard copy manuscripts will be accepted but reluctantly!! All submissions are to be sent to the *Newsletter* Editor at the email or postal address below.
- Electronic copy should be in 11 point Arial font, left and right justified with 16 mm left and right margins. Please use Microsoft Word; any version is acceptable.
- Manuscripts should be submitted in clear, concise English and free from typographical and spelling errors. Please leave two spaces after each sentence.
- Research Papers should ideally include: Title; Names and addresses of authors; Abstract (approx. 200 words); Introduction; Materials and methods; Results, Discussion and References. References should conform to the Harvard System (author-date).
- Technical notes, News, Notes, Notices, Art etc should include a Title; Names and addresses of authors. References should conform to the Harvard System (author-date).
- All pages, figures and tables should be consecutively numbered and correct orientation must be used throughout. Metric units and SI units should be used wherever possible.
- Some black and white photographs can be reproduced in the *Newsletter* after scanning and digital editing (consult the Editor for advice). Diagrams and figures should be submitted as 'Camera ready' copy, sized to fit on an A4 page, or electronically as TIFF, JPEG or BMP image files. Tables should be in a format suitable for reproduction on a single page.
- Research Papers are not being refereed routinely at this stage, although major editorial amendments may be suggested and specialist opinion may be sought in some cases. Articles will generally undergo some minor editing to conform to the *Newsletter*.
- Please contact the *Newsletter* Editor if you need help or advice.

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– Editorial –

Hope you like the new look of the *Newsletter*! It is a simple improvement, but one that adds a bit of quality I think. Thank you once again to Terry Reardon and Lindy Lumsden for adding the final touches, organising the printing and sending them out.

Thank you to everyone who submitted articles to this issue, and to those who have contributed to the news and state roundup sections. Thank you also to Greg Ford for contributing to the Recent Literature section, and to Greg Richards for running the rather irreverent 'Les Hall caption competition'.

This issue is supported by four entities that have contributed towards the cost of the *Newsletter* for the privilege of advertising their product. In the future, the *Newsletter* will be accepting advertisements for products or services that will be in the interest of ABS members, at the discretion of the editor and the ABS executive. These will be interspersed in the *News and Announcements* section. Not-for-profit news items will continue to be accepted without charge. Financial contributions will be put towards the costs of production of the *Newsletter*, and this may allow us to further improve the look in the future. If you are interested in promoting your product or service, please contact me.

I have finally finished making PDF files of the last few newsletters. Issues 15 – 17 should be available on the ABS website (<http://batcall.csu.edu.au/batcall/abs/home.htm>) when this issue comes out, or soon after (thanks Herry!). Note that most previous issues are also available for downloading if you are missing some. Issue 18 will be available after April next year. Note that you will need Adobe Acrobat Reader (free download from <http://www.adobe.com/products/acrobat/readstep2.html>) to read and print these documents. Some files are a little larger than others, so you might have to wait slightly longer for them to download, but most are quite manageable.

I am looking forward to receiving your articles for the next issue. You can send them to me anytime before 21 March 2003. Research papers, short notes, interesting or unusual observations, technical articles, reviews and news: all are welcome in the *Newsletter*. Please take note of the instructions for contributors, as it makes my life a little easier. You can also consult the last couple of issues as a guide to formatting. I look forward to reading all your future articles.

Kyle Armstrong
Newsletter Editor



Orange leaf-nosed bat, *Rhinonictes aurantius* (photo by Kyle Armstrong)

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Front cover: Photograph of an original artwork by wildlife artist Fran Davis (unfortunately I could not reproduce the image in colour – *ed*). The subject of the watercolour is 'Bags', an unreleasable grey-headed Flying-fox that Fran found as a premature bub. Bags could not fly, but was the subject of Fran's paintings for 20 years, often in amazing detail (of the face, nose, tongue, lips, wings, claws, feet, ears etc). Sadly, poor Bags met an ignoble end after being eaten by a python.

– Australasian Bat Society: business and reports –

President's report

Hello again fellow chiropterophiles. Crikey...haven't the last six months flown by?! It doesn't seem that long since I prepared my first report for the newsletter.

The ABS executive have had a relatively quiet six months, although we've been in frequent contact to discuss key issues in line with the objectives of our constitution. Conservation of species and populations, particularly megabats, continues to draw our attention. We have also provided, or sought, input to the development of guidelines for bat surveys at both State and National levels. More on these later.

First though, I'd like to welcome Maree Kerr to the ABS executive. Maree volunteered for the job of Secretary after Nicki Markus vacated the position mid-year. Nicki found she was overcommitted with her new WWF job, which she commenced soon after re-election as ABS Secretary.

On behalf of the ABS, I want to thank Nicki for her contribution as Secretary over the past few years. It's probably the most time consuming job on the executive, and Nicki's tireless commitment, including her role in the Grey-headed Flying-fox issue last year, was much appreciated by the membership of the Society.

Two of our Society's Objectives are: "to be an advocate for the conservation and sound management of bats and their habitat ..."; and "to promote high standards in the handling and study of bats". Issues relating to these two objectives have been the focus of much attention amongst the executive this last six months.

On the conservation front, we have been asked by Environment Australia (EA) to comment on the public nomination of the Torresian Flying-fox (*P. banakrisi*) for listing as endangered under the EPBC Act. I have been in contact with several members who have expertise in this species, and by the time this newsletter goes to print, EA will have received our submission.

It is likely that a number of other bat species will receive public nomination for listing under the EPBC Act over the next year or two. I would like to think that the ABS can play an active role in supporting those nominations. As we receive requests for comment on those nominations from EA, we will consult as widely as possible with the membership of the Society in preparing our supporting submissions. If you would like to be more closely involved in this process, please get in touch with any of the executive members and make your wishes known.

With regard to standards for the handling and study of bats, the ABS made a significant contribution to guidelines for bat surveys being developed by the National Parks & Wildlife Service of NSW. After circulation amongst the executive and broader ABS membership, comments were compiled and submitted to NPWS in summary format.

The discussions that ensued from the above exercise reinforced the need for the ABS to be proactive in developing and promoting the adoption of such guidelines. The microbat survey techniques workshop that we ran at the Cairns conference, also highlighted a general desire amongst members to work towards a set of ABS-endorsed standards that could be applied nationwide with relevant adaptations to suit local needs or project objectives.

To this end, we are planning to hold a workshop in conjunction with the Financial AGM early next year. The aim of the workshop will be to develop draft guidelines for microbat survey and reporting, including standards for interpretation and reporting of ultrasonic call surveys/analysis. We envisage that the guidelines will be reviewed and refined following the workshop, with a view to tabling them for adoption at the 2004 conference. Obviously these guidelines will have to be flexible and subject to periodic review after their adoption to allow for changes in survey techniques and other requirements.

Another significant issue for the ABS is the recent call for tenders by EA for the development of national flora and fauna survey standards to be used in EA's implementation of the EPBC Act (i.e. relating to EPBC-scheduled threatened species). The ABS will be seeking close consultation with EA and the successful tenderer on the bat components of those standards. Indeed, we envisage a role for a number of members in assisting with the development and/or review of the standards. I believe it is imperative that the ABS membership actively support this process and offer our endorsement to EA if /when the standards meet the expectations of our membership.

On another note, it's great to see that Bruce Thomson's work on the conservation of bats in mines has come to fruition with the publication of an occasional paper by the Australian Centre for Mining Environmental Research. The *Australian Handbook for the Conservation of Bats in Mines and Artificial Cave-Bat Habitats* is the culmination of several years work with the mining industry, consultants and bat biologists (including numerous ABS and Bat Conservation International members) around Australia and internationally. It represents a significant step forward for the conservation and management of microbats in Australia, and I congratulate Bruce on behalf of the ABS for a job well done.

Well, that about sums it up for me this time around. I hope you all enjoy a wonderful Christmas and wish you the very best for 2003.

Happy batting!

Greg Ford
ABS President

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Black Flying-fox, *Pteropus alecto* (photo by Helen Gormley)

– Research Papers and Notes –

Harptrap design: where do we go to from here?

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Background

Readers of Australasian Bat Society Newsletter may already know of my particular interest in the equipment (Gration 1999, 2000) we use when surveying bats.

My particular interest over the last 4 years has been to improve the user friendliness and capture efficiencies of the harptrap design of Tidemann & Woodside (1978). This design has served researchers well over the past 2 decades, but aside from some basic design changes (Lumsden 1999), Francis (1989) is one of the few who has instigated major design changes aimed at improving capture rates. What further encouraged me to push on with harptrap design was the results of Dobson *et al.* (2000) research which highlighted the low capture rates in relation to the number of approaches made.

For the last 4 years I have been designing and building a range of harptraps. Two of my earlier designs were put to rest. Over the last 2 years I have been focussing my efforts on designing a harptrap, which I had hoped to be single operator friendly and increase capture rates.

The prototype design process

Early 2000 was the start of my third harptrap project. My previous two projects failed due to my limited experience in all things batty. With my now new found knowledge and experience I believed that the design would be dictated by two key questions:

1. *What design features will improve capture rates?"*
2. *How can a harptrap be more single operator friendly?"*

My solutions to these two questions were:

- Decrease echolocating potential of monofilament lines;
- Reconfiguration of monofilament lines;
- Increase the number of banks of line;
- Changes to the capture bag shape;
- Reshaping of the line carrier frame (convex / concave?);
- Consistency of line tension over the duration of a night;
- Increase capture area size;
- Reduce the size of the trap;
- Change line carrier fitting process;
- Changes to hip design.

Research has been undertaken continually over the last 2 years to see if there was merit in incorporating features based on each of the above solutions.

“What design features will improve capture rates?”

1. Griffin's (1986) research indicated that by decreasing the line diameter, a bats ability to avoid obstacles decreased. The rate of hits increased once an obstacle in the form of a steel line decreased in diameter, <2 mm being the optimum size to minimize detection.
2. I put a series of questions to Tony Messina of Nevada Bat Technology (2001) on the echolocating ability of bats. Tony indicated that the angle of attack (both vertically & horizontally) when approaching a harptrap would dictate the strength of the reflection of the echo. The monofilament lines are more acoustically visible when approached from any angle less or greater than 90 degrees. This is due to the perceived reduction in the gaps between the lines causing the lines to be seen (acoustically) as a larger object and, as a consequence, a greater reflecting area. Tony provided the example of looking at a mistnet. Imagine you are looking at it from front on: it is difficult to see, and as you swing around on an angle the net becomes more visible. The full reply can be found in the archive files of 'Batline'.
3. Francis (1989) designed and built a 4-bank harptrap and his results indicated there were improvements in capture rates.
4. No information was available on whether the failure of the capture bag ends to rise above the hip fittings aided the escape of bats. Personal observations indicated that some bats did not always fall into the bottom of the capture bag. Bat scats were found on top of the plastic at the top of the capture area but there was no evidence of bats in the bottom of the bag. This occurred when the capture bag was tied off too tight, thus reducing the angle of the capture zone into the capture bag.
5. Tony Messina (2001) provided further feedback on the frame design and what was needed to minimise the echolocability of monofilament lines. I had thought of a variety of capture area shapes such as concave etc., but it comes down to the angle of attack influencing the strength of the reflected signal.
6. No information was found on the topic of lines relaxing, however I have had experiences of monofilament relaxing over the duration of the night, particularly on warm nights.
7. Mike O'Farrell's (2001, pers comm., 23 July) work with infrared cameras indicated that the height of the capture area could have a role in the escape of some bats. Mike observed that bats hit the top section of the trap, spread their wings between the lines bringing themselves to a halt, manoevered themselves through the lines, and then flew off. Mike was of the opinion that the capture area height of commercially available harptraps can sometimes lead to escapes: a larger capture area does not necessarily lead to more captures.

“How can a harptrap be more single operator friendly?”

1. Reducing the width would help with the ease of operation when rolling and unrolling the line carriers. My research had indicated that a reduction in the height of traps was possible with no net loss of captures. I was not so keen to alter the width, in fact if anything, I would have liked to have increased the width.
2. The design needed to enable a single operator to erect or dismantle the trap with ease, whilst minimising the entanglement of the lines. This meant that the line carrier fittings needed redesigning.
3. The current design of the hips requires the dismantling of the line carrier fitting if you wish to transport them in the carry bag or alternatively they are transported as separate units. I have had experiences where the hips had been forgotten or separated from other trap components. A one-piece hip would avoid this situation. Not only did the hips need to be redesigned for the purposes of transportation, they also needed to accommodate the proposed new line carriers.

Design and construction of prototype

The design and construction phase were undertaken in the reverse steps of how a project of this sort would normally be undertaken. I had the design ideas in my head but was unsure about the availability of materials to meet my needs. As a consequence, rough sketches were undertaken at the completion of the construction of each step of the prototype. The idea was to construct the prototype from electrical conduit with aluminium inserts for strength. The prototype was to be built as a 1/3 scale of the normal size (Plate 1).

Based on my research, I implemented the following design features:

- Triple bank of lines (Plate 2);
- Spring loaded vertical uprights (Plate 2);
- Altered line configuration (Plate 3). The spacing of the lines on the two outside banks is 50 mm wide; the lines on the middle bank are spaced at 25 mm. The lines on the middle bank are tensioned slightly more than the outside banks (Large Bent-wing Bats *Miniopterus schreibersii* can be seen in the capture bag);
- Elbow fittings for line carriers and capture bag (Plate 2);
- Shaped capture bag so the centre plastic flap could be dispensed with (Plate 2);
- Redesigned hip to accommodate elbows of line carriers and capture bag (Plate 2);
- One piece folding hips (this was to be completed with full-scale version);
- Reduce the diameter of monofilament line to 0.18 mm (6lb).

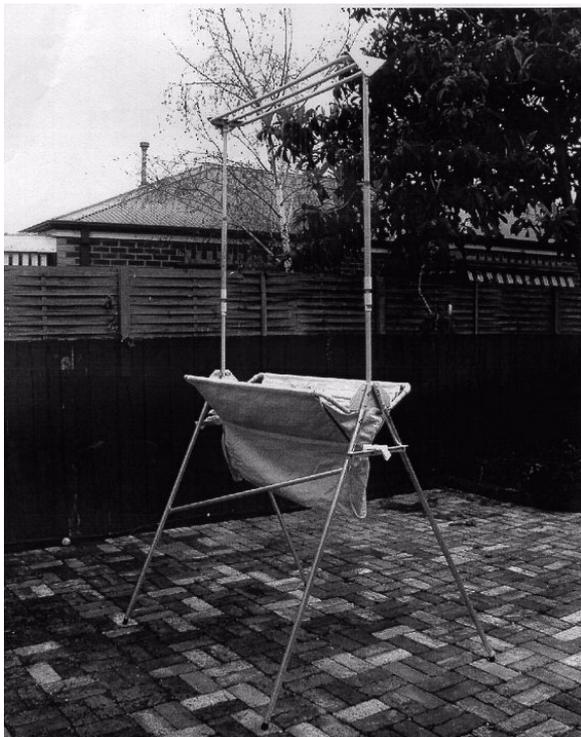


Plate 1.

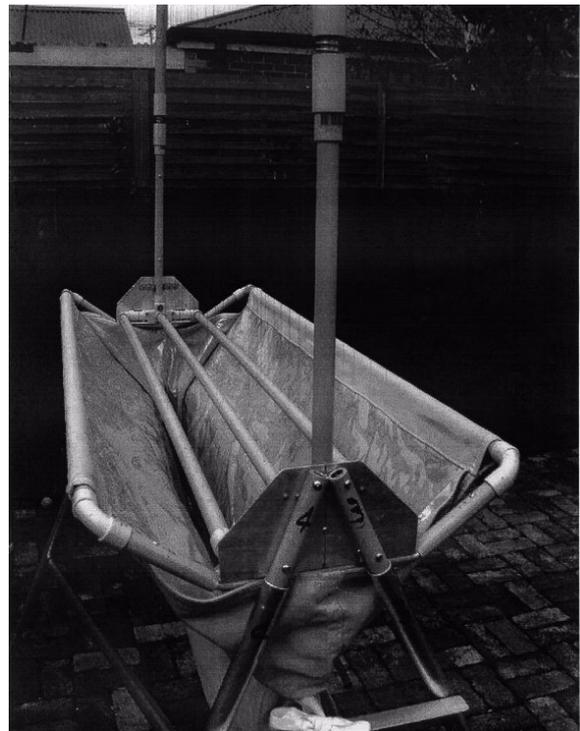


Plate 2.

User feedback

The prototype's ease of operation, and capture rates were assessed over a 12-month period. The ease of operation was easy to quantify, this was achieved by having a variety of people either use it or see it in operation, and they in turn provided feedback. In general the response to its ease of operation was positive. Personally I found it very easy to erect and dismantle, but this was to be expected given that I had designed it to meet my own needs and it was not yet a full-scale version.

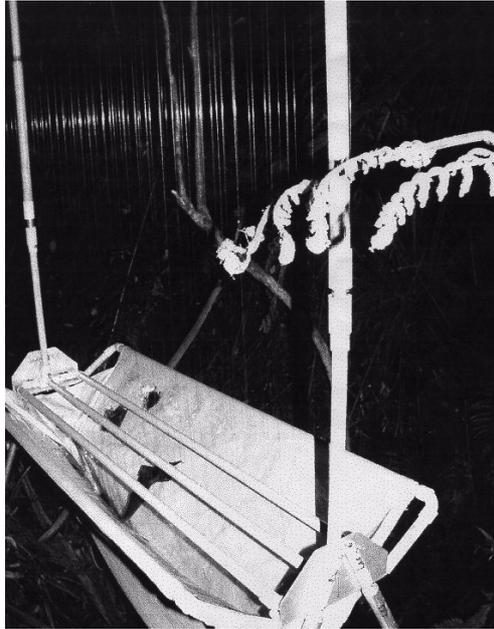


Plate 3.

Improved capture rates?

Whether or not there was an improvement in capture rates is difficult to prove one way or the other, since no statistical comparison between harp trap designs was undertaken. It was envisaged that research comparing capture rates would occur at some time in the future once the full-scale model was operational. Anecdotal evidence suggested the capture rates of the prototype were equal to that of traditional harp traps when they were used on the same night. The question could be asked as to why you would bother given the capture rates were similar. This can be best answered by the fact that the prototype has a smaller capture area yet it did not appear to come at the expense of captures. The prototype's similar capture rates might be attributed to better trap placement and not the design features. At this stage I am not prepared to make a firm statement one way or the other on capture rates. Only thorough statistical testing will determine whether there is a difference in capture rates between trap types.

Construction of the full-scale version (2001)

Buoyed by the apparent success of the previous 12 months testing, I then proceeded to undertake the construction of the full-sized version that was to become the '*Myotis Harptrap*'. I was happy with all the design features implemented in the construction of the prototype, and I only needed to incorporate features that were not included initially. The two features to be included were; increasing the height of the capture bag ends (Plate 4) and; designing the hips so they were a collapsible one-piece unit (Plate 5).

User response to the '*Myotis Harptrap*'

There are currently five of the traps located throughout Australia and one in Belize, however I have not yet received feedback from all of the respective users. Feedback I have received to date is detailed below. One owner is convinced that the triple bank design is capturing more bats than his other traps, However, I cannot support this statement until such time as others or myself have implemented experimentally sound trials.



Plate 4.



Plate 5.

Another user had some teething problems when erecting the 'Myotis'; however these problems were more a case of operator error due to the inadequate instruction manual I had supplied. I also believe that it is important for users not to try to assemble the 'Myotis' as they would a commercially available trap; it requires some subtle differences in the approach. Using my wildlife survey students (Northern Melbourne Institute of TAFE) as guinea pigs, (they had not previously erected a harp trap) I had them erect both the 'Myotis' and a commercially available trap. The response was positive for the 'Myotis' with regard to its ease of operation. Then again, they may have thought there were some extra marks in it for them if they gave me a positive reply.

I believe that the design features put into service to improve the ease of use for a single operator have been achieved and this alone is worthy of mention. Only time will tell whether the features designed to improve capture rates are successful or not.



The 'Myotis harp trap'.

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Standardising methods when using Anabat detectors

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Given the recent discussions aimed at creating a set of guidelines to standardise bat surveys, I would like to add a further dimension to ensuring standardisation when using Anabat detectors (Titley Electronics).

Tony Messina (Nevada Bat Technology) is a retired electronics engineer who in recent times has spent his retirement developing a range of bat orientated equipment, one being the simple bat detector. One of his more recent developments has been the *Bat Chirp Board*. Before I describe how I believe this unit can help us standardise acoustic surveys, some knowledge of how the unit operates is necessary. To do this I have summarised a description of the unit and how it operates from Tony's website (www.nevadabat.com). A full description of its operation can be downloaded in PDF format from the above website address.

"Though many who study bats work with ultrasound as a natural extension of their studies, the true nature of ultrasound is many times misunderstood. The concepts of standing waves, echo cancellation and enhancement, acoustic focus, and others, may be understood in terms of the physics, but not readily grasped in terms of practical environmental experiences. Given the opportunity to work with standardized and repeatable ultrasound signals in various situations, researchers can get a more intuitive feel for the strange characteristics ultrasound can exhibit. That is one of the ideas that led me to design the Bat Chirp Board. Another design objective was to develop a method for accurately setting the sensitivity of multiple bat detectors so that

they are comparable in terms of their detection range. By matching sensitivity thresholds, comparisons of the data collected with these bat detectors can be more meaningful, though environmental variations will still cause differences in their overall detection ranges.

The Bat Chirp uses a PIC microprocessor to digitally synthesize 3 different acoustic ultrasound reference signals.

The first signal is a simple 40 kHz continuous tone. The 40 kHz tone is very useful for searching for null spots in the transducer position of a bat detector set up.

The second signal is dual chirp that alternates between 40 kHz and 62 kHz. The dual chirp signal was designed to simplify matching the sensitivity thresholds on multiple frequency division detectors, such as the Anabat II.

The last signal is a synthetic bat call sequence, composed of variously timed chirps, intermixed with feeding-buzz-like sequences. This signal does a nice job of providing an artificial bat for demonstrating bat echolocation calls and their detection, as well as for testing bat call recording equipment with a repeatable bat-like call structure.

The 40k Hz output signal amplitude of all Bat Chirp Boards is preset to a standardized level when shipped, but can be easily readjusted in the field with a small screwdriver, or similar tool. A calibration mark on the level control facilitates resetting the output of the Bat Chirp back to standard”.

My suggestion as to how the *Bat Chirp Board* can be used to further standardize Anabat surveys is as follows:

If a detector/s sensitivity can be set at some uniform standard measurement each time a field survey is undertaken, then truly comparative studies are possible at any given time in the future providing environmental conditions such as humidity etc are similar. This is where I believe the *Bat Chirp Board* has a role.

For example, if a detector were documented as having its sensitivity levels set at 5 metres from the *Bat Chirp Board* at a given site/s, corresponding acoustic surveys could then be undertaken at this sensitivity level thus ensuring standardization. Furthermore, could there be potential at some future point in time to prescribe sensitivity levels based on forest type?

I would love to see the merits or otherwise of this topic discussed on our list server.

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Update from the Bat Box Project in Brisbane: A modified bat box design for Australian microbats

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The Project

Part of my PhD is to look into artificial roost habitat, such as bat boxes, for microbats in suburbia. This project is mainly to investigate the usage of bat boxes by microbats, to find suitable bat box designs and management practises for the future. With over 70 bat boxes installed in metropolitan Brisbane I have one of the larger bat box projects. Boxes are checked regularly, initially every 3 months, but now, due to a lack of volunteers, every 3-5 months. Four species were found in my boxes: *Nyctophilus gouldi*, *N. bifax*, *Scoteanax rueppellii* and a LBJ ("little brown job" as I could not get the tiny bat out of the box to identify it). This article shares the experience of my last two years and incorporates my own and other information as summarised in the 'Criteria for successful bat houses' which is attached to this article.

The Problems

When I started my project little information was available about suitable bat boxes for Australian climates and bat species. Available information was also often conflicting. I decided then to choose the English bat box design (Stebbings and Walsh, see photo), as used by the Friends of the Organ Pipes N.P. in Victoria. This decision was mainly done because this was the only reliable source of information at that time and the results in Victoria suggested that several microbat species are using the boxes frequently. Thanks to the presentations of Robert Bender and Robert Irvine at the Bat Conference in Tocal and their information afterwards I used similar box designs. I also incorporated some of the information (mainly installation and best location) from the "Bat House Builder's Handbook" from Bat Conservation International, but initially decided against their box design because I wanted to use boxes, which have been proven to attract Aussie bats. However what I did not know then was the problem we all encounter now: the infestation of bat boxes by ants.

Ants

During the last two years I have come more and more to the conclusion that the English bat box design is not suitable for this climate and conditions. I found (as my colleagues did in Victoria) that ants are a major threat to the box occupancy as they can fill up to 50% of my boxes, despite all the treatments I am using to keep them out (talcum powder inside the boxes and marine grease along the spacers). This helps to keep the infestation out for about a month or two, but with the humid conditions here in Queensland and the frequent rain the boxes are soon invaded by ants again. Due to the nature of this box design, ants can fill up the (12-18 mm) entrance slits easily and use the boxes as a safe and dry nest possibility. Not what I aimed for! I found at least five different ant species, which are favouring my boxes over their natural sites. As soon as I clean a box out, some of the bats move back in. But in many cases, I lost the battle and the ants recolonise the boxes quicker than the bats do.

Heat

Another problem the boxes face is the heat in summer. Contrary to the results from Victoria, I found more bats in winter than in summer. Even in regularly used boxes the bat colonies disappear as soon as it gets hot in Brisbane. I always check for bat droppings as well as this is a valuable method to record bat occupancy in between my bat box checks. Even their numbers drop during the hot months.

Conclusions

This all leads to the conclusion that the English bat box design is not suitable for this climate and I am now in favour of the Bat Conservation International bat box design. The BCI box is much larger, has an open bottom and contains several chambers.

Most bat boxes are built and installed by householders so we need to develop a design which is easy to install, easy to maintain and monitor, and suitable for our climate. I think the BCI box designs has all these points:

1. We need boxes which are free of too much maintenance:

Most household users of boxes don't want to climb 5 meters every month to clean out their boxes. (This is also a health and safety issue.)

2. Boxes should exclude unwanted guests:

Open bottom boxes will help to eliminate the problems of ant infestation and the use of ¾ inch roosting spaces reduces wasp use.

3. Boxes should be large enough to give bats enough space to move during different seasons:

Bigger boxes with plenty of chambers and air vents will help to reduce the heat stress on bats. Bats can move more freely between different chambers during the day and can choose the best spot according to the changing temperatures. Please refer to the "Criteria for successful Bat Houses" for more information.

4. Easy monitoring

Most household owners of a box want to observe their boxes for bat occupancy. The open bottom boxes have the advantage that one can check for bats inside the boxes by simply shining a strong torch into the chambers.

However this bat box design is not really suited for a box project such as mine, where capturing and identifying bats are important. Luckily I have the support of Tony Goodrich, who is volunteering frequently. Not only is he a great helper, but also he listens carefully to my problems and being a nest box builder himself he came up with some great ideas, we would like share (see the following article). There is now just one problem to be solved: bat droppings are a great way to tell if bats have been using a box or not (and how often). With an open bottom, droppings won't be collected and this information will be lost. On the other hand, enthusiastic box owners can check the BCI boxes regularly and report it back to the researchers.

I still think we have a long way to go until we understand the roost ecology (especially the artificial roost ecology) of microbats in Australia. By sharing information we might come to a more suitable bat box design for our microbats in the future. If you are thinking of building or buying a box, please try those boxes and incorporate the information I am enclosing (and get back to me with your information and results). At the moment Tony and I are trialing a few of the modified BCI bat boxes in the worst affected ant areas and we will keep you up-dated. The BCI Bat House Builder's Handbook is a real must for people who are interested to buy or build and install boxes as it provides useful information about box designs and installation. It contains several bat box designs so it is worthwhile checking it out (available over the Internet). Tony based the modified design on the smaller BCI box.

Hope you all have better luck with your boxes.



A Stebbings and Walsh design bat box. 170 mm H x 120 mm W x 98 mm D, 12-15mm bottom entrance slits. Photo by Monika Rhodes.

Criteria for Successful Bat Houses

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Excerpted and summarised from *The Bat House Builder's Handbook* (1993; 2001 printing), by Bat Conservation International, Inc. Source: <http://www.batcon.org/bhra/bhcritter.html>

The information incorporates Australian experiences and conditions. All additional text is written in italics. It is a summary of available literature and information, including my own research, information from various nest box builders in Australia, and international bat box research.

1. Design

All bat houses should be at least 2 feet tall, 14 inches or more wide and have a landing area extending below the entrance at least 3 to 6 inches (some ready-made houses feature recessed partitions that offer landing space inside). Taller and wider houses are even better. Most houses have one to four roosting chambers—the more the better. Roost partitions should be carefully spaced $\frac{3}{4}$ to 1 inch apart. All partitions and landing areas should be roughened. Wood surfaces can be scratched or grooved horizontally, at roughly $\frac{1}{2}$ inch intervals, or covered with durable plastic mesh ($\frac{1}{8}$ or $\frac{1}{4}$ inch mesh, available from companies such as Internet, Inc. at 1-800-328-8456). Include vents 6 inches from the bottom of all houses to be used where average July high temperatures are 85° F or above. Front vents are as long as a house is wide, side vents 6 inches tall by $\frac{1}{2}$ inch wide.

'Hollow Log Homes' have good success in attracting bats by putting fabric (e.g. old denim) into the boxes.

2. Construction

A combination of exterior plywood and cedar is best. Do not use pressure-treated wood. Any screws, hardware or staples used must be exterior grade or galvanized. To increase longevity, use screws rather than nails. Caulk all seams, especially around the roof.

The question whether to use plywood and/or wood cuts is hard to answer. The European and the US box designs contradict each other in this particular regard. In my experience, the type of wood might not be as important as making sure that all other criteria have been fulfilled first. People often build or purchase bat boxes without adequate instructions. A long-term study conducted by the North American Bat House Research Project (Bat Conservation International) found that less informed bat box owners were 10% more likely to use the smallest, least successful sizes.

3. Wood Treatment

For the exterior, apply three coats of exterior grade, water-based paint or stain. Available observations suggest that colour should be black where average high temperatures in July are less than 85° F, dark colours (such as dark brown or dark grey) where they are 85 to 95° F, medium colours where they are 95 to 100° F and white or light colours where they exceed 100° F. Much depends upon the amount of sun exposure; adjust to darker colours for less sun. For the interior, use two coats black, exterior grade, water-based stain. Apply stain after creating scratches or grooves or prior to stapling plastic mesh. Paint fills grooves, making them unusable.

In Brisbane: Boxes are more likely to overheat in summer, so a light colour is recommended. Unfortunately, this can be a problem during winter, as many bats seem not to hibernate in our subtropical conditions. In winter, it might be better to provide bat houses with darker paint and/or thicker walls.

4. Sun Exposure

Houses where high temperatures in July average 80° F or less, should receive at least 10 hours of sun; more is better. At least six hours of direct daily sun are recommended for all bat houses where daily high temperatures in July average less than 100° F. Full, all-day sun is often the most successful in all but the hottest climates.

In Australia, especially Brisbane, temperatures in summer can make bat boxes too hot. I found lower occupancy of bats in boxes during summer than during winter in Brisbane. Further studies have to be conducted in order to find a suitable Aussie summer bat box. It can be assumed though that careful consideration of bat box location and thicker walls will eliminate some of these concerns.

5. Habitat

Most nursery colonies of bats choose roosts within 1/4 mile of water, preferably a stream, river or lake. Greatest bat house success has been achieved in areas of diverse habitat, especially where there is a mixture of varied agricultural use and natural vegetation. Bat houses are most likely to succeed in regions where bats are already attempting to live in buildings.

6. Mounting

Bat houses should be mounted on poles or buildings. Houses mounted on trees or metal siding are seldom used. Wood or stone buildings with proper solar exposure are excellent choices, and locations under the eaves often have been successful. Mounting two bat houses back to back on poles is ideal.

Place houses 3/4 inch apart and cover both with a galvanised metal roof to protect the centre roosting space from rain. All bat houses should be mounted at least 12 feet above ground; 15 to 20 feet is better. Bat houses should not be lit by bright lights.

Northern hemisphere trees have a different shape with branches obstructing most of the trunk. In Australia tall, straight eucalypts provide suitable replacements for poles. Unfortunately boxes installed on tree trunks can heat up more easily during summer. Mounting more than one box on the same tree helps the bats to find the most suitable box during changing seasons. Boxes mounted on houses can avoid overheating in some circumstances and can also reduce other problems (see also below). Rachael Long, farm adviser in pest management from the University of California, has been trialling bat boxes for more than seven years. She found that boxes mounted on houses or other buildings were much more successful than boxes installed on poles. Regardless of continents and climate conditions, bat boxes should be mounted not lower than 5m from ground.

7. Protection from Predators

Houses mounted on sides of buildings or on metal poles provide the best protection from predators. Metal predator guards may be helpful, especially on wooden poles. Bat houses may be found more quickly if located along forest or water edges where bats tend to fly; however, they should be placed at least 20 to 25 feet from the nearest tree branches, wires or other potential perches for aerial predators.

8. Avoiding Uninvited Guests

Wasps can be a problem before bats fully occupy a house. Use of 3/4 inch roosting spaces reduces wasp use. If nests accumulate, they should be removed in late winter or early spring before either wasps or bats return. Open-bottom houses greatly reduce problems with birds, mice, squirrels or parasites, and guano does not accumulate inside.

*In Australia we have problems with wild European Honey Bees which can occupy boxes. Make sure you use 3/4 - 1 inch of roosting space to reduce bee use. European box designs are built with bottoms. However, they require regular cleaning and harbour more parasites than those with open bottoms. They also attract unwanted **ants**, which is the **biggest problem for us in Australia**. By choosing boxes without bottoms the ant problem can be solved.*

9. Timing

Bat houses can be installed at any time of the year, but are more likely to be used during their first summer if installed before the bats return in spring. When using bat houses in conjunction with excluding a colony from a building, install the bat houses at least two to six weeks before the actual eviction, if possible.

10. Importance of Local Experimentation

It is best to test for local needs before putting up more than three to six houses, especially comparing those of different darkness and sun exposure.

11. Number of Boxes per Site

Most bat box surveys found that the more boxes available in one area the more likely a bat colony will stay in this area. This is because bats tend to shift roosts on an almost daily basis and by providing many boxes, they are more likely to shift between the provided boxes rather than moving out of the area.

Useful literature and Internet sites:

- Tuttle, M. and Hensley D.L. (2000). The Bat House Builder's Handbook. Bat Conservation International: Austin, Texas.
- Stebbings, R.E. and Walsh, S.T. (1991). Bat boxes. A guide to the history, function, construction and use in the conservation of bats. The Bat Conservation Trust: London.
- Bat Conservation International: <http://www.batcon.org>
- Guidelines for house placements: <http://www.bugspray.com/catalog/bats/bat7.html>

Contact addresses of some nest box companies in SE Queensland (in alphabetical order):

- The Australian Nestbox Company: phone: 07 3857 1086, email: ozbox@bigpond.net.au
- Hollow Log Homes: phone: 07 5472 3142, email: info@hollowloghomes.com.au, website <http://www.hollowloghomes.com.au>
- Wildlife Homes: phone: 07 3878 2322, website: <http://wildlifehomes.com.au>



White-striped freetail bat, *Tadarida australis* (Photo by Luke Hogan and Monika Rhodes)

A modified bat box design for scientific purposes

Tony Goodrich

Wildlife Homes, PO Box 269, Kenmore, Qld 4069. Phone: 07 3878 2322.

Email: wildlifehomes@uqconnect.net Website: <http://wildlifehomes.com.au>

Towards the end of 2001, I began volunteering with Monika Rhodes on some of her field trips. Monika needed help to check some of her 70 bat boxes that make up part of her studies (I hold and carry the ladder). I already had an interest in wildlife nest boxes, and believe they can be used to tremendously benefit our native wildlife, particularly the small parrots, gliders, small possums, insectivorous bats and stingless native bees.

While helping Monika, she explained some of the problems she was experiencing, mostly to do with ants in the boxes. We talked about it and she mentioned a design from Bat Conservation International's *Bat House Builder's Handbook*. From the ideas in this book, I built a few boxes with the narrow chambers. The boxes have no bottoms, which we hope will solve the problem of ant colonisation.

On the next field trip I realised how difficult it was to catch bats if they were down a narrow chamber. I thought of a few design changes that would improve the functionality and make it easier to capture the bats. I redesigned it so that the bottom of the box could be closed off to stop the escape of waking bats. Also, the internal panels can be lifted out with the sleeping bats still attached and dropped straight into a bag for capture before they awake. Any bats that wake and move to avoid getting caught are now easier to catch as the internal panels are removed leaving no small crevices for the bats to hide in.

These boxes are now available from Wildlife Homes in Brisbane and can be sent economically anywhere in Australia. Check out <http://wildlifehomes.com.au> for more information. (*Advertisement: Tony has contributed to this Newsletter*).

References

Tuttle, M. and Hensley D.L. (2000). *The Bat House Builder's Handbook*. Bat Conservation International: Austin, Texas.



1. Air vents on the side of the box to help the bats find a regulated temperature that suits them.

2. The sliding panel used to close the bottom of the box is shown in place.



3. The removable internal panels have access holes about one third of the way up so bats can move between chambers without leaving the box and risk being predated. The faces of all the internal panels have been scored to enable the bats to get a hold.

All photos by Tony Goodrich.

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Draft protocol for working safely in confined spaces

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Introduction (by Kyle Armstrong)

Recent work for Hamersley Iron Pty Ltd and Biota Environmental Sciences Pty Ltd has given me many excellent opportunities to refine the way I perform field work in a safe manner. Such opportunities have included general and specific minesite inductions, specialised training for entry into confined spaces and atmospheric gas detection, vehicle training (as well as much on-the-job experience), various medical courses, rabies vaccinations, and training to be an Occupational Health and Safety Representative. With my new-found awareness, I can look back over my earlier years (of which fortunately there are not that many) and cringe at some of the things that I have done. Many companies, such as those above, allocate a significant amount of resources to safety. As a result, private companies often lead the way in providing a safe workplace for their employees and culture an ever-present awareness of safety.

By writing this article, I hope to make bat researchers and workers more aware of safety, in particular postgraduate students who might be under pressure to produce results within a limited timeframe, with limited support and within a system that might not provide the same opportunities for safety as private industry. Below is a draft protocol that my colleague Piers Higgs and I have developed for entering confined spaces based on our experiences and reading of the literature. In our experience, a confined space is usually a cave or similar, but for someone in the mining industry it might be a ditch, tank or other structure. Regardless of what it is exactly, under Australian Standard AS/NZS 2865:2001, certain procedures should be followed to ensure safe working in a confined space. These are required under Western Australian statute law (either the Occupational Safety and Health Act 1984 and Regulations 2001 or the Mines Safety and Inspection Act 1994 and Regulations 1995, depending on the situation).

The draft protocol also includes a section on human impacts on the caves and their biota. Working on vulnerable species such as *Rhinonictoris* and *Macroderma* has made me think about how much I might be disturbing the populations I am trying to protect ultimately. I think it is also important to be aware of the conservation efforts of others, which is why I have highlighted the minimal impact techniques advocated by the Australian Speleological Federation. The article is my personal working draft and guide only, and I am sure it could be improved in many areas. As they say in the business, safety is the responsibility of everyone, and it is presented for the purpose of increasing awareness only. If the reader decides to use this same protocol, an effort should be made to check and qualify the information provided, and adapt it for their own needs. Articles by Constantine (1970, 1988) are also an excellent start in background reading for this type of work.

The protocol

Purpose

This protocol should be consulted before conducting biological work in the following locations:

- Caves
- Mine adits

The underground structure should not be entered unless there is good reason to do so, appropriate authorisation has been granted and appropriate personal protective equipment (PPE) and safety procedures are in place. Disused mines should not be entered without first consulting with the leaseholder and the Department of Minerals and Petroleum Resources Mines Inspector. Entry may require the Mines Inspector to be present. Entry to Aboriginal sites should not be conducted without permission of the appropriate authority.

Potential Hazards

1. General field hazards
2. Falls, falling objects and collapse of the structure
3. Poor air quality
4. Dust
5. Histoplasmosis
6. Animal and insect bites
7. Human impacts on the cave, and the bats

1. General field hazards

There are many hazards encountered when working in the field, and cannot be dealt with fully in this protocol.

RISK MANAGEMENT FOR WORKING IN THE FIELD - GENERAL

- Vehicles should be well maintained and contain all the necessary recovery gear that might be needed for where you are going. Equipment can be hired if need be. Carry plenty of water. Heavy and larger items should be behind cargo barriers. Ensure at least one person, preferably all, have first aid training.
- Drive carefully on unsealed roads. There is no need for hurry - 80 km per hour should be a sufficient maximum on larger, straight roads, although you should drive to conditions on less well maintained tracks. If you start to nod off, stop, swap drivers, have sleep or a break.
- Carry a GPS, spare batteries and appropriate maps. GPS units can be handy for saving your tracks in and out of areas, and can be hired or borrowed. Cheap models are available e.g. Garmin GPS 76 models.
- Climbing should be avoided if possible. If you must, ensure that you have the appropriate safety gear, systems of work and PPE.
- Dangerous goods such as ethanol, liquid nitrogen and formalin need to be in appropriate containers, labelled appropriately and with the Material Safety Data Sheet on hand (an MSDS can be obtained from WorkSafe Australia or the suppliers of the chemicals). These chemicals cannot travel on aeroplanes, so freight them by road. Consult the courier and literature (e.g. Anon. 2002) for the correct methods for freighting. If you plan to drive with these chemicals in the car, beware of the dangers associated with each chemical and comply with any safety requirements first.
- Wear appropriate PPE: safety glasses (clear for at night), boots, long sleeves and pants, sunscreen. Beware of heat stress, keep drinking.
- Carry communications with you as appropriate: mobile phone, satellite phone (these can be hired, but are relatively cheap to buy, e.g. Telit Globalstar), two-way UHF radios (for when out of earshot, and for communicating with someone inside a cave), HF, VHF or CB radios. Car chargers, list of relevant phone numbers (incl. hospitals, police stations etc.), inform relevant people of location and estimated time of arrival, implement regular contact schedules and emergency backup procedures, carry out a Job Safety Analysis prior to the work being undertaken. Carry a small EPIRB when required (these are small and cheap, particularly the GME MT310 by Standard Communications Pty Ltd, Gladesville, NSW).

2. Falls, falling objects and collapse of the structure

Some caves are relatively complex, with chambers or tunnels either above or below the entrance height. Doline caves typically have vertical entrances. Stumbling, falling or slipping while climbing up to ledges or down to chambers may result in injury. Caves and mine adits may be relatively unstable. There is a risk of loose rocks or rubble falling from the ceiling. Total or partial collapse of the structure is also a risk.

RISK MANAGEMENT FOR UNSTABLE STRUCTURES

- Disused mines should not be entered without first consulting with the lease holder, the Department of Minerals and Petroleum Resources Mines Inspector, and seeking information on the structure of the mine. Entry may require the Mines Inspector to be present.

- Hard hats or caving helmets must be worn in mines and caves.
- Caves and mines should be inspected before entry for unstable structure, and should not be entered if deemed unstable.
- Dolines and caves on precipitous slopes should not be entered without assistance from experienced personnel with the appropriate climbing equipment. The Australian Standards AS/NZS 1891.3:1997 and AS/NZS 1891.4:2000 should be consulted.

3. Poor air quality

Dwyer and Hamilton-Smith (1965) reported that some Australian caves were impenetrable by humans at certain seasons due to the concentration of carbon dioxide (CO₂). 'Foul air' is a life threatening hazard that can be encountered in caves with relatively still atmospheres. Foul air is a cave atmosphere that has a noticeable abnormal physiological effect on humans. In limestone caves, foul air can be defined as containing more than 0.5% carbon dioxide (CO₂) and/or lower than 18% oxygen (O₂) by volume. Other gases may also be present in foul air such as methane (CH₄), ammonia (NH₃), hydrogen sulfide (H₂S) and carbon monoxide (CO). These gases are generally rare in limestone caves (Smith 1998). Caves in the Pilbara are not often in limestone (but might be present in dolomite), are generally shallow and well flushed (Biota 2001, 2002), but occasionally one is encountered that contains air of questionable quality (no data available; K.N. Armstrong pers. obs.). Bats should not be used as indicators of air quality as they are able to tolerate atmospheres unsuitable for humans (e.g. Constantine 1970, 1988).

CO₂ is derived from a number of sources (James 1977), and air quality may change according to several factors (e.g. rainfall; Smith 1997, 1998). Since CO₂ has no smell or visual sign, the first indicators of elevated CO₂ are increased pulse and breathing rate. Higher concentrations lead to clumsiness, severe headaches, dizziness and even death. The effects of long term exposure include calcium deposition in body tissue (between 0.5 – 1% CO₂), and also pH and ion imbalances that lead to acidemia and hypercapnia (between 1 – 2%; see Smith 1997, 1998 for further details). The generally accepted physiological effects of CO₂ at various concentrations (in %) are as follows (quoted directly from Smith 1998):

0.03%	Nothing happens as this is the normal carbon dioxide concentration in air.
0.5%	Lung ventilation increases by 5%. See section below on Australian Standards.
2.0%	Lung ventilation increases by 50%, headache after several hours exposure. Accumulation of carbon dioxide in the body after prolonged breathing of air containing around 2% or greater will disturb body function by causing the tissue fluids to become too acidic. This will result in loss of energy and feeling run-down even after leaving the cave. It may take the person up to several days in a good environment for the body metabolism to return to normal.
3.0%	Lung ventilation increases by 100%, panting after exertion. Symptoms may include headaches, dizziness and possible vision disturbance such as speckled stars.
5 - 10%	Violent panting and fatigue to the point of exhaustion merely from respiration & severe headache. Prolonged exposure at 5% could result in irreversible effects to health. Prolonged exposure at > 6% could result in unconsciousness and death.
10 - 15%	Intolerable panting, severe headaches and rapid exhaustion. Exposure for a few minutes will result in unconsciousness and suffocation without warning.
25 - 30%	Extremely high concentrations will cause coma and convulsions within one minute of exposure. Certain death.

Reductions in the concentration of O₂ **may or may not** accompany changes in CO₂ concentration. The symptoms (at sea level) of reduced O₂ concentration are as follows (quoted directly from Smith 1998):

Reduced from 21 to 14%	First perceptible signs with increased rate and volume of breathing, accelerated pulse rate and diminished ability to maintain attention. See section below on Australian Standards.
Between 14 to 10%	Consciousness continues, but judgment becomes faulty. Rapid fatigue following exertion. Emotions affected, in particular ill temper is easily aroused.
10 to 6%	Can cause nausea and vomiting. Loss of ability to perform any vigorous movement or even move at all. Often the victim may not be aware that anything is wrong until collapsing and being unable to walk or crawl. This is followed by unconsciousness and death. Even if resuscitation is possible, there may be permanent brain damage.
Below 6%	Gasping breath. Convulsive movements may occur. Breathing stops, but heart may continue beating for a few minutes. Ultimately, death.

Three standards of exposure to atmospheric contaminants are defined in the Worksafe Australia Standard NOHSC:1003. These are:

- *Time weighted average (TWA)*: based on a time weighted average concentration of that substance for an eight hour working day.
- *Short Term Exposure Limit (STEL)*: average concentrations of substances over a period of 15 minutes; developed for substances where there is evidence that adverse health effects could occur such as intolerable irritation, chronic irreversible tissue damage and narcosis to an extent that could lead to accidents.
- *Peak Limitation*: a maximum or peak concentration of a substance to which workers may be exposed.

The 'Exposure standards for atmospheric contaminants in the occupational environment' (Anon. 1991) gives the above figures for numerous contaminants. These are legal limits, **not safe levels** and gas detector warnings should be adjusted accordingly. The table below quotes figures from Anon. (1991) for several relevant gasses. In addition, Australian Standard AS/NZS 2865-2001 states that the minimum percentage of oxygen content in air should be 19.5%. Percentages above 23.5% are also considered to be an atmospheric hazard (causes things to burn more violently). Further general information can be found in Constantine (1970, 1988).

Substance	TWA	STEL
Ammonia (NH ₃)	25 ppm	35 ppm
Carbon Dioxide (CO ₂)	5000 ppm	30 000 ppm
Carbon Monoxide (CO)	30 ppm	-
Hydrogen Sulphide (H ₂ S)	10 ppm	15 ppm
Methane (CH ₄)	<i>Simple asphyxiant, explosive between 5-15% conc</i>	
Oxygen (O ₂)	<i>Min: 19.5%, Max 23.5% (AS/NZS 2865:2001)</i>	
Sulfur Dioxide (SO ₂)	2 ppm	5 ppm

RISK MANAGEMENT FOR POOR AIR QUALITY

- Atmospheric testing and monitoring should be carried out consistent with the hazards identified and the risk assessment. It is highly recommended that a calibrated electronic CO₂ detector (e.g. YES 206 Falcon) is used to monitor cave atmospheres for elevated CO₂. Other gases (oxygen, flammables and toxics) should also be monitored with electronic gas detectors (e.g. a GasAlertMax Model GAMAX2-4-AU from BW Technologies); available for hire from some suppliers. Appropriate training in the use of gas detectors should have been undertaken and the user should be familiar with the equipment.

- Prior to entry, the atmosphere in a confined space must have a safe oxygen level, atmospheric contaminants levels lower than exposure standards and flammable gas concentrations lower than 5% of the lower explosive limit. The cave atmosphere should be monitored constantly, starting from outside the entrance, and giving sufficient time for the detector to respond. Time spent underground should be minimised.
- One person should remain outside for emergency backup. This person should not enter the cave in the event of an emergency. There should be a rescue plan that can be implemented should a problem occur. The person entering the cave should be on the end of a rope for communications if required (by a 'tug' system), and to enable a rescue team to find the person in the case of injury. Person outside of the cave should wear gloves when handling the rope (for hygiene and to prevent rope burn).
- Radio communication with UHF radios between the caver and the backup person should be maintained at predetermined intervals. If the caver gets no response from the backup person outside, they should return to the point where communication was last achieved and discuss a course of action (e.g. withdrawing, or continuing but providing a time when the caver will return to that spot). It might be possible to maintain communications through a 'tug' system on a rope. UHF radios may not be intrinsically safe and may be an ignition source in a flammable atmosphere.
- As a general rule, persons should exit the structure without delay if they feel that the air is excessively warm and humid, if a strong odour is present (particularly if a 'rotten egg' smell is present, indicating H₂S), and especially if they feel symptoms such as sleepiness, shortness of breath, or excessive body temperature/perspiration. A sudden high burst of H₂S will 'deaden' your nasal receptors to the gas so you will not be able to smell it. Smell alone should not be used as an indicator of H₂S. If used correctly, electronic detectors should warn of atmospheric dangers long before they become a hazard and before legally allowed limits are exceeded.
- Tests for low oxygen such as the 'naked flame test', which involves the combustion of a cigarette lighter or match (Smith 1998), should not be used as an alternative to the proper equipment and procedures. A naked flame test will not indicate CO₂ concentration (Smith 1997). Elevated CO₂ concentration in caves usually, but not always, corresponds to a decrease in O₂ concentration. Elevated CO₂ is usually the danger in caves rather than depleted O₂ and the human body will respond to elevated CO₂ in the presence of sufficient O₂. Increased breathing rate should be taken as a sign of elevated CO₂ and the underground structure should be exited without delay (Smith 1997, 1998). The naked flame test could also ignite a flammable atmosphere.

4. Dust

The floors of caves and mines are usually very dusty. Since many Pilbara caves have relatively low ceilings, it is often necessary to enter them by crawling, thus bringing persons in closer contact to the dusty cave floor. This dust may irritate respiratory systems. Dust may also contain other hazards (see Histoplasmosis section below), and there is also the risk of asbestos in some mines or caves.

RISK MANAGEMENT FOR DUST

- Asbestos mines should not be entered or approached under any circumstances.
- A P1 (at least - P3 is better) dust mask must be worn. The mask must be well maintained, clean and with fresh filters and pre-filters. Fireman breathing apparatus may be used if they are available.
- Overalls should be worn over normal work clothing, especially if low ceiling height requires crawling. Overalls should be removed after exiting the structure to prevent breathing dust that accumulates on clothing. Clothing should then be placed in a bag for washing, or until it is used again that same day. The mask should be left on when removing and putting back on dusty clothing, and other exposed surfaces should be wiped. Care should be taken when washing down dusty skin, masks and clothing to avoid breathing accumulated dust.
- Clear safety glasses are recommended but since they often become foggy in caves, they may be more of a hindrance.

5. Histoplasmosis

Histoplasma capsulatum is a fungus present in soil, particularly soil with a high content of bird or bat droppings. Histoplasmosis is a fungal infection which can affect the whole body. Infection results from the inhalation of an aerosol of soil, dust or guano which contains spores of the fungus. The degree of infection to humans is dependent on the immune status of the individual and the degree of exposure to spores. While Histoplasmosis is rare in Australia (on average one reported case per year), there have been some cases in eastern Australia which involved severe debilitation (Smith 1994).

The fungus appears to propagate in the presence of bat guano, particularly when dry and powdery and in a relatively hot microclimate. Caves with wet or damp guano have a much lower risk of causing Histoplasmosis. The chance of infection is unknown. People wearing respirators designed for poisonous pesticide sprays have still contracted the disease, yet on other occasions people entering known sites of infection without respiratory devices were not infected (Smith 1994).

Some infected people have no symptoms, however most of the time the disease typically causes a cough, with or without a fever. Other symptoms include diarrhoea and rashes, and in children or immunocompromised people, the fungus can spread throughout the body, resulting in an enlarged liver, spleen and/or lymph nodes and a central nervous system infection. Long term effects range from mild symptoms, which may become evident 2-3 weeks after exposure, to severe respiratory insufficiency and death (Smith 1994; D. Zerr 2000 at <http://www.healthanswers.com.sg>). The disease may recur later in life.

RISK MANAGEMENT FOR HISTOPLASMOSIS

- Known sites of Histoplasmosis exposure should be avoided, however none are currently known from WA.
- The same procedures for avoiding dust inhalation and ingestion should be followed here. P1 (P3 is better) respirators should be worn in all caves and underground mines. The mask should be well fitted. Contaminated clothing and hair should be cleaned before removal of the mask. Ropes should be cleaned periodically and stored in a dust proof bag. Gloves to be worn when handling the rope for hygiene.
- It must be remembered that these procedures may reduce but not eliminate the chance of contracting the disease.
- People entering caves with dry bat guano and elevated temperatures should be aware of the possibility of contracting Histoplasmosis and monitor for symptoms. If any symptoms of Histoplasmosis are identified after cave visitation, a doctor should be consulted without delay. Special reference should be made to the possibility of Histoplasmosis and that it has symptoms similar to tuberculosis.

6. Animal and insect bites

A number of animal species frequently inhabit caves. There is a risk of injury from some of these:

- Snakes which commonly inhabit caves include non-venomous pythons and venomous snakes which can cause fatalities or massive allergic reactions.
- Several species of large spider are observed commonly in caves. These can inflict a painful bite which may also result in allergic reactions or infections. Ticks can be present at cave entrances or in the cave.
- Bats will not bite unless handled. Bats may carry zoonoses such as paramyxoviruses, which can be transmitted by bites or scratches (and by aerosols in rare cases). These types of viruses can jump from animals to humans and, being part of the same family as rabies, can cause similar symptoms and death. Very little is known or available about the frequency of various potential zoonoses (including those other than paramyxoviruses) carried by Western Australian bats.
- Kangaroos will rush for the cave entrance if disturbed while inside. Dingoes may show aggression if cornered in a cave.

RISK MANAGEMENT FOR ANIMAL BITES

- A 'hikers first aid kit' (St John Ambulance) containing extra pressure bandages should be carried at all times. At least one person present should have a current St John Ambulance Senior First Aid certificate so that correct procedures are followed in the instance of animal bites (e.g. White 2001). A more comprehensive first aid kit should be in the vehicle.
- Tetanus and rabies vaccinations should be current.
- A satellite telephone, HF radio or mobile phone should be available on site for emergencies. If the work is being conducted away from the vehicle, an EPIRB device may also be necessary. The person with whom radio schedules are organised should be aware of the work location (give them a GPS location).
- Bats should not be handled unless research is being conducted. Researchers handling bats must have had rabies vaccinations and have maintained a safe titre. Gloves should be worn to minimise the risk of being bitten or scratched and appropriate hygiene should be observed to prevent ingestion of viruses (e.g. hands, equipment, clothing should be washed after handling bats). If a bite or scratch is received, the wound should be washed extremely thoroughly for several minutes and an antiseptic applied. A rabies vaccination should be given as soon as possible (within a day or two). If the bite was sustained by a person without rabies vaccination (i.e. an 'accidental bite'), the person should be vaccinated as soon as possible. In the case of any bite or scratch, the Health Department at Rheola Street, West Perth (phone 9321 1312) or IT Medical (phone 9386 4511) should be contacted for advice.
- The subject of bats and zoonoses is dealt with in more detail in another protocol currently under construction. Methods for avoiding bites and scratches may include coating parts of gloves with fine metal mesh (such as Termi-mesh™) or anaesthetising bats for a short period while they are removed from nets (e.g. with the technique of Anstee and Needham 1996). **Room for discussion here!**
- Be mindful of rapidly exiting kangaroos and dingoes when entering underground structures.

7. Human impacts on the cave, and the bats

The impact of human visitors on cave habitats, cave fauna and aboriginal sites needs to be considered.

RISK MANAGEMENT FOR HUMAN IMPACTS

- Entry to Aboriginal sites should not be conducted without permission of the appropriate authority.
- People entering caves should be aware of the Minimum Impact Caving Code (1995) of the Australian Speleological Federation available at http://wasg.iinet.net.au/mic_v4.html. The code advocates that care be taken in caves to minimise any impact that a visit may have. This includes care not to trample sensitive areas that constitute fauna habitat but may also be extended to that potentially useful for future scientific research. Material should not be removed from caves unless necessary.
- Bats should only be captured, and roost sites only entered if the data would prove directly valuable and necessary to the core project. Some bat species will vacate and relocate after entry into roosts or after simply capturing them at the roost entrance. This has been reported on in a previous ABS Newsletter (Richards and Martin 2001). If bats relocate temporarily to suboptimal roosts, it might result in unnecessary mortality. Risks associated with disturbance during breeding are obviously greater and need to be considered.
- Consider the projects of others: offer to collect data or material for other researchers (if appropriate) to minimise the amount of collecting that needs to be done on any one species. Consider collecting genetic material from species that have been confidently identified (see ABS Newsletter 18).

PPE and safety equipment checklist

- P1 - P3 dust mask with fresh filters and prefilters
- Caving helmet, knee pads, gloves, steel capped boots
- Overalls over normal work clothing
- First aid kit in the vehicle, 'Hikers first aid kit' on site which includes pressure bandages for snake or other bites
- Torches with adequate batteries and a spare globe. LED torches are a good backup.
- GPS, EPIRB, UHF radios, satellite telephone, spare batteries, car and 240V chargers
- Gas detectors, spare batteries
- Recovery gear (harness, rope, etc as required)
- Soap and water/wipes for washing, aerogard for ticks
- Drinking water
- Safety documentation, list of phone numbers etc.
- Research gear

Check out these websites:

<http://www.nohsc.gov.au/>

<http://www.standards.com.au/>

<http://www.safetyline.wa.gov.au/>

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Preparing to enter a Pilbara cave (*photo by Nev Havelberg*).

^v^ ^v^ ^v^

– Reports and Viewpoints –

Another squawk from The Battered Old Bent Bat - a squawk that almost wasn't

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"A squawk that almost wasn't" because, as many of you know, a couple of days before Kyle's original deadline I was seriously assaulted by a couple of teenagers (15 and 17) as I rode my pushbike out of Nimbin. That will teach me not to wave my finger in the air. As I emailed friends shortly afterwards, "**Now I know how a flying-fox feels when threatened by berserk humanoids**" - and this pair were berserk. Not an enjoyable experience, but one learns something new every day from life's little surprises - in this case relevant to my musings on pain and suffering in the last ABS newsletter - "**One doesn't feel pain when one is having the sh*t beaten out of one**". Later, the wounds hurt, particularly when healing, but the main pain is the mental and spiritual - the insecurity, the disquiet, the anxiety. Nevertheless TBTOBB is recovering well, and the other day took his first pushbike ride into Nimbin since the event: "**Nil bastardum carborundum**", as they say - and my thanks to all my friends and family for support.

Remarkably perhaps, I don't think that I am any more bitter and twisted than before, though you may think so from the extent of my whinges and tone of comments below. So first some good news. My friend and colleague **Allen McIlwee**, he who put his life on the line, and his PhD at risk, for flying-foxes was earlier this year awarded his PhD - and with no need for revisions and some very nice comments from the examiners. It couldn't happen to a nicer bloke. Congratulations Allen and best wishes for the future. Also, the two papers that Allen and I wrote on flying-fox population dynamics are now out.

[McIlwee, A.P. and Martin, L. (2002) On the intrinsic capacity for increase of Australian flying foxes (*Pteropus spp.*, Megachiroptera). *Australian Zoologist* **32**, 76-100. Martin, L. and McIlwee, A.P. (2002) The reproductive biology and intrinsic capacity for increase of the Grey-headed Flying-fox *Pteropus poliocephalus* (Megachiroptera), and the implications of culling. In *Managing the Grey-headed Flying-fox as a Threatened Species in NSW*, ed. P. Eby and D. Lunney, Royal Zoological Society of NSW, pp. 91-108.]

Over the last 2 days, even more new Nimbin experiences for TOBB, courtesy of Robyn Gough. Saturday - disentangled a dead female Black from a 1cm mesh plastic net draped loosely over a small apple tree. She had become entangled during the night. I removed her at 10.30AM. What a horrible death, what horrible damage to the fingers - with smashed bones protruding at all angles. What pain! Sunday - gathered up a male Black, already removed from a barbed wire fence. Having seen Robyn & John on TV with a barbed-wire-traumatised FF that had to be euthanased, I went with some trepidation. However the injuries were minimal and restricted to the wing membranes, and the feisty beast chewed and swallowed bananas with great enthusiasm. So, after consultation with Robyn, I released him late PM and off he flew, strongly - across the paddocks **away** from the big fig-tree. Yes folks, this was the first time I have done what so many carers have been doing for so many years - actually gone out and dealt with dead and traumatised flying-foxes.

Heat deaths of FFs In January/ February 2002 there were a number of incidents of large numbers of flying-foxes dying in camps from heat stress, due to extremely high temperatures. I have had various brief reports of numbers and species involved, but I am particularly indebted to Dave Pinson & Sue McArthur (davepinson@iprimus.com.au) for the following. *Dear Len, in reference to the ABS submission on heatwave 2002 - you may find this useful. My partner Sue wrote this for a featured animal story on our website (Tweed Valley Wildlife Carers). It is an emotive account of the rescue of 92 bubs from Dallis Park in the Tweed Valley - most of whom owe a debt to Jackie Maisey. @ 2000 FF's died that day, which is somewhere in the region of 5 -10% of the total colony. Nearly all Blacks from a split Black/GHFF colony. Please feel free to use any info you want. Dave Pinson & Sue McArthur - FF co-ordinators TVWC: go to <http://tvwc.netfirms.com> click on the "featured animal" button, and look for the Dallis Park story.* I have no problem with the "emotive" bit and suspect that many of us frequently weep at what humankind is doing to the planet and each other. But in relation to the heat deaths, **I DO HOPE THAT SOMEONE WILL WRITE UP AND PUBLISH A**

DETAILED DEFINITIVE REPORT, IDEALLY CO-ORDINATING DATA FROM THE VARIOUS CAMPS AND CARER GROUPS THAT WERE INVOLVED. I offer my help in this, and note that it could be done via the FFICN (Flying-fox Information and Conservation Network) cyberchannel which is passed through my e-mail address (see above). I emphasise the importance of these data in relation to the question of what factors regulate the size of FF populations - a subject dealt with below.

There have been a number of significant FF heat-induced-death-events in recent years. However, there is nothing new in this. Ratcliffe (1931) describes such events in his classic study. But there is an even earlier account of such heat-induced deaths (misquoted in the Sydney Morning Herald, 16-17/11/02, p9, as, "Watkin Tench recorded drought in the colony of NSW as early as 1793, when bats dropped dead from the trees"). So, here is the actual description from **Watkin Tench (1789) in "Two Classic Tales of Australian Exploration: 1788 by Watkin Tench; Life and Adventures by John Nicol"**. Ed/intro by Tim Flannery, Text Publishing, Melbourne, 2000, pp.232-234. [NB. I have decimalised Tench's vulgar fractions (LM)].

"The thermometer has been known to alter at Rose Hill [near Sydney], in the course of nine hours, more than 50°; standing a little before sunrise at 50° and between one and two at more than 100°. To convey an idea of the climate in summer, I shall transcribe from my meteorological journal, accounts of... days which were the hottest we ever suffered under at Sydney.

December 27th 1790. Wind NNW; it felt like the blast of a heated oven, and in proportion as it increased the heat was found to be more intense, the sky hazy, the sun gleaming through at intervals.

At 9 a.m.	85°
At noon	104°
Half past twelve	107.5°
From 1 p.m. until 20 minutes past two	108.5°
At 20 minutes past two	109°
At sunset	89°
At 11 p.m.	78.5°

By a large thermometer made by Ramsden, and graduated on Fahrenheit's scale

*My observations on this extreme heat..., were that of all animals, man seemed to bear it best... But even this heat was judged to be far exceeded in the latter end of the following February, when the north-west wind again set in, and blew with great violence for three days. At Sydney, it fell short by one degree of what I have just recorded: but at Rose Hill, it was allowed, by every person, to surpass all that they had before felt, either there or in any other part of the world. Unluckily they had no thermometer to ascertain its precise height. It must, however, have been intense, from the effects it produced. An immense flight of bats[†] driven before the wind, covered all the trees around the settlement, whence they every moment dropped dead or in a dying state, unable longer to endure the burning state of the atmosphere[†]. Nor did the parroquettes, though tropical birds, bear it better^{††}. The ground was strewn with them in the same condition as the bats... [†] Flying-foxes, Pteropus. ^{††} Parrakeets". One first assumes that the bats were *Pteropus poliocephalus*. But, were they?*

The "Moving" of FF camps As you know I have previously expressed strong reservations about this practice - one which appears to be increasing in frequency, if this past year is anything to go by. Moreover, I have seen no answers to questions I raised in the last ABS newsletter regarding:

- (1) the criteria whereby Qld Parks and Wildlife Service (QPWS) give permission for such "movement";
- (2) ABS policy on this subject! Does it have one?

Maclean first got the issue into the public eye, but the one that really made the headlines was the Melbourne Botanic Gardens, and one suspects that the actions of the director of said gardens and of the Victorian Environment Minister had a significant effect on public attitudes to FF camps. It is interesting, therefore, to read the comments of a person whose primary interest is trees, their growth, propagation and health and who is an authority on such. Namely Nan Nicholson of N. & H. Nicholson, authors of the (to date) 5 volume set of beautifully illustrated books of **Australian Rainforest Plants** (Terania Rainforest Publishing, The Channon, NSW 2480). (Nan first gave me this information in conversation, and I asked her for a written account that I could quote in ABS - that is what is quoted, in full below) Nan (personal communication 2002) writes, "**Melbourne Botanic Gardens - what is the fuss about?** I am a rainforest botanist and a flying-fox carer so when I visited the Melbourne Botanic Gardens last November (2001), I wanted to see for myself what damage the resident GHFFs were doing. I was just gobsmacked at how such anti-bat hysteria could have been generated from so little evidence. There was some

minor tree damage from roosting bats but nothing catastrophic and certainly nothing warranting execution of the perpetrators. Even smell and path mess were not very noticeable. I asked one of the gardeners if this level of bat horrors was as bad as it gets and he said yes, with a smirk of apology.

The warning signs indicating that approaching the bats might be life-threatening, were clearly intended to cause fear and loathing amongst visitors, but the people I observed were just plain interested in a fascinating life-form. My brief visit confirmed what I had suspected - that Melbourne Botanic Gardens needs to learn from Sydney Botanic Gardens and start treating their flying-foxes as assets and visitor-attractors. I found it hilarious that a large area set aside within a city for the cultivation of naturalness should not be able to accommodate some self-directed natural beings, particularly ones that are nationally threatened.

Nan's account tallies with the impression I gained a couple of years previously regarding the extent of the damage, and confirms my view of the MBG director acting like a refugee from an alien culture! On the general issue of "managing" flying-fox camps, please read Hall, L.S. (2002) Management of flying-fox camps: what have we learnt in the last twenty five years? In, *Managing the Grey-headed Flying-fox as a Threatened Species in NSW*, ed. P. Eby and D. Lunney, Royal Zoological Society of NSW, pp. 91-108.

Probably the most controversial and painful example of forcible removal of flying-foxes has been that in Charters Towers QLD, which involved first Little-reds with young, and later, Blacks with young, and the saga is continuing to this day (18/11/02). There was great anti-FF emotion in the town, exacerbated by: local press treatment, inaccurate letters to the press relating to disease, the gung-ho anti-bat involvement of a local politician with 3-4 inch headlines, and so on. Yes, I believe that the townspeople **did** have legitimate concerns, but the way in which the matter was handled (**and continues to be handled!**) leaves much to be desired. But for **one** pro-FF person on the spot, gawd knows what might have happened. Also, both the QPWS-approved actions and the illegal ones led to a significant number of injuries and deaths of adult bats as well as deaths of dependent young. The RSPCA were called in, but I had no response from them. I personally question the competence and intestinal fortitude of the RSPCA. As one who spent much time & energy *pro bono* for an RSPCA prosecution and never had a dicky bird in response I am not impressed by their communicative abilities.

An item on Charters Towers in the *Sunday Mail* had a picture of 5 (Black ?) FFs in a tree, captioned, "**DRIVEN BATTY: Charters Towers residents avoid disease-spreading flying foxes**".

Harassment of a FF camp near Mareeba made *The Australian* (01/10/02) with the headline, "**Dawn raid sends bats off with a bang**". Main picture shows flying-foxes outlined against the moon; side picture shows bloke with a gun; caption is, "*Driven batty: Flying foxes disperse at Granite Creek in Mareeba, Queensland, after council worker Franz Moser, below, fires an explosive cartridge*". The text goes: "*It was just on daybreak when the shots rang out, scattering the startled groups of flying foxes in all directions. Having failed earlier in the month to smoke them out of town, council workers at Granite Creek in Mareeba, west of Cairns, have now turned to explosive devices to scare away the thousands of Little Red Flying Foxes that have moved in to the irritation of locals.*

"The only people who say we should ignore them or tolerate them are those who don't have to live with them," Mayor Mick Borzi said. "There's great concern about the odour, the risk of disease and the noise when they are roosting in a residential area." Yesterday's dawn relocation involved four council workers firing Bird Frite cartridges into the air - an explosive device that emits a loud bang like a firework, but which is designed to be harmless to bats. Mr Borzi said the operation had successfully moved about two-thirds of the flying-foxes. It had cost \$30,000 to evict them from town last year, and Mr Borzi anticipated it would be "very expensive" for the council to move them again this year. "But we've got to look after the people that live in the area. They must always come first." The problem is they will have to do it all over again before long. "It moves them off for a while, but then they come back a few months later unfortunately," Mr Borzi said.

Queensland Parks & Wildlife Service district manager Andrew Millerd said the relocation process would only be successful if it continued for a significant time. "They have only recently moved back into the area, so we were trying to undertake this program before it became a [sic] established, habitual site for the flying-foxes," Mr Millerd said. Relocating them can cause some deaths, especially when the bats are breeding, but Mr Millerd pointed out that this season held the least risk of significant casualties. "There's nothing particularly special about the site that means they have to be there," he said. "There are other opportunities that would afford them the level of protection that they want."

Interesting text. Now, what *is* QPWS policy on moving FF camps? Apparently there is nothing on their web-page. However, FF carers from Central QLD received a copy which I circulated on the FFICN network. It is now included on said carer's web page: <http://home.iprimus.com.au/gonbatty>

So, peruse carefully. But to return to Charters Towers, Jon Luly of JCU sent me a long report on the "public" meeting in CT, dealing with the bats. This was circulated to the FFICN network, but I can send it out to any one interested. However, notable among Jon's comments is: *"There was recognition of a need for research (particularly into methods of "moving" bats - for some reason pyrethrins were considered a splendid deterrent; the revelation that most of the fogs used to date contained diesel was not greeted happily by [a representative] from Qld health and shock by myself). Immediate suggestions were made that JCU should do "The Research". Sadly the mechanics of research were not fully understood."*

I echo Jon's shock, and repeat my concern that projects such as routine use of diesel smokes on FFs, and the proposal to cull GHFFs in MBG never seem to need the approval of any sort of **Animal Ethics Committee**. Inhalation of diesel fumes can have all sorts of long-term effects on respiratory function. **What sort of research was used to justify such usage of diesel? What is ABS policy on such usage and such policies?**

Well, **they** might only use pyrethrins and diesel smoke in Charters Towers, but up in the NT they use the ultimate high tech stuff to "entice" (yes, "entice") the bats to move. *"In the Northern Territory's Top End, parks and wildlife rangers are going to great lengths to stop bats setting up a permanent home at the Mataranka thermal pools. Helicopters are being used to scare flying-foxes away from the area, forcing them to relocate about one kilometre from the tourist spot. The chief district ranger, Eddie Webber, says the helicopter mustering is effective. "The noise and the down draft of the rotors will entice the flying-foxes to get up and move and they move en masse, like just a solid sheet of flying-foxes move along and we do use bird flight to encourage those in the more persistent groups that won't move on, so it only takes about an hour at a time [to] relocate them down to where we think is appropriate for them," he said. *ABC News, 9/9/02.*

I note that the newly published **NSW NPWS booklet on Threatened Species lists as "threats" to Black and Grey-headed flying-foxes, "Deliberate destruction and disturbance of flying-foxes including shooting of individuals and harassment and attempted relocation of camps near urban areas."**

So, why am I making so much fuss about the increasingly Australia-wide fashion for moving FF camps - after all, they've got plenty of other places to use - so they can quite rightly b*gger off and stop bothering us, and we'll "help" them move if they don't.

Well, those knowledgeable in the theoretical aspects of population ecology, on reading the McIlwee-Martin papers on FF population dynamics, may note that FFs appear to be **K-strategists as opposed to r-strategists**, on the basis that they have a low reproductive rate with late sexual maturation, long life and a large investment in parental care. Without going into too much detail, or beyond my level of expertise, the **r-strategy** involves maximising *r* (the intrinsic rate of increase of the species), and is associated with species living in relatively "unsaturated" environments where competition and population density-dependent effects are minimal. In contrast, **K-strategy** involves maximising *K* (the carrying capacity of the environment), and is associated with 'saturated' ecosystems where density is high and competition for resources is intense. *"At ecological saturation, the optimal strategy channels all possible resources into survival and production of a few offspring..."* (McNaughton, S.J. 1975. *r*- and *K*selection in *Typha*. *Am. Nat.* **109**, 251-263.).

The distinctions are not straightforward. Thus Stephen J. Gould. (1977, *Ontogeny and Phylogeny*, The Belknap Press, Harvard University, pp. 290-291), makes some interesting points in discussing how natural selection might favour one or other strategy, *"In simplest terms, r selection will predominate when the density-independent component of natural selection is in control - when populations can expand with no negative feedback on growth rate by dwindling resources. K selection will prevail when the density-dependent component predominates - when increase in one genotype must be at the expense of the other."* But he then goes on, *"Situations favoring r selection might include large, frequent and unpredictable fluctuations, frequent catastrophic mortality; superabundant resources & lack of 'crowding'. K environments tend to be crowded, stable, and benign"*.

So which scenario would FFs fit into? The question of the mechanisms whereby population size is regulated has been with me for many years. As a student I became familiar with the "density-

independent" theories of Andrewartha and Birch, yet at the same time was much enamoured by Nicholson's liver-and-blow-fly experiments as paradigms of density-dependent regulation. Half a century later I ponder the regulation of FF populations. The question of density-dependent regulators (DDR) is raised briefly in the Martin-McIlwee papers but not really discussed. Possible DDRs include: predation (by crocodiles, pythons, raptors, owls), with predation pressure increasing as FF numbers increase; increasing competition for food supplies (native fruits and blossom), which diminish as FF numbers increase; increased mortality from disease/ parasites with increased population density (no major epidemics have been observed); decreased reproductive success with increasing numbers - but why? On the face of it, none of these putative DDRs seem particularly plausible, and one is left with population regulation by random-but-regular catastrophe.

But what about competition for space in suitable maternity roosts as a factor limiting population size? What are the actual requirements for effective maternity roost sites? Are there actually a limited number of such sites? If so, FFs face an ever-decreasing number, due to human interference. Could suitable maternity camp sites be **the** factor placing an upper limit on FF population size?

Disease and the reporting of disease by the media Increasingly the diseases of FFs are being used as an excuse for the disturbance/ forcible removal of FFs. Repeatedly there is misinformation promulgated in the media. For example, "A Northern Territory scientist says fruit bat numbers in the Darwin metropolitan area could be controlled through habitat maintenance. **The NT Environment Department's John Woinarski says the large number of bats finding their way to Darwin is due to a bad wet season and the floods in Katherine. He says bat faeces can spread the potentially fatal lyssa virus and the bats themselves destroy fruit crops....**" ABC News, 21/9.02". **Both Mr Woinarski and the ABC should know better. Also perhaps the ABS could have pre-prepared press-releases to counter such crap.**

In this respect I am very impressed by the **JOINT PRESS RELEASE BY THE [UK] DEPARTMENT OF HEALTH AND DEFRA (<http://www.defra.gov.uk>) 28 September 2002 SUSPECTED CASE OF BAT RABIES IN LANCASHIRE** and in particular for the **Notes for Editors** which follows

"Initial tests carried out on a Daubenton's bat submitted to the Veterinary Laboratories Agency in Weybridge, Surrey have shown positive results for a strain of rabies. Confirmatory tests are in progress... "

Notes for editors *If the confirmatory tests being carried out on the bat prove positive, the likely agent will be European Bat Lyssavirus (EBL), a strain of rabies common in bats across Northern Europe. If virus is isolated it will be genetically typed to establish its origin. EBL rabies will not affect the UK's rabies-free status.*

*EBLs are closely related to classical rabies virus. They have been known to infect not only the primary hosts (insectivorous bats) but on very rare occasions other animal hosts and human beings. In Europe, between 1977 and 2000, a total of 630 EBL cases in bats have been confirmed, mainly in Denmark, the Netherlands and Germany. There has been a previous bat-associated rabies case in the UK, when a Daubenton's bat (*Myotis daubentonii*) was found in Newhaven, Sussex during 1996. The animal was infected with EBL type virus. The virus had a genetic sequence which matched EBL viruses from the Swiss-German border, suggesting that this bat might have been a migrant bat... On rare occasions there has been transmission of EBLs to terrestrial mammals. On two occasions sheep have been infected and in 2002 EBL was detected in a stone martin in Germany. Since 1977 there have been three human deaths in Europe attributed to EBL infections, all in cases where the humans had been in close contact with bats. Although such human cases are very rare, the risk posed to humans from an EBL infected bat still exists.*

Bats are a protected species and must not be killed or their roosts damaged. EBLs may only be transmitted by the bite of an infected bat. There is therefore no risk to human beings if bats are not approached or handled by them.

Precautionary measures

Persons who find a sick or ailing bat should not approach or handle the bat but seek advice from a local bat conservation group.

Persons licensed to handle bats in Great Britain should ensure that they have rabies vaccination and should always wear protective gloves when handling bats.

If any person is bitten by a bat, the wound should be immediately thoroughly cleaned with soap and water. Additional cleansing of the wound site with an alcohol base or other disinfectant is also recommended and immediate medical advice must be sought.

NB almost all that ABS needs do is substitute "Australian bat *Lyssavirus* (ABL)" for "European Bat *Lyssavirus* (EBL)" - oh yes, and how about an ABS one on Hendra?

Great Balls of Fire Why are fruit growers so preoccupied with the "magic bullet" approach, when all they have to do is net? I suppose that, like all of us, they want something cheap and easy. Thus, they will always be prey to the smart operator. I have memories of the vast amount of taxpayers' money that was put into the Lismore region to help development of the "Electronic Scarecrow" - a Hi-tek device that was going to solve all of the growers' problems with FFs. My colleague, Mike Calford, who worked on the hearing range of FFs, predicted that the ES wouldn't work. And guess what? It didn't. There is a perception that, if you sling enough money into research, scientists MUST come up with an answer. Well, I worked for almost three decades in cancer research and it ain't necessarily so. It may well be that no matter how much research is done, there is, in fact, no effective solution to some problems.

Another point about the latest yew-beaut whizz-bang hi-tek toy is its dependence on the myth of FF "scouts" - explicitly stated in the following extract A myth that, as one who has watched innumerable FFs flying OUT to feed, and flying IN to feed, regards as total crap. I'm sure that all of you have seen that the first FFs to arrive at a food source turn right around and fly back to the camp to tell the others or, if not that, circle around calling loudly to attract all the others, a paradigm of Dinkydi Ozzy Mateship. Note also the standard reference to "plagues". Remember that electrocution grids "only kill the scouts", then think of the kill figures for the Bosworth grid! From the *Sydney Morning Herald* 12-10-02 entitled:

"SCARE TACTICS IN TO BAT" and subtitled **"Flying fox foes are under fire"**. It is, remarkably, accompanied by a small picture of an infant FF resting on its back, head up on a humanoid hand - perhaps it was dead?. *"A fearsome fireball that leaps 15 metres into the air is part of a new arsenal of scare tactics for farmers and towns driven batty by flying fox plagues. Far North Queensland company Vigilance Technologies has developed a system which uses radar to detect the arrival of the first bats, which act as scouts for the rest. The radar triggers strobe lights and recordings of bat distress calls to frighten the animals away. The fireball erupts only if the animals are out of its reach. -AAP*

And from ABC News website -<http://www.abc.net.au/news/australia/qld/cairns/regcrn-11oct2002>: **Fire ball deterrent in flying fox fight.** *A new flying fox deterrent system, including a 15-metre fire ball, is being demonstrated today in far north Queensland.*

Lychee growers say their industry has been seriously harmed by last year's Queensland Government decision to stop issuing permits for electric grids preventing bats eating orchards [sic].

Vigilance Technologies' managing director John Muehlebach says his system will not harm or kill the bat. He says it includes detecting the bat using a radar, applying strobe lights to deter the animal, igniting the fireball and playing recordings of bat distress calls.

"What we're using is a large gas burner that produces a gas flame that goes up about 15 metres high and is about five metres high," he said. "So what we're in fact doing is using the same principal as nature in that animals will relocate when there's a bushfire around, so we're basically creating a simulated bushfire."

And courtesy of Jackie Maisey, the following was said about the system in an ABC radio interview: *"Going to target the "scouts" therefore educating the whole colony! as the "scouts" return to the colony to tell the others if there is good feeding and if it's safe! ... Cost if you have your orchard near a colony in the vicinity of \$40,000. Less if away from the colony and only a few FF's need deterring".* Jackie wondered what happened to the 'scout' theory in this instance.

One does wonder about the human race.

One also wonders about the ABC. As a professional scientist I am less than impressed by the ABC's current "FLAGSHIP" science program "Catalyst" and I have my own name for it. Superficial treatments; dinky musical moments; ooh-aah wonder; much colour and movement and rarely any real in-depth discussion. To say that is pandering to the short attention span of the kiddies is being unfair to kiddies -

and, yes, we must have some **confrontation**. As an example, a recent program on fossil dinosaurs with feathers, largely featured a confrontation between Mike Archer and some US creationist. Flagship **Science** program?

So to **Flying Fox Fight**, ABC Catalyst, Thursday, 15 August 2002. The typical confrontational presentation - fruit-growers versus "THE CONSERVATIONISTS" [might just as well have said "greenies"] - and a problem about to be resolved by "SCIENCE" in the shape of a "YOUNG FEMALE SCIENTIST", who, to quote the program transcript, "*is starting the first study to provide the hard biological data needed to assess the true state of the bat populations and reproductive life cycle. This should help to identify any at risk colonies, and determine what, if any, are sustainable cull levels. But one side in the debate will lose – how will they handle the truth?*". And the methodology that will do all this? DNA fingerprinting (to tell where the FFs come from) & tooth growth rings (to determine the population age structure and...).

There was a shot of a very dense fly-out (suggesting huge population numbers - but no mention of the animals' very slow reproductive rate) - juxtaposed with a fruit grower using the shot to discredit the accuracy of population counts - a presentation making it bleeding obvious to everyone watching that "THE CONSERVATIONISTS" didn't know what the Billy Connolly they were doing. Note that it was clear that it was "THE CONSERVATIONISTS" who were responsible for FFs being declared vulnerable. This was also emphasised by the intellectual purity of the scientific heroine, who is about to wholly resolve the conflict, by determining "the facts, ma'am, just the facts and nothing but the facts" - a presentation which explicitly contrasted "THE SCIENTIST" versus "THE CONSERVATIONISTS".

Funny that. To my knowledge, the data responsible for both GHFFs & SFFs being declared vulnerable, came from scientific studies by fully trained, experienced, responsible, professional scientists - whose data were peer-reviewed by independent scientists comprising four separate scientific committees, three state and one federal. Am I a paranoid old b*gger, or am I a paranoid old b*gger? I believe that the program has given a completely inaccurate picture to the general public, has demeaned the work many professional scientists, and is a disaster for what is happening in Charters Towers and other places around this b*ggered country. If any one thinks that I am being unfair to C***alyst, I have a complete transcript of the program that I can e-mail. Kerryn P-J wrote a letter to the ABC protesting and received the usual bland non-event-of-a-letter that characterises such replies.

Just like the ones one receives from politicians.

Politicians! One wonders - is there any politician anywhere in Australia who has any scientific training?

One is not impressed by Mr Kemp's apparent willingness to involve the agricultural lobby's scientific experience and expertise in decisions relating to biodiversity, threatened species etc.

One is even less impressed by Acting Prime Minister John Anderson who said a decade of working towards sustainable land management had not achieved its objective because it failed to recognise the need for landholders to have security of their investment. **Policies had been based on science which was "unnecessarily green"** *August 17, 2002 West Australian Newspapers Limited.*

It seems to me that farmers are always asking for scientific help and "scientific evidence", then, when it don't suit 'em, damn it on some ground or other. Often they refer to those responsible for the evidence as "conservationist extremists" or, as in a recent response to the Federal World Heritage judgement involving SFFs, as "Eco-terrorists".

And the land clearing continues, the perpetrators, in my mind being the real "eco-terrorists". And now the name calling is being applied to CSIRO by the agricultural and business lobbies.

Clearly CSIRO should be re-organised (again) and placed under the auspices of the Minister for Small Business. Then CSIRO could concentrate on research that will demonstrate that land clearing is actually beneficial to this b*ggered land.

One really does wonder about the human race and its future.

I'm glad I'm old.

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The Bat Roost Box Network

Robert Bender

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At the ABS Conference in Tocal, Hunter Valley in April 2000, I presented a paper about the bat box project at Organ Pipes National Park on the western fringe of Melbourne, Victoria. In discussions afterwards, I found a substantial number of people from around Australia expressing interest in hearing more about it, wanting copies of the paper, some thinking of starting up projects of their own. Several emailed me about their interest after my return home. It seemed to me that interest had become sufficiently widespread for it to be worth an attempt at setting up a network of people with this common interest, held together by an occasional newsletter. So I started it off by cutting a story from the Friends of Organ Pipes NP newsletter about our most recent box inspection, developing a mailing list and sending it off by email.

After an initial burst of activity, there was a break for a few months, but it has now taken off fairly well and seems to be valued by most of the people on the mailing list. There have, to date, been thirteen newsletters, nearly all sent by email, with one or two sent out as paper copies. Topics dealt with in the Newsletters have been:

No.	Dates	Content
1	5 May 2001	Organ Pipes National Park, Melbourne bat box project: Apr 01 box inspection
2	22 May 2001	Monika Rhodes introduces herself
3	2 June 2001	Frank Box: Myotis in Brisbane
4	13 June 2001	Adrian Daniell on Latrobe Uni Wildlife Reserves bat boxes
5	16 July 2001	Monika Rhodes Work In Progress; Organ Pipes May – July
6	11 Dec 2001	OPNP Aug – Dec.; Mimi Pohl research proposal in Melbourne
7	8 July 2002	Alan Franks, Qld.; Bat Roost Box Kit update: Latrobe Valley Field Naturalists
8	11 July 2002	Rob de Souza-Daw: boxes at Hazelwood Power Station, Victoria
9	July 2002	Monika Rhodes: Conf. paper summary; Organ Pipes: Jan-June
10	July 2002	Monika Rhodes: report; Organ Pipes: July
11	1 Sep. 2002	Tim Low from <i>The New Nature</i> ; Rex Harris: boxes on macadamia farm NSW; Organ Pipes: Aug.
12	7 Sep. 2002	Monika Rhodes on Tim Low
13	27 Sep 2002	Mark Kiser: bat boxes in USA; Trevor Hudson: boxes in Bushy Park Wetlands; bat boxes Wilson Reserve, Ivanhoe

The newsletters have contained mainly reports on bat box projects – nine of them so far, along the east coast states, photos of bats in boxes, lists of species using or not using boxes, and a review of Donna O’Shea’s Honours thesis on her behavioural study of bats in boxes at Latrobe University, Melbourne.

The mailing list started with about 15, and has now grown to 37. People on it are mainly in the eastern states. There are 12 in NSW, 13 in Victoria, 9 in Queensland, 1 each in South Australia, Western Australia and Tasmania. Some of these are box makers (generally with bat boxes as a side interest in a business with main market in possum and bird boxes), some are National Parks Service employees in various states, or people managing research projects or doing university research towards advanced degrees. Seven of the 37 people on the mailing list have contributed to the newsletter so far. Their topics concern box projects in:

Victoria	2
Brisbane/Qld	7
Organ Pipes, Vic.	7
Latrobe Uni. Vic	1
Latrobe Valley Vic.	2
Nut farm in NSW	1
Bat boxes in the USA	1

The executive of the ABS has become interested in the project, added a page about the network to their website and propose to attach the newsletters to it, so they can reach a wider group.

Much interest has been generated about the Bat Roost Box Kit produced by the Latrobe Valley Field Naturalists Club and published by the West Gippsland Catchment Management Authority.

The network is a small venture to meet the need of a group with a special interest. There are sure to be others who are not currently on the mailing list who might be interested to receive the newsletter or, better still, to contribute to it. It is not really a scientific publication (yet), but an opportunity for people with a common interest to exchange experiences.

Anyone who wishes to join the mailing list, or to contribute a story to the newsletter can do so by contacting me via email at rbender@netlink.com.au

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Current Research News

Susan Campbell

Zoology Department, The University of Melbourne. Email s.campbell3@pgrad.unimelb.edu.au

Victoria's south-west is set to become a hot spot for bat research over the next few summers with independent PhD's set to delve into the ecology of two fascinating microbats – the Large-footed Myotis (LFM - *Myotis macropus*) and the Southern Bent-wing Bat (*Miniopterus schreibersii bassanii*). Located 450 km south-west of Melbourne, the Lower Glenelg National Park (LGNP) is one of five sites where I plan to trap what has been dubbed as 'Australia's fish-eating bat' (Robson 1983). In addition to a truly unique mode of foraging, the LFM carries the prestigious title of being Lindy Lumsden's favorite species of bat – an envious title amongst the bat world I'm sure! As well as my work at LGNP, Chris Grant from Deakin University, Warrnambool, will be looking at, amongst other things, the impact of human disturbance on the cave-roosting bent-wings.

A preliminary trip to LGNP in July 2002 saw Chris leading us up the limestone cliffs and crawling/scrambling/ wading deeper into caves in search for winter roosts. With the assistance of David Ryan from the Nelson Parks Victoria Office, our efforts were rewarded with the discovery of four colonies of bent-wings in six caves examined, and a cluster of four LFMs roosting close to a larger group of bent-wings in the "1886 cave". With the full-moon and an inch-thick frost at night, no self-respecting bat was out foraging for us to trap, but the numerous leeches more than compensated for the lack of microchiropteran activity.

Once the weather warms up, I intend to trap LFMs at five isolated sites (Figure 1): LGNP, The Lakes National Park (LNP), Barmah State Forest (BSF), Eildon National Park (ENP) and Coranderk Bushland (CB). I will collect tissue samples from all five sites and conduct radiotracking at two (BSF, LGNP). I hope to fit 12 Holohil transmitters to LFM at both BSF and LGNP this summer and next to determine if roost-site selection is occurring, and whether roosting behaviour is flexible at different localities and across time. Some insight into the foraging requirements of the species will also be gained by teaming nightly tracking with a dietary study. I think a study on the impact of water-borne pollutants on this top-order predator would be fascinating, however for the time being I am trying to keep my project-scope in check!

To complement these behavioural studies, I am currently testing 20 microsatellite primers developed for *Myotis myotis* and *M. bechsteinii* overseas (Castella *et al.* 2000, 2001, Kerth *et al.* 2002) on three LFM tissue samples generously supplied by the South Australian Museum. Assuming that amplification of the primers is successful, I will investigate population structuring and genetic diversity across the above five sites, and potentially investigate mating systems at one or two sites. Depending on the

accessibility of maternity roosts, I am considering freeze-branding individuals as a way of marking individuals to assist in mating system observations.

I'd love to receive any advice or comments people may have on this project, especially in these early planning stages. I look forward to keeping you all up to date on my findings ...

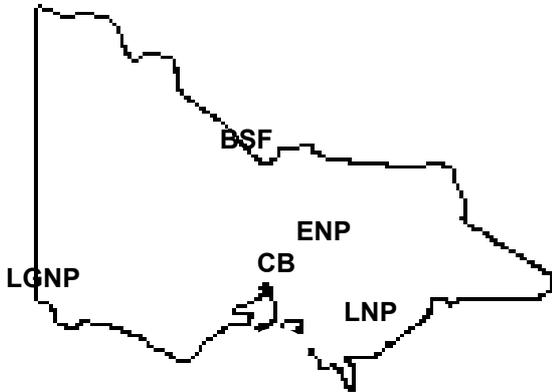


Figure 1. Map of Victoria showing approximate location of potential field sites (see text for full names).

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Large-footed Myotis *Myotis macropus* (Photo Lindy Lumsden)

Batting in Myanmar

Elery Hamilton-Smith, AM

PO Box 36, Carlton South, Vic 3053. Email: elery@alexia.net.au

Thanks to Prof. Daw Tin Nwe of Yangon University and Paul Bates of the Harrison Institute in Britain, I have just enjoyed my first visit to Myanmar. They invited me to attend the nation's first-ever international workshop on Bat Research and Conservation, and then to participate in a fortnight of field research in the Mawlamyine and Hpa-an areas.

The workshop involved a considerable number of academics, graduate students and forest managers from Myanmar, together with visitors from Britain, United States, Malaysia, Portugal, India, and myself from Oz. I have rarely attended a workshop with so much enthusiasm and so much commitment to both research and conservation.

I can only say that I believe that the extent to which Myanmar has suffered sanctions and exclusion from some international bodies (including IUCN) is outrageous. There have been some major human rights issues in Myanmar but simply closing the door on a nation is no solution to such problems. Further, all nations have human rights problems – and some in the Asian region have far greater ones than Myanmar. But unlike Myanmar, they are of immense economic significance to most Western countries (so we treat them with kid gloves!) and both they and others manage to keep their abuses relatively hidden from sight.

Right now, the people of Myanmar are struggling to rebuild their country – as just one example, I have rarely come across universities that are producing such good quality teaching and research, even though they are cut off from many of the resources that we would assume in any university. They desperately need our support and assistance right now. Similarly, they have managed to establish 33 major protected areas. They need our help in training and again in simple resource support.

I guess part of my feelings are driven by the extent to which the students and others made me so welcome (just as many Asian countries have) and the extent to which they have immersed themselves in our program, both contributing a great deal to it as well as enjoying what we have given them. But their exclusion from much of the international community means that they are at the stage that many other countries were when I commenced working in the region back in the 1960s. So, I am personally convinced we must do what we can to help them. Our experience in the country and their gratitude for it will repay us hundreds of times over.

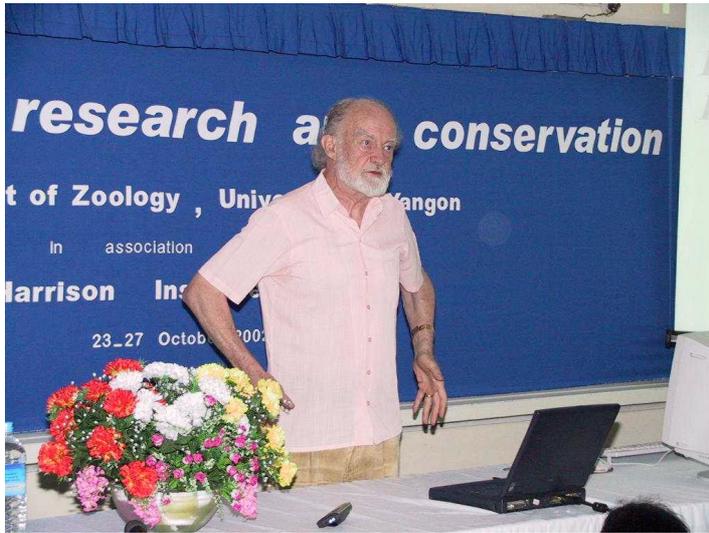
The workshop

Only a few years ago, little more than a list of recorded bat species in Myanmar was available, with indeed limited information even on distribution. The very real leadership from Professor Nwe and her colleagues at the Yangon University, coupled with the continuing support from the Harrison Institute is changing all this, and has created a remarkable opportunity for the development of local researchers. This is also taking place against the background of the strong and growing commitment to natural area conservation.

One of the telling bits of evidence from the workshop is that two M.Sc. students reported some remarkable previously unknown phenomena more or less as a matter of course, simply because their lack of proper access to the world literature means that they did not even know they had made a significant discovery! I will not detail it here, but we are doing what we can to help them publish their work in the international literature and gain due credit for it.

One of the few bits of tourism I was able to fit in was to visit the Shwedagon Pagoda which is one of the most beautiful and truly alive religious buildings of my whole life experience. Further, each night at least half a million *Tadarida plicata* fly out across the city, just like the famous Carlsbad Caverns, Austin bridges or other major flights of *T. brasiliensis* in the USA. Such flights take place right across the

country. At the other extreme the most recently reported addition to the recognised fauna is the famous bumble-bee bat, *Craseonycteris thonglongyai*, which weighs in at about 1.5 grams as the smallest known mammal. Our work has added further new locality records for this remarkable creature (and for many of the other species we handled).



Elery speaking at the international workshop on Bat Research and Conservation in Myanmar

Our field program

The unpleasant part of this was the journey to reach our base. It took over 13 hours to travel the strip of wall-to-wall potholes from Yangon to Mawlamyine: and that is a main highway! But the field work itself was great. Twelve postgraduate students, virtually all women, accompanied the small group of us from outside of Myanmar. I have never worked on a field program with a more committed, enthusiastic and joyful group. We worked every day, often out on the road by 10.00 am, and generally got back to the hotel at least 12 hours later. Each day we would home in on a specific cave or several caves, examine the cave environment and record as much as we could for the new national caves and karst inventory which is now well under way, then select trap and netting sites and collect for as long as the bats kept coming, sometimes getting six or eight species per cave. Our scientific results are still being sorted out and analysed, but will progressively appear in the literature.

Many of the caves enjoy a useful level of protection in that the first sector of many of them is set up as a temple with a whole collection of Buddha images – often extremely well done and well kept. We were made welcome wherever we went, and in one instance four of us visited a village that had been in the area blockaded for many years by the army and only recently opened up to the world. We were especially welcomed, as other than a few of the old people, none of the villagers had seen Europeans before.

Buddha statues inside the Weibyan Cave



But the most remarkable thing was way in which the students kept absorbing new experiences, new concepts and new skills without seeming to get tired. After a series of introductory presentations and demonstrations, one group just took over the development of the cave inventory; others developed specific skills in the identification, measurement and other recording of the collected bats; and one also took on mastering the technology of ultrasound recording – and did so virtually in a single night. Paul, Ian Mackie and I in particular found ourselves constantly working with groups, usually of three, or even spending time in one-on-one teaching – very exciting but demanding.

We were particularly impressed with the commitment to and progress in achieving nature conservation. I believe the future of Myanmar's environment is in relatively good hands – and they deserve any support we can give them.

So, can I ask you all to please provide copies of your own published work, together with any duplicate books or journals (even old ones) on which you can lay your hand. If you are involved in editing or producing a journal, try to persuade the publishers to make a complete series available. Give us digital files of work too, and if you have any really useful CD-Roms or .pdf downloads, let us have copies or web addresses. Perhaps eventually we can at least give the students a decent bat studies library.

If you can give a period of time to work as a volunteer either within our own program, or directly to the university, let me know. I can assure you that although it will have its frustrating moments, it will give you immense pleasure and satisfaction.

Contact me in the first instance. But if you are donating half a ton of literature as I recently did for another university, don't send it until I can advise how best to arrange forwarding.



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– News and Announcements –

News from the SFNSW Bat, Frog and Reptile School: Cascade, September 2002

Alison Towerton

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

Email: alison@sf.nsw.gov.au

Every year since 1994, the State Forests of New South Wales (SFNSW) has held a number of wildlife schools around the state. The schools may be general, covering all terrestrial vertebrate groups, or more specific, such as the frog and bat school. Schools have been held at Dorrigo, Kioloa, Narranderra, Nymboida and the Pilliga. This year, September 9th saw a rather large group gather at the Cascade Field Studies Centre near Dorrigo, on the plateau west of Coffs Harbour, NSW. Attendees included staff from SFNSW, National Parks and Wildlife Service (NPWS), Department of Land and Water Conservation, Department of Agriculture and consultants. SF Research Division's Frog Ecologist, Frank Lemckert, organised and led the school. Bats are normally handled by Brad Law, but he could not be present on this occasion due to other commitments, and therefore Glenn Hoye provided his expertise at the recent course. Also present were Mark Fitzgerald (reptiles) and Cameron Slatyer with a special appearance from Marion Anstis (tadpoles).

For the bat section of the course, a total of twelve harptraps was set in a variety of habitats to demonstrate techniques such as trap placement in flyways and the use of vegetation and other material for funnelling. Triplining and mist netting were discussed briefly and a demonstration of microbat banding and anabat recording was provided. Species trapped were *Miniopterus schreibersii*, *Nyctophilus gouldi*, *Chalinolobus morio*, *Kerivoula papuensis*, *Vespadelus darlingtoni*, *V. pumilus* and *V. regulus*. Microbat biology was presented by Glenn along with information on survey techniques, threatened species and lyssavirus. Course notes were provided by Brad Law and Mark Chidel. A brief discussion on NPWS scientific investigation licensing was given by Frank while Amanda Paul from Dept. of Agriculture discussed Animal Care and Ethics issues to round off the occasion. A good time was had by all.

People interested in attending such a course can contact Frank Lemckert (02 9872-0159 or frankl@sf.nsw.gov.au) or Traacey Brassil (02 9872-0105 or traaceyb@sf.nsw.gov.au).

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The ABS listserver has moved

Alexander Herr

Email: aherr@csu.edu.au

The ABS listserver has moved to a new server. I have transferred current list members to the new server, so no action on your behalf is required. The old list will function until the end of this year, however please use the new list for future communications.

Subscription to the listserver are now handled through a web-based interface. It provides a range of options including digest and viewing of member email addresses. You can access it on:

<http://listserv.csu.edu.au/mailman/listinfo/abs>

Notice of a Bat Workshop in Victoria

presented by

**The Fauna Survey Group, Field Naturalists Club of Victoria
and
The Australasian Bat Society**

Presenters:

- Lindy Lumsden
- Robert Bender: on the use of bat boxes
- Matt Gibson: software to automate analysis of Anabat signals

Topics include:

- Harp trapping
- Handling and identification of bats
- The use of Anabat detectors

Where: Kinglake area
When: 8th and 9th Feb 2003
Cost: \$65 (includes barbecue tea on Saturday and Sunday breakfast)
Accommodation: BYO tent, or floor space is available in an empty house.

All profits will be divided between the two organising groups. For more information and to make bookings please contact: Ian Kitchen, Field Naturalists Club of Victoria, Locked Bag 3, P.O. Blackburn, Vic 3130. Phone 03 9795 7423.

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Bats of South East Australia
Copyright Nicholas Birks
wildflight.com.au

New poster available!

This is a black and white reproduction of a new bat poster available from Nick Birks at Wildflight Australia Photography. It looks stunning in colour with green ferns, blue cliffs and a purple-red sky. Produced for the Naracoorte caves, it combines Nick's photographs taken in the wild over some time, and includes a key for identification.

Cost: \$15 plus postage

Size: 420 x 600 mm

Contact:

Nick Birks

Wildflight Australia Photography

116 Fullarton Road Norwood SA 5067

Tel: 08 8431 8300

Email: nicholas.birks@wildflight.com.au

Website: www.wildflight.com.au

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Winner of the 'Les Hall caption competition'

In the last *Newsletter* (issue number 18, page 68), the editor announced a competition to provide a funny caption to explain what Les Hall was doing with his lasergun. Unfortunately, this was always going to be a bit irreverent. Four entries were received, which were judged by Greg Richards who had this to say:

The winner of the 'Les Hall caption competition' was Kim Van Dyk, with Harry Parnaby a close runner up. After decades of flying-fox studies involving wanderings within flying-fox camps, Les has obviously been wee-ed upon many times. The repeated effect of this upon one's pate may explain the hair thinning that is common in ageing bat researchers, hence Harry's suggestion that hair restoration studies may be prominent in the minds of those who have retired. Accordingly, it was difficult to decide the winner. Kim wins a Flying-fox book and Harry wins a cigar and a jar of Brylcreem, which is suspected to prevent the absorption of flying-fox wee.



"That'll teach you for weeing on me!"

Kim Van Dyk

"Dr Les stands on tip toe in a desperate squirt at a *Cheiromeles*, which escaped during his recent trials of a new hair restoring potion. An unexpected instant effect was a ten fold increase in size of the bats 'member', the weight of which caused it to alight on the tree. The original photograph has been cropped, to protect the faint of heart."

Harry Parnaby

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Potential Honours project offered

The following is an outline of a potential honours project on insectivorous bats. It is offered by Patrick Prevett at the University of Ballarat to commence in January or June 2003. If interested contact Patrick by email (p.prevett@ballarat.edu.au) or phone 03 5327 9217.

Project title: Porosity in a forest landscape, or How do bats use available space during foraging flights?

Theoretical basis: Bat wing morphology has evolved so that a bat's intrinsic flight performance is matched to its ecological role. Since flight type in bats is governed by wing shape you will need to model wing shape of selected species in accordance with their supposed use of preferred habitat.

Methods: You will use luminescent tags attached to bats to track bat movements within forest patches selected to assess activity at different stem density and canopy height. Data will be entered into a GIS database. Movement paths used by bats will be overlain onto appropriate topographic and utility maps.

This will allow assessment of differential use of forest roads, tracks and spaces between trees and between over and understorey canopy. Ideally we will map the routes taken by bats between roost site and forage sites.

Outcome: Ultimately you will generate a computer model of bat flight to show virtual flight paths selected by bats in a virtual forest subjected to changes in vegetation structure. The simulation will be aimed at modelling the response of different bat species to change in their environment as induced by forest fragmentation processes such as the creation of gaps, the creation of edges, tree thinning, seedling regeneration or shelterwood harvesting.

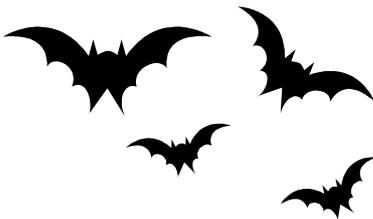
If that sounds too esoteric we can still find you a research question on bats suitable for an honours year. Honours students attract an equipment grant of \$500 plus any extra funding if the project is linked to a Parks Victoria project. So my message to all undergrads is, if you don't get a job after graduating why not do honours as an option to afternoon TV!!

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The Phoenix Wailer

Current information on this passive solution for reducing damage to crops by wildlife pests can be found at our new website:

www.phoenixwailer.com



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AUSTBAT HARPTRAPS

The Austbat Harp Trap has been in continual production for over twenty years. Over that time it has been refined and improved to offer today's bat worker the most effective, reliable and easy to assemble bat trap possible.

Sound design and selection of high quality lightweight materials result in a microbat harp trap that is:

Effective - design refinements ensure excellent capture success combined with low escape rates;

User friendly - quick to assemble, easy to adjust; no tools are required;

Corrosion resistant - judicious use of stainless steel, brass and high grade anodised aluminium;

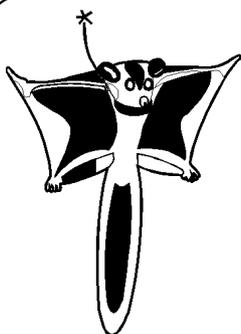
Lightweight - the standard 4.2 m² trap weighs twelve kilograms, the carry bag just 500 g;

Interchangeable - all components adhere to our tight dimensional tolerances and are precision machined, enabling parts to be freely interchanged between traps if required. Future spare parts are guaranteed to fit the trap that you buy today;

Proven - over 480 Austbat traps are operating in 17 countries around the world, covering a vast range of habitats, from steamy jungles to scorching deserts. This is a living testament to the dependability of the Austbat Harp trap.

Standard 4.2 m² two-bank traps and spare parts are generally available "off the shelf". Mini two-bank traps, as well as three or four bank traps are made to order.

Traps are supplied fully strung, c/w manual and heavy duty cartage tube (specify long tube [hips in], or short tube [hips out]). Options include lightweight carry bag and stringing kit.



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austbat

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News from around the traps

Victoria

Rob Gration reports:

Three students I am supervising from the Northern Melbourne Institute of TAFE (NMIT) are in the throes of completing construction of a Bat Condo located at Kinglake National Park (Victoria). It has a floor area of 2.4 x 1.2 metres and is approximately 1.2 metres from the floor to the apex of the roof, and built on 3 meter high posts. Located in various parts of the structure will be a series of baffles offering a range of microclimates. Bat guano will be used to encourage occupation of the Condo. Once occupied, the aim is to offer park visitors the opportunity to witness the fly out of the bats of an evening as part of the parks summer activities programs. In conjunction with the Bat Condo, two NMIT students are also creating a bat interpretive display to be located in the information centre. Keep an eye on the next newsletter for reports on the outcomes of both these projects.

I have just completed putting together a power point presentation aimed at years 10-11. It consists of 70-odd slides and includes a range of activities, photos and presenter background notes. It is generic in nature so it can be adapted to suit your target audience. It covers topics such as: evolutionary history, distribution, echolocation, flight, and a range of other topics. My aim is to have it available in the near future once it has been trialed by a number of presenters, it will be made available to ABS members for the cost of the CDROM.

Patrick Prevet reports from the University of Ballarat:

Andrea Solly has completed another round of fieldwork at the University's Research Station at Nanya in far western NSW. Captures have been considerably lower compared to previous rounds. Could this be drought related? Has there been movement away from the area perhaps to more permanent water? So at the risk of having bombs thrown through the window we hope for another dry year to more completely test hypotheses. Children's paddle pools will be imported to the research station over the Christmas period, not for the children but for the bats to quench their thirst. Andrea was last seen, no not cooling off in the paddling pools but gloating over a fine specimen of *Tadarida australis* captured in a harp as the last few drops of water evaporated from Double Dam. We will use the artificial water to determine whether bats are still in the area or have they temporarily moved away in the absence of water? Andrea has about 30 bats banded but no recaptures so far.

On the teaching front, and also at Nanya, final year undergrads in Environmental Management from UB recently undertook Anabat surveys in the area. Two students undertook a 24-hour tank watch from a hide adjacent to the last remaining water at Nanya. Bats had a continuing presence as shown by the Anabat's non-stop clatter and students filled their field notebooks with pages of data on goats, macropods, foxes and birds taking the last call for drinks. It will be interesting to see what happens as the last water disappears.

Patrick continues to update his roost site data base for the Wombat State Forest in an attempt to establish the nature of bat response to shelterwood harvest. Does anyone else find they regularly only get 5 or 6 days max from the transmitters?

Once again Environmental Management at the University of Ballarat is keen to accept a few honours students if there is anyone excited out there about bat research in the arid zone. Alternatively why not sample the delights of the more mesic environment of the Wombat State Forest or perhaps the Otway National Park. Contact me if you are interested or considering postgrad work.

The interest in Matt Gibson's electronic key has been huge with enquiries from most States. Matt has opened up channels of collaboration with several Anabat people as his electronic key demonstrated by Patrick at the last Bat Society meeting continues to evolve. Whilst Matt cannot service everyone's needs at once, if you persist in your enquiries he will endeavour to sort something out with you.

Western Australia

Brenden Metcalf reports:

Joe Tonga, a local bat box builder, has constructed and placed a number of bat boxes of various designs and sizes, throughout Perth. It will be interesting to see whether they are occupied over the coming months. In conjunction with Joe's activities, I am also running a number of bat surveys in urban remnants in Perth with the aim of introducing 'Friends' groups to the bats in their reserves ("so do we actually have bats in Perth? ... I never knew!!"). Some preliminary monitoring using Anabat has yielded at least one interesting record so far – during a survey in the southern suburbs of Perth we recorded a Chocolate Wattled Bat. Although present on the Darling Scarp to the east of Perth, it was not previously known whether this species still occurred on the Swan Coastal Plain (on which Perth is situated; see Dell and Banyard 2000).

In addition, we have also managed to obtain funding from the Western Australian Department of Planning to set up a permanent Anabat monitoring station at Whiteman Park, on the northern outskirts of Perth. Hopefully there should be some interesting and useful information coming out of the station in the next few months and many more after.

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Kyle Armstrong reports:

The Speleological Research Group of WA and the WA Speleological Group have begun a project on the Quininup Lake Cave in the southwest of WA. Peter Armstrong, Ric Brown and I are currently examining whether the Chocolate Wattled Bat *Chalinolobus morio* changes roosting position within the Quininup Lake Cave according to season. We would like to be able to determine if current management practices can be augmented based on our observations. We also wish to establish whether the current trackmarking is suitable in terms of minimising disturbance to bats at all times of the year. We are extending our project to the remainder of the southwest for both regional context for the Quininup project and to be able to develop a proposed regional management plan for bats in caves in the region. Together with Jay and Ross Anderson and Robert Susac, we have begun a similar project at Yanchep that involves gating, and plan further additions to this regional project.

^v^ ^v^ ^v^



Grey-headed Flying-fox, *Pteropus poliocephalus* (photo by Helen Gormley)

– Recent literature –

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