The Australasian Bat Society Newsletter

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Syconycteris australis Photo: Les Hall

INSTRUCTIONS TO CONTRIBUTORS

The *Australasian Bat Society Newsletter* will accept contributions for one of two broad sections of the Newsletter. There are two deadlines each year: 21 February for the March issue, and 21 September for the October issue. The Editor reserves the right to hold over contributions for subsequent issues of the Newsletter, and meeting the deadline is not a guarantee of immediate publication.

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

For consistency the following guidelines should be followed:

For Scientific Articles:

- Hard copy manuscripts should be posted to the Newsletter Editor at the address below.
- Electronic copy manuscripts should be submitted in plain text (ASCII) form on an IBM format 3½" floppy disk to the above address, or as an e-mail attachment, to the Newsletter Editor.
- Manuscripts should be submitted in clear, concise English and free from typographical and spelling errors.
- Papers should ideally include: Title; Names and addresses of authors; Abstract (approx. 200 words); Introduction; Materials and methods; Results, Discussion and References. References should conform to the Harvard System (author-date).
- All pages, figures and tables should be consecutively numbered and correct orientation must be used throughout. Metric units and SI units should be used wherever possible.
- Some black and white photographs can be reproduced in the Newsletter after scanning and digital editing (consult the Editor for advice). Diagrams and figures should be submitted as "Camera ready" copy, sized to fit on an A4 page, or electronically as TIFF or BMP image files. Tables should be in a format suitable for reproduction on a single page.
- Manuscripts are not being refereed routinely at this stage, although major editorial amendments may be suggested and specialist opinion may be sought in some cases. Articles will generally undergo some minor editing to conform to the *Newsletter*.

For News, Notes, Notices, Art etc.:

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

Special notes for electronic submission:

Although electronic submission is strongly encouraged, there are a few ground rules. Plain text (ASCII) is by far the best format to eliminate system/software compatibility problems, and can easily be sent as part of the body of an e-mail message. This is the most *convenient* way for me to receive text generated on an Amiga or Macintosh. If attaching formatted DOS/Windows files to e-mail, please remember to tell me what word processing package has generated the file. My system can decode UU, MIME and BinHex attachments.

If none of this makes sense, please ask for advice from your local computer guru, system administrator or Internet service provider (ISP).

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Editorial

Dear Bat-Niks

How time flies when one is having fun!! Alas, my two years as editor are coming to an end and I must move on. Somewhere in the background I hear the drumming of Les's fingers on his desk in eager anticipation of my completed Ph.D. Just give me a minute, Les …

And is that the 'real world' I hear calling in the distance? Does this mean that my days in the Hallowed Halls of Academia are also numbered? I fear that it does; here I am again, pondering possibilities at the crossroads of life …

Enough of the cliches, already. For the ABS, the past two years have been eventful to say the least. We have become incorporated, increased our membership, begun to formulate policies, and found the process quite challenging. One of our biggest challenges has been to know how confidently the executive is able to represent the views of members when quick action is called for. This question arose repeatedly as the ABS attempted to deal with flying-fox issues such as the camp dispersal at Maclean in 1999 and with the current issue of lobbying government to reconsider the listing of Grey-headed and Spectacled flying-foxes in the face of declining populations. How comfortable do members feel about the executive's ability to act decisively and, in the absence of relevant policies, sometimes autonomously on behalf of the ABS? Some draft policies have been compiled to address this important issue (p. 28), and we look forward to some active input from members before finalizing these policies. Your opinions are not only requested but vital to the process.

The past two years have also seen an increasing media interest in the issues surrounding bats. Battoes across the country have been consulted by photographers, journalists and film crews from around the globe (eg: The Smithsonian, National Geographic and Geo magazine) and the resulting articles and documentaries are anticipated to be released throughout the year. We can only hope that with increasing education and more positive exposure to bats more people will learn to appreciate their value and support their protection. Here's to never giving up in the face of adversity …

Thank you again for your support in making the newsletter so successful over the past two years. The variety and abundance of contributions has made me look forward to producing each new issue with the knowledge that all factions of bat enthusiasts – academics, carers, students, conservationists, educators and field workers - are duly represented.

Looking forward to seeing you all over a nice glass of Red at the 9th ABS conference in the Hunter Valley in April.

Nicki Markus

President's Report

It's not long until the ABS conference now and so I hope everyone is suitably prepared for some intensive bat discussions and ready to exchange remarkable (yet true) stories of bat ecology and survival! I am told that in order to assist the communication of these stories, a certain amount of wine-tasting may have to be undertaken (well, we will be in the Hunter Valley, after all!!!). So it sounds like another excellent conference in the making!

It will be an important time for members to get together and for us to discuss future plans for the ABS. Over the past two years, there have been both criticisms and praise, and our conference and AGM provides the venue for us to consider what we need to be doing to provide the best 'value for money' services for everyone over the next two years. Have a think about this and be prepared to have your say!

We will also be interested to hear what members have to say about some of our current initiatives, particularly the development of our ABS position statements.

The Society is also financially quite strong at the present time and we need to consider how best to use these funds to further our ABS objectives.

See you at the conference - BYO ideas and enthusiasm!

Bruce Thomson

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- Research Articles and Reviews -

GRATION BAT-TRAP

In keeping with my equipment theme from the last newsletter, I thought I might share another project I undertook late 1998.

The project was to revolutionise the capture rate of insectivorous bats in harp traps (Photo 1.). The project design objectives were as follows:

1. **Attract bats to the trap.** Use lighting as a means of attracting insects?
2. **The capture of bats from any direction.** A circular trap?
3. **Simple for one person to erect.** Minimal sections, lightweight and not need 3 hands and 3 metre long arms to put together!
4. **Ability to erect at a range of heights quickly.** Single adjustable upright and fixing point at apex.
5. **Effective in the capture of bats.** All of the above solutions will improve capture rates.

The solutions to the above objectives were as follows:

Objective 1: battery operated florescent light was fixed to the main structure of the trap (Photo 2).
Objective 2: barrel shaped trap was constructed with the same surface area as a traditional harp trap (Photo 1).
Objective 3: the trap consisted of 3 pieces, the base in the form of a cross piece which was to be pegged to the ground, the main upright fixed to a pivot section on the base and finally the trap itself fixed by 4 bolts to the upright. The upright and trap were constructed of 20mm and 15mm mild steel tubing respectively and the base of galvanised steel plate (Photo 3).
Objective 4: a quick locking latch was fixed to the apex to allow the trap to be hoisted into the canopy (Photo 2) and the main upright consisted of a variety of lengths.
Objective 5: I will discuss this later in the report.

Photo 1.

Photo 2. **Quick locking latch**

Photo 3.

Did I achieve my project objectives?

The answer is yes to the first 4 objectives:

1. The lighting system attracted insects, which in turn attracted bat activity.
2. The bats approached the trap from anywhere within 360 degrees.
3. One person could erect the trap quickly and easily using either the uprights or by roping to a tree limb by the fixing point on the apex of the trap.
4. The trap was set at a range of heights varying from 3 meters to 6.5 meters using the uprights and 5 metres using the rope system. The height at which it could be erected using the rope system was only limited by a fixing point being located in the survey area and the method of getting the rope over the desired fixing point.
(My throwing arm is about as good as David Gower's, ex captain of the English Test team)
5. Did it catch any bats? The answer is no, although there were some near misses. Why didn't it catch any bats? My theory is because they were in attack mode the monofilament line was also being detected and evasive action was undertaken.

The lesson learnt from the project was a pretty obvious one: have a thorough knowledge and understanding of the ecology of the species to be surveyed. As I mentioned in my report in the last newsletter, at that time I was only just getting immersed into all things batty so don't be too hard on my ignorance of bat ecology at that time. I have not given up on all the design features, in time some will be recycled in another project.

If you're wondering what become of the infamous Gration bat-trap, it has been re-fashioned into a canoe rack for my ute.

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P.S. The canoe design objectives were all met.

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Bat Activity around Scattered Remnant Trees in a Rural Landscape

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Introduction

The fragmentation of woodlands for agricultural purposes has resulted in a loss of biodiversity in the often highly modified remnants that remain. However, bats appear to have been less affected by the transformed rural landscape, owing—in part at least—to their ability to fly long distances between patches of vegetation (Lumsden *et al.* 1995). Knowledge of the way bats utilise and distribute themselves within habitats is particularly important in efforts to conserve these areas with adequate resources to meet the roosting and foraging needs of a wide range of bat species. Studying the vertical stratification of bats is one way of ascertaining flying and foraging preferences of bats, as Whybird (1998) was able to demonstrate by using bat detectors at ground, sub canopy and canopy levels of a tropical rainforest in north Queensland. This approach is not known to have been used in woodland remnants.

The aim of this project was to gain a basic understanding of the way bats utilise mature, native trees in a fragmented rural landscape by monitoring activity levels and feeding rates at different heights and times. A secondary aim was to determine the utility of ground level monitoring versus monitoring at different heights for bat surveys. Ground level monitoring was found to be sufficient for detecting all species in lowland regrowth forest in Victoria (Kutt 1993), but this was not the case in Whybird's (1988) survey of tropical rainforest.

Methods

Charles Sturt University (Thurgoona campus) was the site chosen for this study. It is situated on a rural area of land consisting of paddocks, scattered trees, pockets of remnant woodland and regrowth vegetation and a few dams. The sample comprised six mature eucalypts, including two *Eucalyptus camaldulensis* (River Red Gum), one *E. albens* (White Box) and three *E. melliodora* (Yellow Box). The understorey consisted of a ground layer of pasture (exotic) grasses. Some of the sampled trees were in close proximity (<50 m) to other mature eucalypts, while others were more isolated.

Two Anabat II bat detectors (Titley Electronics) were calibrated so that they had equal detection ranges. Each of two sets of equipment—comprising an Anabat II bat detector and delay switch (Titley Electronics) and a GE AC/DC Cassette Recorder containing a standard "C" 100 minute audio cassette—was secured inside a plastic container with the bat detector's microphone unobstructed and pointing upwards. One set of equipment was raised 10 m into the canopy of a selected tree. The

second set was placed on the ground, directly below the raised one. Bat calls were recorded simultaneously on each of the two Anabats for two periods of at least one hour, the first between 2030 and 2145 (incorporating both dusk and darkness), the second between 2145 and 2300 (all in darkness). A different tree was sampled on each of six calm, rainless nights from 19 - 23 January 1998 and 31 January 1998. Temperatures during sampling times ranged from 22.2°C to 28.9°C. There was no moonlight, except on the last night of sampling, when the moon was a waxing crescent.

Downloaded bat calls were assigned to a species or one of two or more species by comparing their pulse parameters to those of previously recorded reference calls (Herr and Klomp, 1995, unpublished data). Due to the large number of species groups identified, the description and analysis of the results were restricted to the following:

(1) Total bat activity.
(2) Activity of foraging assemblages (as modified from Herr, 1998, and references cited therein). The two assemblages used here are (a) Open Space Flyers (OS flyers)—Herr's (1998) above canopy flyers and subcanopy flyers that prefer canopy gaps and open spaces—and (b) Close-to-Structure Flyers (CTS flyers)—Herr's (1998) subcanopy flyers that prefer to feed close to structures and gleaners.
(3) Activity of bats identified to species level, but also including the joint category of *Nyctophilus geoffroyi* and *N. gouldi*, two species currently impossible to distinguish by their calls. Only a descriptive analysis was possible here.

The number of bat passes (a call of at least one second, separated from a similar call by at least one second) per hour, number of feeding buzzes per hour and rate of feeding (buzzes per pass) were calculated for each of the categories listed above. A multiway ANOVA was used on log-transformed data to test the effects of height, time and foraging assemblage on the number of passes and number of buzzes per pass.

Results

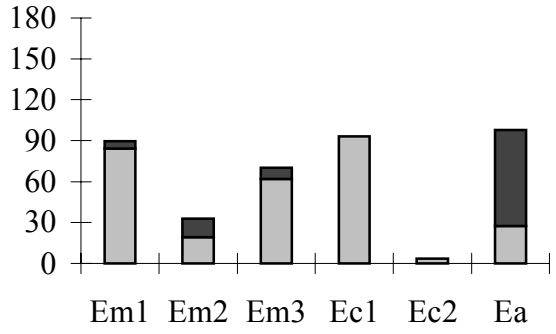
Activity Levels

Bat activity levels for the six eucalypts sampled were high overall, particularly in the first hour. During this sampling period, the number of passes recorded ranged from 3.44 to 98.0 (mean = 64.5 ± 38.2 [SD]) above 10 m and from 3.44 to 178 (mean = 90.1 ± 65.8) above ground level (Figs. 1a and 1b). OS flyers accounted for between 57.9% and 100% of bat passes in five of the six trees sampled above 10 m in the first hour of recording, with similar proportions, 75% to 96.8%, occurring at the lower level for the same trees. One anomalous tree, the *E. albens*, exhibited higher bat activity levels for the CTS foraging assemblage in the earlier sampling period in both high and low strata (71.9% and 69.8% respectively) (Figs. 1a and 1b).

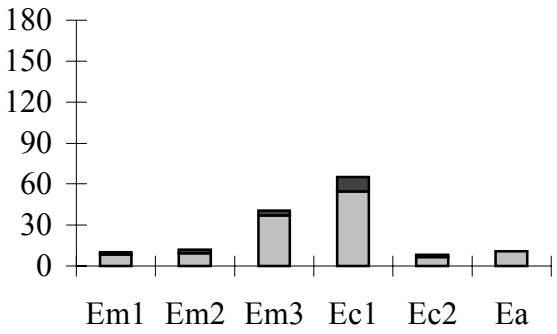
In the second hour of sampling, the mean number of bat passes for all bats in the upper stratum was 62% lower than in the first hour (24.5 ± 23.3, range = 8.2 – 65.1), while at the lower level, the average dropped by 48% (46.7 ± 45.7, range = 17.2 – 138.3) (Figs. 1c and 1d). The general decrease occurred in both foraging assemblages but was more consistent across trees for OS flyers. The decline in CTS

flyer activity was largely influenced by the effective disappearance of this group from the *E. albens* during the second hour (Figs. 1a – 1d).

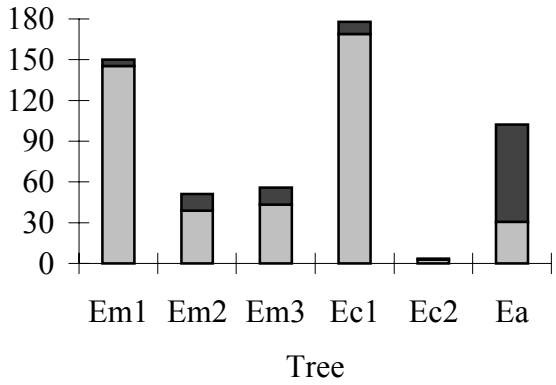
Neither height nor time had a significant effect on log number of passes (F = 2.48, df = 1, 40, P = 0.1232; F = 2.99, df = 1, 40, P = 0.0913, respectively), despite the apparent trends. However, OS flyers were significantly more active than CTS flyers (F = 24.28, df = 1,40, P < 0.0001). There were no interactive effects between combinations of the three factors.



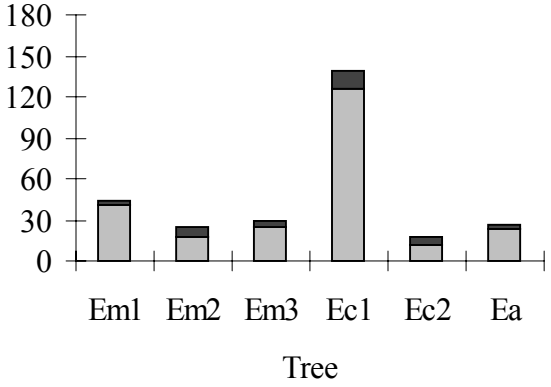
1a: Above 10 m, 1st hour.



1c: Above 10 m, 2nd hour.



1b: Above ground level, 1st hour.

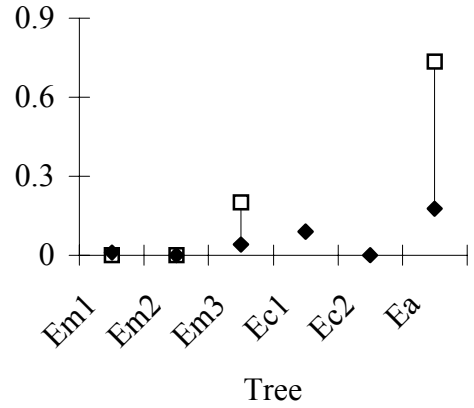


1d: Above ground level, 2nd hour.

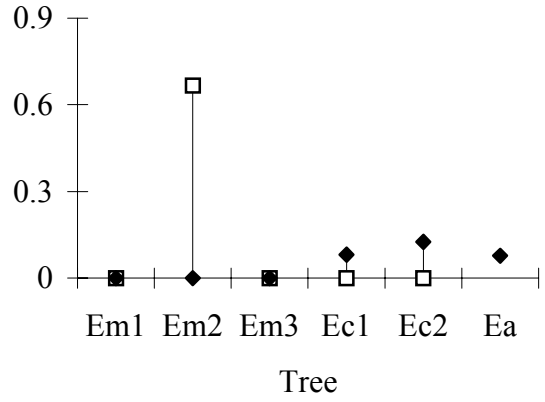
Figures 1a – d: Number of passes per hour for open space (OS) flyers and close-to-structure (CTS) flyers, grouped by tree species. Em=*Eucalyptus melliodora*, Ec=*E. camaldulensis*, Ea=*E. albens*, light shading OS, dark shading CTS.

Feeding Activity

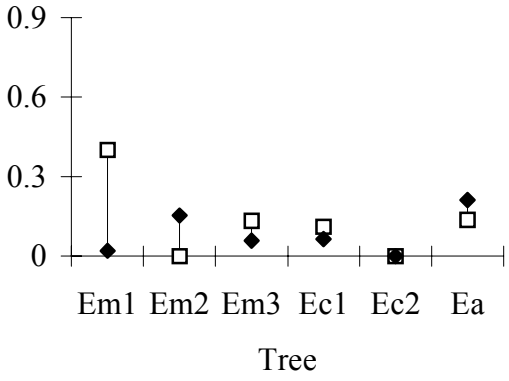
For both OS flyers and CTS flyers, more foraging occurred at more trees in the lower stratum than the higher stratum in both hours, with the exception of the *E. albens*. In this tree, equally high activity levels recorded by the two Anabats in the first hour coincided with a large number of feeding buzzes for CTS flyers, mainly above 10 m (51.84 buzzes). Ignoring this anomalous value, feeding activity across all sampling units for the CTS assemblage ranged from 0 – 9.72 buzzes per hour (mean = 1.45 ± 2.52), while the range for OS flyers was 0 – 14.56 (mean = 3.07 ± 3.85).



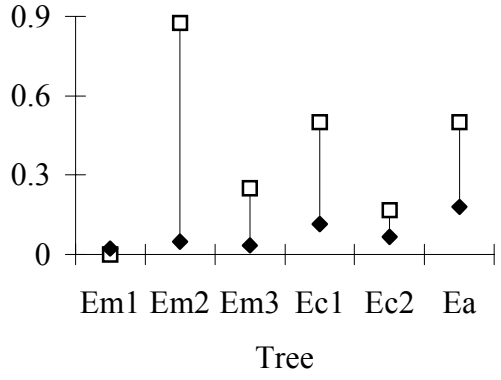
2a: Above 10 m, 1st hour.



2c: Above 10 m, 2nd hour.



2b: Above ground level, 1st hour.



2d: Above ground level, 2nd hour.

Figures 2a-d: Number of buzzes per pass for open space (OS) flyers and close-to-structure (CTS) flyers, grouped by tree species. Em=*Eucalyptus melliodora*, Ec=*E. camaldulensis*, Ea=*E. albens*, closed diamond OS, open square CTS.

Despite the higher frequency of feeding buzzes recorded for OS flyers, the rate of feeding (i.e. number of buzzes per pass) was generally higher within the CTS group (Figs. 2a – 2d). Approximately one third of the sampling units in which CTS flyers were active recorded higher rates of feeding (maximum = 0.88 buzzes/pass) than the highest rate obtained for OS flyers (maximum = 0.21 buzzes/pass).

As occurred for log number of passes, there was no significant effect on feeding rates (log buzzes per pass) by either height or time (F = 2.51, df = 1,40, P = 0.1212; F = 0.67, df = 1, 40, P = 0.4165, respectively). Foraging assemblage did have an effect, however, with CTS flyers showing significantly higher feeding rates than OS flyers (F = 5.00, df = 1, 40, P = 0.0310). There were no interactive effects between combinations of the three factors.

Species Breakdown

Bat species identified during this study included *Mormopterus planiceps* long penis form (LPF), *M. planiceps* eastern form (EF), *Chalinolobus gouldii*, *Vespadelus darlingtoni* and *V. vulturnus*, as well as one or both of the *Nyctophilus* species, *N. geoffroyi* and *N. gouldi*, which cannot be distinguished by their echolocation calls. Calls recorded above 10m for this latter species group were not detected by the ground level Anabat. All of the species identified in this study were detected at least once by the ground level Anabat.

Considering the echolocation calls identified to species level, the most frequently recorded species was *M. planiceps* LPF (OS flyer), followed by *C. gouldii* (OS flyer) and *V. darlingtoni* (CTS flyer). For both *M. planiceps* LPF and *C. gouldii*, overall activity levels were highest in the lower stratum (particularly *C. gouldii*) and in the first hour (particularly *M. planiceps* LPF). Foraging activity for *M. planiceps* LPF occurred in both strata with similar frequencies and rates, but tended to be highest in the first hour of sampling. Almost all feeding activity for *C. gouldii* occurred below 10 m and feeding rates were more consistently high in the second hour. This is similar to the pattern observed for the CTS foraging assemblage, although in the latter group, feeding rates were substantially higher than for *C. gouldii*. *V. darlingtoni* was widespread among the sampled trees and most activity (feeding and otherwise) occurred at lower levels.

Discussion

In most cases, the lower Anabat recorded more activity and feeding attempts than the Anabat suspended at 10 m, although the difference was not significant. This is not surprising as two of the most commonly recorded species, *C. gouldii* and *V. darlingtoni,* are typically sub-canopy flyers (Dixon, 1998, and Churchill, 1998, respectively) and the lack of cluttered vegetation between the canopy and the ground provided suitable foraging habitat for the most common species, *M. planiceps* LPF (Richards 1998).

The tendency for activity and feeding frequency to decrease in the second hour suggests that the sampled trees are (or are near to) roosting sites and that much of the activity recorded in the first hour is associated with bats leaving their roosts and dispersing to feed. This is reinforced by the fact that only in the second hour did the subcanopy flyers (*C. gouldii* and the majority of the CTS flyers) have

consistently high feeding rates in the lower 10 m. Mature (hollow bearing) trees, and their associated roost sites, are acknowledged as an important resource for bats (Lumsden *et al.,* 1995).

OS flyers were significantly more active (number of passes) than CTS flyers at the six sampled trees. However, the reverse was the case for feeding rates (buzzes per pass). This highlights the greater importance of vegetation for CTS flyers in these open and fragmented habitats. OS flyers utilise mature trees as roosting sites and forage in the spaces around them, but they are also able to feed on swarms of insects occurring away from vegetation, for example around streetlights (Kirsten and Klomp, 1998). CTS flyers appear to be restricted to foraging within and around vegetation and therefore need to make more efficient use of this limited resource by attempting to catch prey more often. This is supported by similar findings for *Rhinolophus megaphyllus* (a CTS flyer) in a fragmented woodland and farmland mosaic in south-east Queensland (Pavey, 1998). The degree to which increasing fragmentation of suitable habitat will affect CTS flyers is likely to depend on the ability of individual species to travel between vegetation patches or isolated trees.

In this study, all of the identified species were recorded at least once by the ground level bat detector. However, not all calls recorded by the higher bat detector were detected on the ground. Furthermore, *M. planiceps* EF was only detected in the second hour. This suggests that a survey carried out with less sampling effort is likely to miss some of the less common species. A landscape that is variably fragmented and modified will probably not contain a uniform distribution of its full range of bat species. Therefore, it is suggested that in patchy rural habitats, surveys should be more extensive, either spatially (more sites or heights) or temporally (more hours sampled within a night—Law *et al.,* 1998—or more sampling nights).

Vertical stratification is potentially a very useful tool in studies of bat behaviour in different habitats as it can help to determine preferred flying heights and feeding heights for different species or foraging guilds, as well as the likelihood of roosting activity and the changes in different activities over time. It would be interesting to incorporate factors such as diet preference and interspecific competition into future research investigating vertical stratification.

References

Churchill, S. 1998. *Australian Bats*. Reed New Holland, Sydney.

Dixon, J.M. 1998. Gould's Wattled Bat *Chalinolobus gouldii*. In: Strahan, R. (ed). *The Mammals of Australia*. Australian Museum/Reed New Holland, Sydney. pp. 512-513.

Herr, A. 1998. Aspects of the ecology of forest dwelling bats (Microchiroptera) in the western slopes of the Australian Alps. Ph.D. Thesis, Charles Sturt University, Albury.

Herr, A. and Klomp, N.I. (eds) 1995. South-eastern Australian bat call library.
URL: http://batcall.csu.edu.au/batcall/batcall1.html.

Kirsten, I. and Klomp, N.I. 1998. Microchiroptera in urban, rural and forest areas of southern NSW. *Aust. Bat Society Newsletter* 11: 28-31.

Kutt, A. 1993. Notes on recording reference sequences of bat echolocation calls and bat activity at different height levels. *Aust. Bat Society Newsletter* 2: 16-23.

Law, B., Anderson, J. and Chidel, M. 1998. A bat survey in State Forests on the south-west slopes region of New South Wales with suggestions of improvements for future surveys. *Aust. Zool*. 30: 467-479.

Lumsden, L.F., Benett, A.F., Krasna, S.P. and Silins, J.E. 1995. The conservation of insectivorous bats in rural landscapes of northern Victoria. In: Bennett, A., Backhouse, G. and Clark, T. (eds). *People and Nature Conservation: Perspectives on Private Land Use and Endangered Species Recovery*. Royal Zoological Society of NSW, Mosman. pp. 142-148.

Pavey, C.R. 1998. Habitat use by the eastern horseshoe bat, *Rhinolophus megaphyllus*, in a fragmented woodland mosaic. *Wildlife Research* 25: 489-498.

Richards, G.C. 1998. Southern Freetail Bat *Mormopterus planiceps*. In: Strahan, R. (ed). *The Mammals of Australia*. Australian Museum/Reed New Holland, Sydney. pp. 485-486.

Whybird, O.J. 1998. Methods of sampling forest bats and bat activity above the ground. *Aust. Bat Society Newsletter* 11: 31-35.

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Spectacled Flying-fox Count November 1999

Olivia Whybird and Stephen Garnett

Concern over the status of the Spectacled Flying-fox has highlighted the need for more information on population trends. This was the fourth count of Spectacled Flying-foxes we have conducted. In 1998 and 1999, the counts took place in March, at the time young flying-foxes were flying independently, and in November, before the new young are independent. These counts therefore take place at times when the population is at its highest and lowest for the year, respectively. In March 1998, the total population of Spectacled Flying-foxes in the Wet Tropics was estimated to be about 150,000+/-30,000. In March 1999, however, colony counts were severely disrupted by rain and were comparable for only a small number of camps. In November 1998, 114,000+/-14,000 were counted. The November 1999 count was the first opportunity to obtain comparable numbers for colony populations.

METHODS

Bats were counted by groups of volunteers as they left their camps to forage in the evening. Volunteers were positioned to count all major fly-out streams without accidental overlap. Where possible each camp was counted on three successive nights. The number of bats is taken from the best count or an average of the best counts. This year the weather on the last night was much clearer and much better for counting, and all groups nominated this night as the best count. Two colonies that were very small and one that was impossible to count on fly-out were estimated from the ground.

The counts were undertaken at all camps that could be located in the Wet Tropics region from Cardwell to Bloomfield, including the Atherton Tablelands. Before the counts commenced, searches for colony sites were made throughout the species' historical range, particularly at known or historical flying-fox campsites.

RESULTS

The numbers of Spectacled Flying-foxes counted in camps in November 1999 is less than two thirds what it was in November 1998. Table 1 contains the estimates and their associated error for each colony in 1998 and 1999. The major differences between them are:

1. The absence of bats from three sites on the Atherton Tableland where they had previously been present continuously for over fifteen years.

2. The presence of extra camps near Cairns.

Since the counts there have been sightings of substantial numbers of Spectacled Flying-foxes near Ingham, where 88 were killed on a single electric grid during the last week in November. They have also been seen in the Cardwell district, although only one small camp has since been located. A

campsite north of Cardwell, where 5,500 bats were counted in March 1999, has now been cleared. A new campsite located near Kennedy since the count contains about 1,500 Spectacled Flying-foxes.

Fruit-growers reported greater damage this year than ever. Bats have been recorded eating lychee flowers as well as fruit and banana growers have been reporting scars on bananas where bats had scratched banana skins while feeding on banana flowers. There are unverified reports of bats being poisoned in banana crops.

Low numbers of Pied Imperial Pigeons were reported visiting the Brook Islands during October, but the numbers have since returned too normal. Anecdotal reports from people searching for seeds for revegetation also suggesting that fruit abundance in the rainforest may have been lower than normal.

Camp	Nov-98	Error	Nov-99	Error
Bloomfield	11500	2000	3000	2000
Daintree	18000	2000	12600	1000
Newell Beach	4500	500	4400	500
Daintree District	34000	4500	20000	3500
Mareeba	1000	100	1300	100
Tolga	4000	500	5500	500
Powley Road	6000	500	0	
Whiteing Road	8000	1000	0	
Zillie Falls	2000	1000	0	
Topaz	0		1000	500
Palmerston	0		4100	300
Tablelands	21000	3100	11900	1400
Maria Creek	400	50	0	
Mt Myrtle	400	50	Colony not located	
El Arish	20	0	100	50
South Barnard Islands	1500	150	0	
Mission Beach	50	0	Colony not located	
Russell River	8000	1000	12800	1000
Bedarra	0		100	50
Cassowary Coast	8870	1100	13000	1100
Kuranda	500	50	400	50
Fishery Falls	3000	200	5100	400
Cairns	45000	5000	12200	1000
Green Island	90	0	0	
Gordonvale	colony not located		10600	1000
Yorkey's Knob	0		1200	200
Cairns District	48590	5250	29500	2650
TOTAL	113960	14100	74400	8650

Table 1. Comparison of estimates in November 1998 and November 1999

DISCUSSION

There has been an apparent rapid decline in numbers of Spectacled Flying-fox present in known camps. If the counts reflect a genuine 35% mortality in the wild population two explanations are most likely: excessive numbers of bats are being killed in orchards or bats have starved as a result of food shortage.

Rumours of poisoning in broad scale crops would support the first theory. The presence of 88 dead bats in week beneath a single electric grid would also suggest that damage mitigation is likely to exceed the productivity of the bats, especially as some bats being killed are leaving offspring to die back at the camps. If over 0.1% of the known population die beneath one electric grid in one week then a very substantial proportion of the population is likely to be killed by grids and by shooting over an entire fruit season across the wet tropical region.

Fruit shortages are suggested by the change in behaviour of the Pied Imperial-Pigeons. Although pigeon numbers have returned to normal, low fruit numbers through the middle of the year could have resulted in substantial mortality. Cyclone Rona, which passed over the coast near Daintree, may have had a major effect on fruit availability in that area.

Two alternatives to mortality are emigration and behaviour. First, although the count covered 80% of the species' historical range, the bats may have emigrated from the count area in response to two years of exceptionally wet weather the like of which has not been seen since the 1970s, for which there are no comparable counts. The presence of substantial numbers near Ingham would support this theory.

The other possible explanation is that many bats are in small camps rather than in the large breeding camps. The failure to find camps near Cardwell, despite the presence of bats, suggests some bats may occupy small camps. The small camps at El Arish, Bedarra and formerly Green Island could be repeated at many undetected sites around the landscape.

There is little data to support any of these explanations. Many questions have yet to be answered. In the meantime, as a precaution, the Spectacled Flying-fox could be considered for listing as a threatened species in at least the Endangered category. On a single year's data the decline fits the IUCN criterion of Critically Endangered (A2a: an 80% decline over 10 years projected on the basis of direct observation). The use of electric grids to protect orchards could also be examined critically for its effects on the bat populations. This could be done in conjunction with research to find non-lethal means of deterring bats from orchards. Finally annual monitoring will be important to determine whether this year's results are aberrant or part of a long-term trend.

Acknowledgements

We wish to thank, once again, the 100 or so volunteers who have given up their weekend evenings to count Spectacled Flying-foxes, as well as all the people who report on colony locations.

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Low reproductive success in Grey-headed flying foxes associated with a short period of food scarcity

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Introduction

Periodic interruptions to nectar flow in the forests of south-east Australia are associated with a high incidence of flying fox damage in commercial fruit crops and high levels of culling in orchards (Ratcliffe 1932, Eby 1991, Tidemann *et al.* 1997). These episodes often occur in late spring and early summer, and coincide with the timing of birth and lactation in Grey-headed and Black flying foxes. While interpretations of the impact of food shortages on flying foxes have focused on the effects of culling on population size (e.g. Duncan *et al.* 1999), severe food stress during spring and summer may also impact the proportion of females that give birth to live young and rear them to weaning. This has not been examined.

In late October/early November 1998, beekeepers in coastal areas of northern New South Wales and southern Queensland reported a 10 - 14 day period when nectar flow was depleted (B. White, NSW Agriculture Apiary Officer). It coincided in timing and distribution with reports from commercial fruit growers of severe damage to crops by flying foxes (P. Wilk, NSW Agriculture; S. Teagle, Qld. Department of Primary Industries). It also coincided with significantly lower than average body weights in postpartum females collected by wildlife conservation groups, and a high incidence of premature births (Collins 1999). This event provided an opportunity to compare patterns of reproduction at colonies in the affected area with those in regions that did not experience a food shortage. It also provided an opportunity to examine the capacity of the species to ameliorate the impacts of seasons of poor reproductive success by bringing forward the timing of conception. Current models of reproduction in Grey-headed flying foxes propose that seasonal breeding schedules are largely inflexible and that females who either fail to conceive or fail to lactate will not conceive early in the following season (O'Brien 1993, Martin *et al.* 1995). However, supporting evidence from wild populations is lacking.

Methods

Births in Grey-headed flying foxes commence in late September and continue to late November or early December. A small number are born later in some years. Females have single young that begin to fly independently at approximately 12 weeks, and roost with their lactating mothers, to at least 16 weeks. There is a period from mid December to mid January when the normal birth phase is complete and all the season's young are roosting with their mothers. This study assessed reproductive success in Grey-headed flying foxes as the percentage of females with live young at this time.

Six maternity colonies in NSW were selected, four within the area affected by the food shortage and two outside this area. Each colony was surveyed once between 16 and 21 December 1999. In each colony $\geq$20 trees distributed evenly through the colony were chosen, and on each tree, a target area (comprising adjacent branches with adult mixed-sex groups) was surveyed using 10X binoculars. The

sex of all animals roosting in the target area was documented and each female was scored as with or without young. Target areas were of a sufficient size to contain 5 - 7 females. In addition, random walks were made through each colony to ensure the patterns observed in the target areas were consistent with patterns elsewhere.

The 1999 work commenced in the first week of September, prior to the normal birth period. Any female that conceived in the months following the food shortage, but prior to the usual period of conception would have been lactating and roosting with dependent young at this time. Fixed target areas were established in each colony and surveyed in the first week of each month to January 2000. The numbers of target areas that contained animals varied with changes in population size. Therefore, sample sizes in 1999 differ between months. Data were collected as per 1998. One colony surveyed in 1998, Maclean, was subject to an ongoing program of disturbance in 1999 which may have confounded results from the site, and an alternative colony was selected.

Results

Table 1. The percentage of female Grey-headed flying foxes with live young in six colonies in New South Wales in 1998 and 1999, and the percentage of target areas at each site that contained females with young. Sample sizes are in parentheses.

Colonies not affected by food shortage in spring 1998

		mid-Dec 1998	Sept 1999	Oct 1999	Nov 1999	Dec 1999	Jan 2000
Cabramatta	females + yg	88.0 (103)	0 (76)	2.3 (87)	86.2 (118)	88.4 (199)	83.6 (194)
	target areas	100 (23)	(12)	(15)	100 (20)	100 (23)	100 (23)
Gordon	females + yg	93.4 (99)	0 (65)	4.9 (81)	89.5 (86)	94.0 (101)	91.0 (100)
	target areas	100 (20)	(10)	(14)	100 (16)	100 (20)	100 (20)

Colonies affected by food shortage in spring 1998

		mid-Dec 1998	Aug/Sept 1999	Oct 1999	Nov 1999	Dec 1999	Jan 2000
Wingham	females + yg	-	0 (71)	1.9 (106)	93.8 (99)	81.7 (142)	87.3 (161)
	target areas	-	(11)	13 (16)	100 (15)	100 (22)	100 (25)
Bellingen	females + yg	51.6 (159)	0 (87)	6.3 (111)	81.7 (114)	80.3 (137)	85.1 (87)
	target areas	92 (26)	(15)	24 (17)	100 (18)	100 (22)	100 (15)
Susan Is	females + yg	7.8 (129)	0 (57)	23.6 (106)	67.9 (106)	72.0 (248)	70.2 (238)
	target areas	20 (20)	(10)	88 (17)	100 (16)	100 (35)	91 (33)
Maclean	females + yg	20.4 (256)	-	-	-	-	-
	target areas	52 (33)	-	-	-	-	-
Booyong	females + yg	18.3 (136)	0 (59)	12.0 (100)	76.9 (104)	88.9 (81)	69.8 (136)
	target areas	33 (21)	(10)	13 (15)	100 (15)	100 (13)	100 (21)

1998

Females with young were found in all colonies. In colonies outside the area affected by the food shortage, greater than 88% of females had live young, and females with young were found in all target areas (Table 1). However, in colonies in the affected area the percentage of females with live young was considerably lower, ranging from 7.8% to 51.6%. The distribution of young in these colonies was patchy. High percentages of target areas in Maclean, Susan Island and Booyong contained no young.

1999

No young were found in any colony in August/September 1999, either in target areas (Table 1) or in random walks. The percentage of females with young in each colony rose steeply between the first week in October and the first week in November. In early January, $\geq$70% of females in all colonies had live young, and young were found in 100% of target areas in all colonies except Susan Island.

Discussion

Culling of Grey-headed flying foxes during food shortages is acknowledged as a significant threatening process for the species (Duncan *et al.* 1999). This study suggests that these episodes are additionally associated with significantly reduced rates of reproduction. The 1998 survey was undertaken opportunistically in response to an unforeseen event and did not investigate a causal relationship between the food scarcity and the low percentages of females with young. However, reports from wildlife conservation groups of rapid weight loss in postpartum females, premature births and aborted foetuses during October/November provide evidence of a direct relationship, which should be examined more closely (Collins 1999).

There is no indication from this work that Grey-headed flying foxes alter their breeding schedule following seasons of low reproductive success. Had a significant proportion of the females without young in December 1998 conceived prior to April/May 1999, their dependent young would have been in the colonies in early September 1999. Rather, females returned to the standard breeding pattern. This result is consistent with current understanding of seasonal breeding in Grey-headed flying foxes, and supports the view that they are unable to adjust their reproductive cycle in response to year-to-year changes in their environment (O'Brien 1993, Martin *et al.* 1995).

The food shortage experienced in 1998 was unusually widespread and affected a high proportion of the population. At the time of the incident only two known colonies of significant size were located in unaffected areas and their combined population was approximately 40,000 (author's unpublished data). However, it is not uncommon for food shortages in spring and early summer to impact smaller areas. For example, severe fruit crop damage indicative of interrupted nectar flow has occurred repeatedly since 1986 in two commercial fruit-growing districts in New South Wales: Sydney/Camden = 1987/88, 1991/92, 1994/95 and 1997/98; and Northern Rivers = 1986/87, 1989/90, 1993/94 and 1998/99 (Ullio 1992, Slack and Reilly 1994, L. Ullio and P. Wilk, NSW Agriculture). Each of these areas contains several Grey-headed flying fox maternity roosts. These recurring episodes of food scarcity may have a dual impact on abundance in Grey-headed flying foxes, by increasing levels of orchard culling and by substantially reducing reproductive success.

Literature cited

Collins, L. 1999. Wildlife caring and conservation: the impact of drought on the flying-foxes of the NSW north coast. *Australasian Bat Society Newsletter* **12**: 31-32.

Duncan, A., Baker, G.B. and Montgomery, N. 1999. *The Action Plan for Australian Bats.* Biodiversity Group, Environment Australia, Canberra.

Eby, P. 1990. Seed dispersal and seasonal movements by Grey-headed flying foxes and the implications for management. *In* J. Slack (Ed.) *Flying fox Workshop Proceedings* Pp. 28-32. NSW Agriculture and Fisheries, Lismore.

Martin, L., Kennedy, J.H., Little, L., Luckhoff, H.C., O'Brien, G.M., Pow, C.S.T., Towers, P.A., Waldon, A.K. and Wang, D.Y. 1995. The reproductive biology of Australian flying-foxes (genus *Pteropus*). *Symp. Zool. Soc. Lond.* **67**: 167-184.

O'Brien, G. 1993. Seasonal reproduction in flying foxes, reviewed in the context of other tropical animals. *Reprod. Fert. Dev.* **5**: 499-521.

Ratcliffe, F.N. 1932. Notes on the fruit bats (*Pteropus* spp.) of Australia. *J. Anim. Ecol.* **1**: 32-57.

Slack, J. and Reilly, T. 1994. The economics of orchard netting. *In*. R. Turner (Ed.) *Bird and Bat Control for Horticulture and Aquaculture*. Pp. 42-47. Queensland Department of Environment and Heritage, Brisbane.

Tidemann, C.R., Kelson, S.L. and Jamieson, G. 1997. Flying-fox damage to orchard fruit in Australia – incidence, extent and economic impact. *Austral. Biol.* **10**: 179-186.

Ullio, L. 1992. Flying foxes and fruit growing around Sydney. *In* K. Blade (Ed.) *Proceedings of a Fruit Crop Protection Seminar*. Pp. 8-13. New South Wales National Parks and Wildlife Service, Turramurra.

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- Reports -

Bats & Ecotourism – Developing a Thematic Interpretation

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The Bat Centre at the Naracoorte Caves Conservation Park was opened in October 1995 as a result of the vision and persistence of Brian Clark (the District Ranger). It was a world first in that it allowed visitors to experience the world of the Common Bentwing Bats without actually disturbing them.

As a combined Bat Centre/Blanche Cave tour, visitors spent up to thirty minutes in the Bat Centre. The interpretive emphasis was on the infrared camera technology used to view the bats. The centre was designed with six TV screens placed in a central island that included the guides operating the console. Seating was arranged around the edge of the room to ensure that all visitors would have an equal opportunity to view the live camera output from the Bat Cave. Apart from some basic maps and a few photos the centre presented no other non-guided interpretation.

With the opening of the Wonambi Fossil Centre at the end of 1998, it became apparent that the Bat Centre was in need of a revamp. Fortunately, some funding became available for this purpose. As I was already spending time at the fossil centre, undertaking an evaluation for my ecotourism Honours project, looking at the interpretive possibilities that arose with the revamp of the Bat Centre was a good opportunity for me. The Bat Centre was the right size, scope, subject and location for an exercise in interpretive design.

Developing a thematic interpretation of the Bat Centre

On reviewing the process that had been undertaken in developing and then upgrading the Bat Centre, it was clear that the interpretation was, and still remains, technology driven. I then considered another approach in the interpretation of a wildlife attraction such as the Bat Centre. I had already investigated what other wildlife centres were doing with their interpretation. The camera images at the Bat Centre are an outstanding tool for interpreting these bats. They provide visitors with the opportunity to see something that they cannot see anywhere else – a close up view of how these bats live in their natural environment - without disturbing them. However, what would make this truly unique is how it could

be interpreted in the context of the centre and the tour. By itself, the camera footage does not interpret bat behaviour and is no longer truly unique. For example, it is now possible for someone to view live footage of bats in their cave enclosure at the Washington Zoo on the Internet.

I also thought that it would be really useful to get a handle on public perceptions of bats. One of the really interesting things about trying to present and interpret bats as a wildlife tourist attraction is that, although bats make up almost 25% of all mammals and are found in almost all areas in the world, they are very much an unknown quantity to a lot of the public. In addition, bats have a kind of love-hate relationship with people. As an icon for children, bats feature frequently as cartoon characters and even as one of the best known American crimefighters – 'Batman'. Yet they are frequently on the receiving end of bad press when real bats enter areas frequented by humans. Fears of spreading diseases, bats catching in people's hair, and of vampire bats are not uncommon.

The Australian Museum planned an exhibition about Bats. Part of their planning process entailed undertaking a comprehensive formative evaluation of that exhibition. In the context of this exhibition, a summary of the findings indicated that:

- Bats are fascinating because they are mysterious & unfamiliar
- Bats provoke strong emotional responses
- Bats are associated with darkness & night
- Bats are night creatures that live in caves
- Visitors wanted to see live bats

Specific information about the biology and lifestyles of bats also indicated that visitors wanted to find out:

- how bats fly
- why they hang upside down
- how do they see with sound, ie. echolocation
- where they live, ie. habitats/environments
- bat social structures
- behaviour (feeding, reproduction)

Even though bat interpretation appears to be undertaken by a range of institutions (ie museums, sanctuaries, parks), all of the interpretative programs are highly thematic and actively set about changing the attitudes of their visitors to bats by creating a greater awareness and understanding of bats. The Bat Centre has an added advantage that none of these exhibits have: the ability to view bats in their natural habitat. It would therefore make sense to develop a theme about what it is in the natural habitat that makes this special.

The bats at the centre live in darkness and in a cave. What is about these bats that makes it possible for them to live so successfully in caves? This theme – "A Life in the Dark" - could then focus on those features of the bats that make this possible. These would include:

- Flight
- Echolocation
- Hanging upside down
- Living in caves
- Feeding at night

These could be effectively presented within the Bat Centre as wall panels or recreated models aimed at older people (echolocation picture), and as guided hands-on activities for children. Computer simulations of some of these processes would also be useful, but the current set up of the Bat Tour makes this impractical. As part of a guided tour, any additional interpretive elements must be effective tools for the guides to use to interpret the bats for their visitors.

Future Opportunities

One of the challenges in wildlife interpretation for the future is going to be how to make the best use of the ever-increasing sophistication of both technology and visitors. The growing impact and power of the Internet will open up another level of opportunities. Already it is possible to view live footage of wildlife in zoos.

The Worldlife Centre, currently under planning in the UK, is touted to be the latest in high-tech zoo developments where, to quote William Travers:

> "Three o'clock feeding time at the zoo will be replaced by a satellite link with the Amazonian rain forest, the Great Barrier Reef, Antarctica or Africa and allow people to interact with that environment through our guide on the spot."

The next step is a "sensorium" where virtual-reality technology will allow visitors to see the world as a bat or a spider would. A headset and wired glove will link the human with the image.

Not everyone will agree that this type of experience will adequately replace the type a person has with a live animal. However, one of the main factors in the growth of wildlife tourism and recreational activities is the growing public concern for the environment. There are those (such as Travers) who believe the use of wild animals compromises many of the conservation objectives that these activities are supposed to support. Whatever your viewpoint, it is clear that the there are going to be many opportunities to use technology in the wildlife interpretation. The Bat Centre should be no exception.

References

Croke, V. 1997. *The Modern Ark.* Simon & Schuster, New York.

Kelly, L. 1998 *Evaluation Report Bats Exhibition.* Australian Museum, Sydney.

Effects of fragmentation and tree clearing on insectivorous bats in the eucalypt woodlands of Central Queensland

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Australia is reported to have one of the highest rates of vegetation clearance in the world and much of this occurs in Queensland. However, the effects of tree clearing on the vertebrates of this region are generally unknown. Through the various concerns of stakeholders on local tree clearing guideline workshops, a Natural Heritage Trust (NHT) project was initiated in winter of 1998 to determine the effects of fragmentation and tree clearing on vertebrates in Central Queensland. Recommendations from this work would then feed back into tree clearing guidelines for the region. Surveys targeted the poplar box / brown's box (*Eucalyptus populnea* / *E. brownii*) and silver-leaved ironbark *(E. melanophloia*) woodlands as these are the most widespread and extensively cleared communities in Central Queensland. These woodlands originally comprised around 30% of the region, although by 1997 just over 1 million hectares had been cleared, leaving an area of 810,000 hectares or 43% remaining.

A range of site types were selected which represent the size and configuration of remnants which are being retained at the property level in Central Queensland. Sites types included large (2000 ha.), medium (50 - 300 ha.) and small remnants (5 - 20 ha.), linear strips (50 - 150 m. wide) and Eucalypt regrowth and pasture sites. Between five and 8 replicates of each site type were chosen totalling 60 sites. Insectivorous bats were sampled at all sites (and seasonal replicates conducted for half of these sites) using the Anabat ultrasonic detection method. Bats were also trapped opportunistically around the region. Field surveys were completed early February 2000. Analysis will attempt to determine the effect on insectivorous bats of converting eucalypt woodland to pasture, the effect on species of converting large continuous forest to small isolated remnants, and whether vegetation structure and remnant condition is affecting the suitability of habitat for species.

The support of the Queensland Environmental Protection Agency (Juliana McCosker), Griffith University (Dr. Carla Catterall), Queensland Herbarium (Dr. Rod Fensham), Queensland Museum (Jeanette Covacevich and Patrick Couper), and the Parks and Wildlife Commission of the Northern Territory (Dr. John Woinarski) is acknowledged.

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TOLGA BAT RESCUE 1999

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Tolga is a small town 3 kms north of Atherton and 90 kms by road from Cairns in Tropical North Queensland, Australia. Tolga Scrub is a fragment of the endangered type 5b rainforest, about 1 km by 150 metres in size. It is bordered by a main road, a caravan park, an industrial estate and a brand new enormous powerline! Prime bat real estate! It is home to, some would argue, the equally endangered Spectacled flying fox. The Spectacled flying foxes wintered over at Tolga again this year and we have had bats admitted to the bat hospital throughout the year. The Little Red flying foxes also visit Tolga Scrub but only periodically. They visited in small numbers in November, unlike last year, when they visited three times in much larger numbers. The Little Reds visited Mareeba township instead, causing a fracas that subscribers to Batline will be aware of. The March and November 1999 census data showed there were about 5000 Spectacleds at Tolga Scrub. The other colonies on the Atherton Tablelands did not fare so well. For the first time in living memory, the Spectacleds did not return to three traditional maternity colonies and in only small numbers to two others.

Tick paralysis, orphans and cleft palates

This has been a good year for tick paralysis thanks to the southern oscillation index. We have had lots of rain, which for unknown reasons means that the paralysis ticks and the Spectacled flying foxes have a lot less contact. We found 58 live adults with tick paralysis and 22 dead ones. Last year, we recovered 200 and 100, respectively. Of the 51 live adults (7 were euthanased), 41 were female – 30 with babies, 11 without, three of which were pregnant. There were only 10 males. Eleven of the 22 dead were females with babies, though most of the babies were still alive. It would appear that the colony is breeding well. Only 8 of the 22 dead were males. We had a German volunteer for one week and a Sydney volunteer for one week. Fortunately we have some terrific local volunteers.

Tick paralysis season (October and November) is also birthing season. There were 14 live lone babies, 33 dead and four with cleft palates. Most of the dead babies were abandoned babies recovered late in the season. Unfortunately, these older babies do not usually fall to the ground until they are dead. We will have about 60 orphans for release – babies from Tolga, Ingham, Daintree, Rockhampton Zoo and Cairns areas.

It is difficult to compare the statistics for birth defects this year to last year's numbers. Last year, we were in the Scrub twice a day during the main birthing time as there were a large number of adults with

tick paralysis. This year we only checked every 2 or 3 days, which is sufficient time for these babies to have been scavenged. We had 4 babies this year with severe cleft palate compared to 30 last year.

Fund-raising and Education

We have T-shirts and posters for sale as well as running a bed and breakfast, Pteropus Guesthouse, for people interested in wildlife. We have had several famous chiroptologists as guests already! National Parks have given us a 3 year permit for the display of flying foxes at the hospital, as well as a separate 3 year education permit for work in the community.
The education work is very broadly based. It includes:

* A website at www.athertontablelands.com/bats

* Printing of two posters, *Flying foxes of the Atherton Tablelands* and *Tolga Bat Rescue*. A third, *Microbats of the Atherton Tablelands*, is also planned.

* Education days with schools, tree-planting groups, vacation care groups, wildlife rescue groups and National Parks groups and education stalls at local markets as well as permanent displays at the local tourist information centre.

* Planning the development of educational material and curriculae on bats for children 6-8 years old with the local Education Department's Tinaroo Environmental Centre.

* Planning of the development of educational material about fruit bats with a joint community/National Parks tree planting group. This group plans to educate the public about the important role of fruit bats, cassowaries and musky rat kangaroos as the principal dispersers of rainforest seed.

Along with the University of Queensland bat people, we were involved in the making of a film for National Geographic at the end of 1998 that has not yet been released. It is part of a series called 'Mission Wild'. Most recently, we were visited for a story on flying foxes that will appear in magazines for Australian Geographic and the Smithsonian Institute. I think most of the bat people (and their local bats!) from Sydney north to Cape Tribulation were involved in this story. There were also another four freelance international photographers/photojournalists who visited in 1999.

We are now all waiting for the March census of Spectacled flying foxes in the Wet Tropics.

Deep North Bat News

Chris Clague and Olivia Whybird

Things have been relatively busy over the last months in Far North Queensland, so we thought we would let you know what has been happening in the deep North. We have officially set up an environmental services business specialising in bats, which we have named Phoniscus. One of our first projects was to gate a number of old (1880's) gold mines in the Goldsbourgh Valley near Cairns. These mines contain *Hipposideros ater* (Dusky Leafnosed Bats), *Rhinolophus megaphyllus* (Eastern Horseshoe Bat), *Miniopterus schreibersii* (Common Bent-wing Bat) and *Rhinolophus philippinensis* (Large-eared Horseshoe Bat). The project has been a great success with all of the gates installed working for all of the species present and it has allowed us to experiment with different designs which has prompted the design of a new style of gate. We have further developed a trial gate system that allows the testing and experimentation with design, and we have used this at every mine before constructing the final metal gate to ensure that all species present will use the gate. The new style of gate developed reduces the amount of metal 'visible' to the bats and thus has reduced the instances of balking as bats approach it. It is also refreshing to note that the number of bats using the voids has increased, perhaps due to the decrease in human visitation to these sites. Bruce Thomson has visited the mines for media photo opportunities (Courier Mail) and went into a photographic frenzy involving bats leaving some of the many local voids. Chris has now completed the fieldwork for his PhD and is oscillating between writing up in Brisbane (University of Queensland, Vision Touch and Hearing Research Center) and business commitments in North Queensland. The November 1999 Flying-fox census has been completed. Most people thought that the flying fox numbers would be declining due to the large number of significant threatening processes which are affecting the population. However, the measured 35% decline in population size over 12 months (Nov. 98 to Nov. 99) was much larger than anyone expected. Hopefully this was just a particularly bad year. See the report in this issue for further information. Roger Coles of the University of Queensland is now based on Thursday Island in the Torres Straits and has been visiting numerous islands in the region looking for bats. He has made some interesting observations including: the possible rediscovery of *Saccolaimus saccolaimus* (Bare-rumped Sheath-tailed Bat), a large colony of *Miniopterus schreibersii* (Common Bentwing Bat) roosting in an old World War II bunker, a maternity colony of *Taphozous australis* (Coastal Sheathtail Bat) in the lower mine on Possession Island, as well as many cave roosts around the Albany Passage.

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Clarifying the advocacy role of the ABS

At the 1996 AGM at Naracoorte, members of the ABS passed a motion that the Society should act as an active advocate for the conservation of bats. While there was overwhelming agreement that the ABS should participate in advocacy, the form that participation should take was neither debated nor agreed. These deliberations were left to the Executive (see President's Report, ABS Newsletter, September 1999). Over the past few years, some significant conservation and management issues have arisen and the Executive has responded in ways it felt were appropriate; being mindful of the potential for advocacy to be divisive within the Society, the limited time and resources available to the Executive and the legal implications of taking a public stance on controversial matters. Some members have expressed the view that the ABS has been too tentative in its response to conservation issues. Others have felt it was too outspoken.

We would like to discuss and clarify the advocacy role of the ABS at the 2000 conference and AGM, and put forward the following set of motions as a starting point. These motions propose a two-tiered system of advocacy in which a distinction is made between the provision of information about bats and the expression of an advocacy position or opinion by the ABS. We propose that the Executive be given the authority to provide information (based on current research) on any topic relating to bats without the approval of the members. The Executive should be given discretion to provide this information to any agency or person it believes is relevant. However, the Executive should not have the authority to make a statement of opinion without the approval of members. Such statements would only be made where members have agreed to Position Statements covering the topic.

In early 1999 three Subcommittees were established to provide a forum for developing Position Statements in areas known to be controversial: Bats in mines and other structures, Viruses and Flying-fox camps. Deliberations on these are continuing, and when finalised the outcomes will be put to members for a vote and those that are agreed will form the basis of ABS positions on these topics.

A hypothetical example to illustrate the proposed two-tiered system of advocacy:

Big Bad Mines, Inc. announces that they are going to blow up a mountain in Tasmania that contains the only known maternity colony of the Greater Lesser Pie-eyed Bat. The ABS Executive, without reference to the members could send to the relevant Ministers, government departments, mining company and the general public information on why the mountain is (or is not) vital to the species and what the likely implications of this action would be, given current understanding of the biology of the GLP-EB. However, as not all members of the Society might think this is a bad thing, the communication could not state that, in the opinion of the ABS, the fireworks should not proceed unless an agreed Position Statement regarding the preservation of cave roosts supported that statement.

Draft Motions:

1. That the ABS Executive will, on behalf of the ABS, act as an advocate for bat conservation by communicating with government authorities and the community in general.

2. That advocacy by the ABS Executive will take the form of either the provision of information on bats and situations that affect bats, or an expression of the advocacy position or opinion of the ABS.

3. That the ABS Executive will confine its communications to the provision of information except where an ABS Position Statement covering the relevant topic has been agreed by the members.

4. That the Executive will take reasonable care in determining the accuracy of information on bats and situations that affect bats before they disseminate it, and this it will do by reference to known scientific (and other) authorities and references.

5. That the Executive has the authority to provide information on bats and situations that affect bats and express the position or opinion of the ABS, in situations where a Position Statement has been approved, to Government authorities and the general community, without requiring specific approval from the membership on each issue.

6. That all communications relating to advocacy, from the ABS Executive to external recipients must have the written or verbal approval of a majority of the Executive, be on ABS letterhead and be signed by a member of the Executive. Communications that do not conform to these protocols will not be communications from the ABS.

7. That all communications relating to advocacy from the ABS Executive to external recipients must be filed by the Secretary and made available to any member of the ABS at the following AGM or on demand.

If you will not be at the AGM but would like to vote on these motions, please use the enclosed proxy form.

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- Contacts / NetWork / News -

Two well-known bat people receive Australia Day Awards

Helen Luckhoff and Lana Little both recently received Australia Day Achievement Medallions from the Queensland Environmental Protection Agency.

There are few people in ABS who are not familiar with Helen Luckhoff's name. Many of us are aware of her considerable contributions to our knowledge of flying-foxes and of her dedication to the caring of orphan and injured wildlife. Helen arrived in Australia from South Africa in 1970 and shortly afterwards came across her first orphaned flying-fox. This quickly led to a passionate involvement in the caring for orphaned and injured flying-foxes and other wildlife. Helen was one of the co-founders of the Orphan Native Animal Rear and Release Programme (ONARR) and is their co-ordinator for flying-fox rehabilitation.

Helen has contributed substantially to the understanding of the raising of, and caring for flying-foxes and has been particularly helpful to researchers at the University of Queensland and Queensland DPI. As a result of her contributions and knowledge, Helen has been a co-author on a number of scientific articles on flying-foxes. She was one of the first to recognise the importance of de-humanising and educating orphan flying-foxes prior to their release into the wild. Helen was invited to Guam to advise the Department of Fish and Game on rearing orphan young and caring for injured adults. Her activities in community wildlife welfare have resulted in Helen being a key advisor for the EPA's Code of Practice for the care of orphaned, sick and injured protected animals by wildlife care volunteers.

Helen Luckhoff with some of the many flying-foxes who have benefited from her experience as wildlife rehabilitator.

Lana Little is the District Ranger at Chillagoe and is known to all bat researchers who travel north and west of Cairns. Her knowledge of this area is exceptional and Lana's assistance has often been the saviour of many bat expeditions, whether through helping with a vehicle break-down, cave locations or an introduction to a property owner. Lana has an extensive knowledge of the above and underground animals, plants and geology of the Chillagoe and Mitchell/Palmer Rivers limestone outcrops in northern Queensland. As well as all her other duties as district ranger, Lana has been involved with locating and counting colonies of a number of bat species in northern Queensland, including Ghost bats, Diadem horseshoe bats and both species of Bent-winged bats.

Lana's award reflects recognition of the dedication and personal effort that she has put into understanding, caring for and managing her patch of the world.

The Australasian Bat Society would like to congratulate both of you on your very well deserved awards.

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FLOWERING EUCALYPTS ON THE WEB

Results from a long-term study on the flowering patterns of eucalypts will be published in Austral Ecology (formerly Australian Journal of Ecology) early in 2000. This research was carried out by State Forests of NSW over a 10-year period. Sites were located between Coffs Harbour and Grafton on the NSW mid-north coast. Actual flowering patterns of 20 study species as well as a project summary are now available on the State Forest of NSW Internet site at:

http://www.forest.nsw.gov.au/Frames/f_research.htm

Brad Law

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What's happening to the cave bats?

In January of this year, I joined with a cast of thousands led by Terry Reardon and seeking to count the Common Bent-wing Bat *Miniopterus schreibersii* population of the Bat Cave maternity site at Naracoorte, SA. We essentially arrived at three somewhat worrying findings - all the evidence suggests there has been a significant decline in the numbers of bats present, the roosting pattern of the population has changed and the incredibly rich guanophilic invertebrate community of the cave floor has virtually disappeared.

Having since made inquiries about other populations, there are a few other issues :

- At Warrnambool, Vic, we already knew that the Thunder Point site had a rock collapse which meant the site could no longer serve as a maternity site. Lindy Lumsden and Paul Gray have found some 12,000 adults in residence at Starlight Cave which has a less than optimal structure and plans are in hand to close a couple of roof windows to improve this site.
- At Nowa Nowa, Vic, where Tony Mitchell keeps a good eye on bat populations, numbers seem to be relatively stable, but again the bats have shifted the maternity population to a different roost site within the cave.
- In NSW several people have suggested that the numbers have declined, but we lack systematic evidence on this. Roosting patterns appear to have changed at Bungonia.

Then at Murra-el-elevyn on the Nullarbor, which is a major maternity site for Chocolate Wattled Bat *Chalinolobus morio*, Alan Poore of the WA Speleological Group reported finding several hundred dead bats on the floor on 20th January.

Given this much evidence of actual or potential instability of bat communities, it seems we would be well advised to ensure that continuing scrutiny and monitoring of cave bat populations should be put in place. Neville Michie, who joined in the Naracoorte exercise, is looking at developing simple electronic instrumentation for monitoring - but the key need is for a person to take responsibility for each of the key sites.

There will be a brief meeting during the Hunter Valley conference to discuss this. Do let me know if you are interested, particularly if you are unable to come to the conference.

Elery Hamilton-Smith.
elery@alexia.net.au
P.O. Box 36, Carlton South, 3053

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NEW BAT ROOST BOX PROJECT IN MORWELL NATIONAL PARK, VICTORIA:

VOLUNTEERS NEEDED

A group from the Latrobe Valley Field Naturalists is initiating a project to set up bat roost boxes in Morwell National Park to be launched on 26 February 2000. The project is funded and is to be managed by the West Gippsland Catchment Management Authority.

The first step has been to decide on roost box designs, where to set them up, how many boxes to install and a general plan for a monitoring program. The next step is the launch, to be followed by regular monitoring, which may occur quarterly or more often, depending on the availability of interested volunteers.

What is needed for follow-up is a qualified bat-bander who is licensed to handle bats and able to identify species, in case the project succeeds in attracting microbats to roost in the boxes. This would enable the project volunteers to learn about bat identification and would also make it possible to develop the project further. With the advice of a bander, volunteers could then decide on whether the box designs are attracting a satisfactory range of species, offer an adequate variety of summer and winter roosts, and whether it is worth spending money and time to widen the project to set up more boxes.

The project is modelled on a very successful roost box project at Organ Pipes National Park, conducted by Friends of Organ Pipes and Natasha Schedvin.

If anyone is interested to volunteer for such a project, please contact:

Rob de Souza-Daw
23 Manuka St.
Churchill 3842
Telephone: 03 5122 1946.

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Recent Literature

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

Birt, P. and Markus, N. 1999. Notes on the temporary displacement of *Pteropus alecto* and *P. poliocephalus* by *P. scapulatus* within a daytime campsite. *Australian Mammalogy* 21: 107-110.

Brigham, M. R. and Geiser, F. 1998. Seasonal activity patterns of two species of *Nyctophillus* bats based on mist-net captures. *Australian Mammalogy*, 20: 349-352.

Field, H., McCall, B. and Barrett, J. 1999. Australian bat lyssavirus infection in a captive juvenile Black flying-fox. *Emerging Infectious Diseases* May-June 1999, 5(**3**): 438-440.

Halpin, K., Young, P.L., Field, H. and Mackenzie, J.L. 1999. Newly discovered viruses in flying-foxes. *Veterinary Microbiology* Aug. 16, 1999, 68(**1-2**): 83-87.

Hamilton-Smith, E., Flavel, S. & Reardon, T. 1997. Potential wealth and great optimism: Mining bat guano in the Flinders Ranges. *Proceedings 21st Conference, Australian Speleological Federation*, pp.16-22.

Herr, A. and Klomp, N. I. 1999. Preliminary investigation of roosting habitat preferences of the large forest bat *Vespadelus darlingtoni* (Chiroptera, Vespertilionidae). *Pacific Conservation Biology* 5: 208-213.

Law, B.S. and Anderson, J. 1999. A survey for the Southern Myotis *Myotis macropus* (Vespertillionidae) and other bat species in Red River Gum *Eucalyptus camaldulensis* forest of the Murray River, New South Wales. *Australian Zoologist* 31: 166-174.

Law, B.S. and Lean, M. 1999. Common blossom bats (*Syconycteris australis*) as pollinators in fragmented Australian tropical rainforest. *Biological Conservation* 91: 201-212.

Lumsden, L. F., and Bennett, A. F. (2000). Bats in rural landscapes: a significant but largely unknown faunal component. pp. 42-50. In *Balancing Conservation and Production in Grassy Landscapes. Proceedings of the Bushcare Grassy Landscapes Conference, Clare, South Australia, 19-21 August 1999.* T. Barlow and R. Thorburn, eds., Environment Australia, Canberra.

O'Donnell, C. F. J., and Sedgeley, J. A. (1999). Use of roosts by the long-tailed bat, *Chalinobus tuberculatus*, in temperate rainforest in New Zealand. *Journal of Mammalogy* **80**: 913-923.

Palmer, C., and Woinarski, J. C. Z. (1999). Seasonal roosts and foraging movements of the black flying fox (*Pteropus alecto*) in the Northern Territory: resource tracking in a landscape mosaic. *Wildlife Research* **26**: 823-838.

Reddacliff, L.A., Bellamy, T.A., and Hartley, W.J. 1999. *Angiostrongylus cantensis* infection in Grey-headed fruit bats (*Pteropus poliocephalus*). *Australian Veterinary Journal* 77(7): 466-468.

Sanderson, K.J. and Kirkley, D. 1998. Yearly activity of bats at Belair National Park in Adelaide, South Australia. *Australian Mammalogy* 20: 369-375.

Sedgeley, J. A., and O'Donnell, C. F. J. (1999). Roost selection by the long-tailed bat, *Chalinolobus tuberculatus*, in temperate New Zealand rainforest and its implications for the conservation of bats in managed forests. *Biological Conservation* **88**: 261-276.

Shilton, L.A., Altringham, J.D., Compton, S.G. and Whittaker, R.J. 1999. Old world fruit bats can be long distance fruit dispersers through extended retention of viable seeds in the gut. *Proceedings of the Royal Society of London Series B – Biological Sciences*, pp. 219-223.

Start, A.N. 1998. Do rainbow lorikeets evict bats? *Western Australian Naturalist* 22(**2**): 1323-124.

Vardon, M.J. and Tidemann, C.R. 1999. Flying-foxes (*Pteropus alecto* and *P. scapulatus*) in the Darwin region, north Australia: Patterns in camp size and structure. *Australian Journal of Zoology* 47(**4**): 411-423.

Wilmer, J.W., Hall, L., Barratt, E. and Moritz, C. 1999. Genetic structure and male-mediated gene flow in the ghost bat (*Macroderma gigas*). *Evolution* 53(**5**): 1582-1591.

AUSTRALASIAN BAT SOCIETY
MEMBERSHIP APPLICATION/RENEWAL FORM

The Australasian Bat Society was conceived at the 4th Australian Bat Research Conference (Brisbane 1991) and became an incorporated society in 1998. The ABS unites people with a common interest in this unique fauna. Whether they be researchers, naturalists, foster-carers or fruit-growers, everyone benefits from our unification. By presenting a united front to assist the resolution of conservation problems, or to lobby politicians, or simply spread the good word to the public, the goals of the ABS are conveyed more efficiently than through individual effort. Every second year the ABS arranges the Australasian Bat Conference. Communication is promoted through a bi-annual newsletter, which contains research news and notes, and our web page on the Internet - http://batcall.csu.edu.au/batcall/abs/welcome.htm

Further information on membership can be obtained from the Membership Secretary:
Lindy Lumsden, PO Box 137, Heidelberg, Victoria 3084, Australia.
Phone No. (03) 9450 8694. E-mail <Lindy.Lumsden@nre.vic.gov.au>

MEMBERSHIP FORM FOR THE AUSTRALASIAN BAT SOCIETY

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

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

Address:.....

.....

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

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

Email address: .....

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

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

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

Signed: .....

My payment by cheque/bank draft for Aust$..... is attached, **OR**

Please debit my Bankcard / Mastercard / Visacard the amount of Aust$ .....

My card number is: __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ __ Expiry date .....

Cardholder's Name .....

Signature .....

Table of Contents